Department of Computer Science and Engineering

The Department of Computer Science & Engineering was initiated in 1980 and the first B.Tech. batch graduated in 1982. Apart from being the department producing the first batch of graduates in Computer Science and Engineering amongst the Indian Institutes of Technology, this is one of the most reputed centers for Computer Science education and research in the country.

The hallmarks of the department are in the breadth of its academic curricula and diversity in fundamental research and industrial collaborations. Collaborative research is ongoing with researchers in internationally acclaimed universities and research institutions abroad and in India such as USC, TIFR Mumbai, ISI Kolkata, RRI Bangalore, Perimeter Institute of Theoretical Physics, and SAC Bangalore. The Department has long-term research partnerships with leading companies such as Intel, National Semiconductors, Microsoft, General Motors, Synopsys, Sun Microsystems and Texas Instruments.

The alumni of this department are well established all over the globe achieving excellence in professional fields as well as in academics and research, and holding positions of rare distinction in leading industries and academic institutions of the world.

The Research Scholars Day is an Annual event to bring together the research students and faculty and provides a forum for the researchers to share their work and helps in recognition, feedback and possibly collaborations. The Sixth Research Scholar Day of the Computer Science & Engineering Department, IIT Kharagpur is being held on 8th April 2017. I hope this event will bring together the students and faculty researchers from different areas together so that they can learn and appreciate the diverse research activities in the Department. We are looking forward to strengthening the research culture in the Department. Apart from doing significant research and publishing in good fora, researchers must participate in listening to other researchers. A vibrant peer group and exposure to talks by great researchers play a positive role in shaping the budding researchers. I wish such events will help in encouraging the research scholars to work harder and better and bring the community of research students and teachers together.

Sudeshna Sarkar
Head of the Department

PhD Scholars

Abantika Pal

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Joined the department in: December 2014

Supervisor: Dr. Pralay Mitra

Abantika is a PhD Scholar at IIT Kharagpur in Computer Science and Engineering Department. Her PhD work is supervised by Dr. Pralay Mitra. Her research interests mainly include Bioinformatics and Computational biology. She is currently working on the problem of Protein Interactor Discovery. She has received M.E. degree from the Department of Computer Science Engineering, Jadavpur University and received a B.Tech. degree from Academy of Technology. She has one year of teaching experience as teaching assistant in Computer Science Engineering Department, Jadavpur University. She has worked in Cognizant Technology Solutions as Programmer Analyst Trainee in .Net Technology. She has also worked in Tata Consultancy Services as Assistant System Engineer Trainee in Java Technology.

Protein Interactor Discovery

We are trying to develop a method that will check whether a protein complex will crystallize or not. If not then who else should partner with the existing protein molecule so that it will be crystallizable. We are testing the co-crystallizability of a protein complex using the knowledge of the protein-protein/ligand docking algorithms. For unsuitable cases, our plan is to design the complementary partner that will initiate and stabilize crystallization process.

Abhijit Mondal

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Joined the department in: September 2015

Supervisor: Dr. Sandip Chakraborty

Abhijit Mondal received B.tech. degree in Computer Science & Engineering from Kalyani Govt. Engg. College in 2010. He joined Department of Computer Science and Engineering of Indian Institute of Technology Guwahati in 2010 and received M.Tech degree in July, 2012. From October 2012 to July 2015, He worked as Member of Technical Staff in Veveo India Pvt. Limited. He joined research program in Deportment of Computer Science & Engineering of Indian Institute of Technology Kharagpur in July 2015. Since then he have interest in Wireless Network.

Computer networking and wireless networks

His primary research area is computer networking and wireless networks. Currently, he is working with a flexible, lightweight transport protocol. This protocol will be able to use all the interface available to a device. It can smartly decide which interfaces it can use to save energy while maximizing throughput. Another project he is working with is wireless relay network. In this work, he is trying to design ad-hoc relay to connect two remote location only using the wireless network. It will solve the problem of setting up the connections with wire. It is easy to deploy and maintenance.

Abhijnan Chakraborty

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Joined the department in: July 2014

Supervisor: Prof. Niloy Ganguly

Abhijnan Chakraborty is a PhD scholar in the Department of Computer Science and Engineering at IIT Kharagpur working under the supervision of Prof. Niloy Ganguly. He is the recipient of Google India PhD Fellowship in Social Computing in 2014. He has been awarded Prime Minister's Fellowship for Doctoral Research in 2015. Prior to joining PhD, he was working at Microsoft Research (MSR) India for around two years. Abhijnan has obtained M.Tech. in Computer Science and Engineering from IIT Kharagpur in 2012 and B.E. in Information Technology from Jadavpur University in 2009. His research interests broadly lie in Networked Systems, particularly online social networks and mobile networks. He has published papers in top venues like Mobicom, ICWSM, and Hypertext etc.

Designing Information Retrieval Systems Optimized to Users' Sampling Strategies

Due to the enormous amount of information being carried over online systems, most users take the help of Information Retrieval (content recommendation, search or ranking) systems to find important information. Because of the churn in information popularity in such systems, the emphasis is on receiving information in real-time. Almost all of the current Information Retrieval (IR) systems emphasize content's "recency" over content's "relevance or long-term popularity", e.g.

    i.   News websites are getting updated almost every hour to show breaking news.

    ii.   Twitter, Facebook, Google+ are showing trending topics every half-an-hour or so.

A user who is sampling (i.e. logging into) these websites at time t, is only getting top K most popular information, computed based on the instantaneous popularity of all the information at time t. But, there is a limit on the amount of information the user can process (depends on her idle time as well as cognitive limit) e.g. one can read at most 100 news stories a day. There is a notion of timeliness associated with information - one would want to know about some event soon. While looking back at the end of a significant time period (say a week or a month or a year), the user must not miss any information which was really important (or popular) during that period. Faced with the above constraints, the user is following an ad-hoc sampling rate. As the IR system designers want the users to come back more often on their system to get more eyeballs, the IR systems are becoming more temporal. Their time window of showing top K popular information is thinning gradually forcing the user to sample more. As the sampling rate is approaching the limit for the user, she is feeling exhausted and gradually becoming inactive on that particular system. In this work, we want to first systematically measure the effect of such frequent information change in the IR systems and investigate efficient sampling strategies for content published in such online systems. Finally, we want to design IR systems which honor individual users sampling strategies, yet maximize coverage over information with "long-term importance" and minimize the delay in getting such information.

Abhik Jana

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Joined the department in: January 2015

Supervisor: Dr. Pawan Goyal

I am a Ph.D. student in the Department of Computer Science and Engineering, IIT Kharagpur, since Jan 2015. My supervisor is Dr. Pawan Goyal. My basic interest lies in the study of Natural Language Processing, Cognitive Computing.

Novel Word sense detection and Wikification of scientific articles

Novel Word sense detection - Word sense discovery methods, attempt to discover novel senses by comparing sense clusters across two time-periods. For sense induction, one can use a distributional thesauri based network from a large dataset such as Google syntactic n-grams. After clustering the network for each target word, different clusters for the target word are considered to denote various senses. Such sense clusters can be constructed across various time-points and new senses can be discovered by comparing the two sets of clusters. On manual inspection, however, it appears that each "new sense" cluster does not always necessarily indicate a sense . Our proposal is to use network properties to enhance the existing framework to detect the word sense change more accurately. We take the words in the sense cluster of a particular target word as an ego network for that word, and measure the network properties across different time points for this ego network. We see that it helps to improve the accuracy of novel word sense detection.

Wikification of scientific articles - In order to disseminate the exponential extent of knowledge being produced in the form of scientific publications, it would be best to design mechanisms that connect it with already existing rich repository of concepts -- the Wikipedia. Not only does it make scientific reading simple and easy (by connecting the involved concepts used in the scientific articles to their Wikipedia explanations) but also improves the overall quality of the article. We propose a novel metapath based method, WikiM, to efficiently wikify scientific abstracts . Motivations for this work comes from the observation that, wikified abstracts of scientific documents help a reader to decide better, in comparison to the plain abstracts, whether (s)he would be interested to read the full article.

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Abir De

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Joined the department in: July 2012

Abir De got his B.Tech in Electrical Engineering and M.Tech in Control System Engineering (Dual Degree) both from Dept. of Electrical Engineering of IIT Kharagpur in 2011. He has been a research scholar in the department of Computer Science & Engineering, IIT Kharagpur since 2012. His research interests are in the area of Complex Networks, specifically in Online Social Networks.

Supervisor: Prof. Niloy Ganguly with collaboration from Prof. Soumen Chakrabarti (IIT Bombay)

Link Prediction in Social network

In link prediction (LP), a graph mining algorithm is presented as a graph, and has to rank, for each node, other nodes that are candidates for new linkage. LP is strongly motivated by social search and recommendation applications. LP techniques often focus on global properties (graph conductance, hitting or commute times, Katz score) or local properties (Adamic-Adar and many variations, or node feature vectors), but rarely combine these signals. Furthermore, neither of these extremes exploit link densities at the intermediate level of communities. We attempt to describe a discriminative LP algorithm that exploits two new signals. First, a co-clustering algorithm provides community level link density estimates, which are used to qualify observed links with a surprise value. Second, links in the immediate neighborhood of the link to be predicted are not interpreted at face value, but through a local model of node feature similarities. The resulting predictor is simple and efficient. In our work we try to evaluate the new predictor using five diverse data sets that are standard in the literature.

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Alapan Kuila completed his B.Tech. in Computer Science and Engineering from St Thomas' College of Engineering and Technology, Kolkata in 2013. He received his M.E. degree in Computer Science and Engineering from Jadavpur University in 2015. From November 2015 till June 2016 he worked in the Dept. of Computer Science and Engineering, Jadavpur University, Kolkata, as a Junior Research Fellow. Since July 2016, he has been a research scholar in the department of Computer Science and Engineering, IIT Kharagpur. His research interests includes Machine Translation, Natural Language Processing and Deep Learning .

Neural Machine Translation

Advances in machine learning including unsupervised learning have made it possible to design NLP systems for low resource languages. My specific interest is to work on Machine Translation involving Indian languages involving both formal texts and code-mixed languages. We wish to work with methods to compensate for the availability of annotated parallel corpus by using linguistic resources and monolingual data. I am interested in applying state of the art Neural Machine translation methods.

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Amit V. Nandedkar

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Supervisor: Prof. Jayanta Mukhopadhyay, Prof. Shamik Sural

Amit V. Nandedkar received his B.E. (Computer Science & Engg.) degree in 2001 and M.E. (EC specialization in Computer Technology) degree in 2004 from S.R.T.M. University, Nanded, (M.S.). He joined the SGGS Institute of Engg. & Technology, Nanded as a lecturer in June 2004. Since July 2013 he has been a QIP research scholar in the school of Information Technology.

Document Image Processing & Retrieval

The primary objective of this research work is to develop novel algorithms for document image retrieval and evaluating their performance. The task also includes development of various preprocessing and segmentation techniques for document images, e.g. separation of text and graphics, detection of stamps, logos, and signatures.

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Sanskrit Computational Linguistics

The bulk of the Sanskrit literature is written in the form of poetry (Shloka), primarily owing to the traditional use of free word order enriched with various metrical patterns in sentence constructions. However, the peculiarities of such constructs render the state-of-the-art NLP techniques often inept at the task and a full-fledged parser is required to handle the shlokas. Similarly, In Sanskrit texts, it is common to find challenges due to rich inflectional morphology, phonetic sound joins across word boundaries (Sandhi) etc. My research problem currently revolves around building tools that can handle syntactic constructs in Sanskrit.

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Anandarup Mukherjee
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Supervisor: Dr. Sudip Misra

Anandarup Mukherjee is currently pursuing PhD in Engineering, from Indian Institute of Technology, Kharagpur (IIT Kharagpur). His current designation is Senior Research Fellow (SRF) and he is engaged with both the departments of Computer Science and Engineering as well as Agriculture and Food Engineering (AgFE) at IIT Kharagpur. He volunteers as a part of the Membership development team at the IEEE Student branch at IIT Kharagpur. He finished his M.Tech and B.Tech from West Bengal University of Technology in the years 2012 and 2010, respectively. He has served as an Assistant professor in the department of Electronics & Communication Engineering at University of Engineering & Management, Jaipur (2012-2014); prior to that he served as a lecturer in the department of Information technology at Institute of Engineering & Management, Kolkata (2011-2012).

Networked Robots

The various challenges faced during development of a networked robot-centric architecture are being addressed. The robots range from basic ground-based rovers to micro and macro aerial rovers and platforms. These robots are controlled over the network.

Anirban Santara
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Supervisor: Dr. Pabitra Mitra

Anirban graduated from the Department of Electronics and Electrical Engineering, IIT Kharagpur in 2015 and joined Direct PhD program in the Department of Computer Science and Engineering, IIT Kharagpur. His prime area of focus is Machine learning with Artificial Neural Networks (Deep Learning). Currently he designs task-specific deep learning architectures and learning algorithms for a number of applications like image understanding, speech recognition, natural language understanding, and medical image analysis, remote sensing and climate data-mining. He is the coordinator of the reading sessions of the newly formed Deep Learning Research Group.

Multi-modal Deep Learning

Search for a vector space where every point represents a concept along with its physical (visual), spoken and textual descriptions.

Antonio Anastasio Bruto da Costa
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António Anastásio Bruto da Costa received his Bachelor of Engineering degree in Computer Engineering from Goa Engineering College, Goa University, Goa in 2010, and the M.Tech. degree in Computer Science and Engineering from Indian Institute of Technology, Kharagpur in 2014. He holds the State Gold Medal (B.E, 2010) and was awarded the Institute Silver Medal (M.Tech, 2014). From July 2010 to May 2012, he worked as a Software Engineer at Persistent Systems, Verna - Goa. In January 2014, he worked as an Intern at Texas Instruments, Bangalore. Since July 2014, he has been a research scholar in the department of Computer Science & Engineering in IIT Kharagpur. His research interests are in the areas of Formal Verification of Hybrid Systems.

Hybrid behavioral modeling

Hybrid behavioral modeling is an essential step in the design of switched electronic control systems. A formal analysis of such models helps in arriving at provably correct design parameters that are sufficient to guarantee that the design will meet the necessary functional requirements. Often such analysis needs to look beyond functional correctness to evaluate the margins of behavioral attributes. Our notion of features addresses this requirement. The syntactic fabric of our feature definitions enjoys similarity with assertion languages; however, unlike assertions, the consequent of features are real valued expressions representing the feature value. We have done extensive work in the formal analysis of features for hybrid models of AMS designs. We now have methodologies for abstract interpretation of features over hybrid automata models, leveraging reachability solvers for extracting feature ranges formally, for developing feature-accurate simulatable AMS behavioural circuits, and further demonstrating how Satisfiability Modulo Theory (SMT) solvers can be used for extracting behavioural traces corresponding to corner cases for various feature design attributes.

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Joined the department in: July 2015

Anupam Khan has received his B.E. in Information Technology from National Institute of Technology, Durgapur in 2006. From June 2006 till May 2008, he worked as Associate Systems Engineer in IBM India Pvt. Ltd., Kolkata. Since May 2008, he is working with Indian Institute of Technology Kharagpur. He received the M.S. degree in Industrial and System Engineering from Indian Institute of Technology, Kharagpur in 2011. He has joined as a research scholar in Computer Science and Engineering, IIT Kharagpur in July 2015. His research interest is in the area of Data Mining with a particular focus on the application in educational domain, especially student performance modelling.

Analysing the student performance in education system

Analysing the student performance is one of the most explored research topic in education system. Researchers are primarily trying to model the student performance with the help of their CGPA, internal course assessment, social background etc. However, performance may not depend only on student; there are many other external influential factors involved in the knowledge dissemination process. With the availability of large scale digital data, these factors may be explored in educational data mining (EDM) context. Most of the proposed methods in EDM literature model student performance in such a way that it can predict student performance in the middle of the course. These prediction models may not help a student or their mentor to choose proper course. A better choice helps the student to build up expertise in particular domain. Our primary goal is to build up a performance model which can predict student performance before the start of the course. However, identification of proper influential factors are necessary to build up such model.   So far we have analysed the impact of teaching quality on student performance. The literature on higher study indicates that superior teaching leads to student satisfaction. In contrast, poor teaching may demotivate a student which catalyse the process of diminishing interest on the course. However, the correlation between teaching effectiveness and final grade is still not clearly known. We have proposed a quantifiable measure of performance degradation and analysed the probable relationship of poor performance by both teacher and student. The result suggests that performance degradation is inversely related to teaching quality. The trend is similar for all categories of student. We are further studying the impact of other influential factors on student performance.

Anupam Mandal
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Joined the department in: December 2011

Anupam Mandal received his B.E. and M.S. degree in Computer Science and Engineering from National Institute of Technology, Durgapur and Indian Institute of Technology, Madras respectively. He is currently a scientist at Center for Artificial Intelligence and Robotics, Bangalore. Since December 2011, he has joined the department of Computer Science & Engineering in IIT Kharagpur as a sponsored research scholar. His research interests are in the area of speech recognition and VoIP technologies.

Supervisor: Prof. Pabitra Mitra

Keyword spotting in speech

My current work is on spotting keywords in continuous speech, a sub-area of continuous speech recognition. I am focusing on template-based approaches to keyword spotting that require lesser training data and may perform robustly in presence of noise and channel based degradations. As these methods involve matching of sound instances present in an utterance without any prior assumption of the underlying language, they may also work well for multilingual speech. My research is targeted towards novel methods of speech template representation and matching.

Ayan Das
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Joined the department in: July 2013

Supervisor: Prof. Sudeshna Sarkar

Ayan Das received his B.Tech. degree in Computer Science and Engineering from National Institute of Technology, Durgapur in 2008. From July 2008 till July 2011, he worked in Tata Consultancy Services, Kolkata, as a Systems Engineer. He received his M.Tech. degree from in Computer Science and Engineering from Indian Institute of Technology, Kharagpur in 2013. Since July 2013, he has been a research scholar in the department of Computer Science and Engineering in IIT Kharagpur. His research interests are in the areas of Natural Language Processing and Machine Learning.

Natural Language Processing in Indian Languages using Deep Learning

 My research involves development of linguistic tools and resources for low-resource languages by cross-lingual transfer methods. Cross-lingual   transfer methods involves development of linguistic resources for resource-deficient languages using the resources of other resource-rich languages. We are working on development of syntactic parsers for low resource languages taking advantage of existing parsers of different source languages. Currently, we are working on cross-lingual transfer parsing for Bengali language. We have shown that delexicalised transfer method at phrase level followed by rule-based expansion of phrases helps to improve the quality of Bengali parsers obtained from Hindi. Further, we have developed a Bengali treebank by annotation projection method using a Hindi treebank and a Bengali-Hindi parallel   corpus. We have also developed a method of syntactic re-orientation of the source language parse trees to improve the quality of transferred parsers when there is significant syntactic difference between the source and the target languages. We further aim to work on semantic parsing and semantic role labelling of resource-deficient languages such as Bengali by cross-lingual transfer methods. We further aim to explore multi-lingual transfer methods where multiple source languages are used instead of a single source language to improve quality of the transferred tools and resources.

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Supervisor: Prof. Bivas Mitra

Ayan Kumar Bhowmick is currently pursuing his Doctor of Philosophy (Ph.D.)
degree from the Department of Computer Science and Engineering, Indian Institute

of Technology Kharagpur, India under the supervision of Prof. Bivas Mitra. He joined the department in July, 2015. His current research interests include study of information diffusion in online social networks such as Yelp and Twitter. He has obtained his M.E. degree in Computer Science and Engineering from IIEST Shibpur (formerly known as Bengal Engineering and Science University, Shibpur) in 2015. He briefly worked as a Programmer Analyst in Cognizant Technology Solutions India Pvt. Ltd from August, 2011 to September, 2012. He received his B.Tech degree in Computer Science and Engineering from St. Thomas College of Engineering and Technology under West Bengal University of Technology in 2011.

Studying the dynamics of Information Diffusion in Online Social Networks

My broad area of research is focused on the study of the role of information diffusion in online social networks such as Yelp and Twitter. Location-based social networks such as Yelp allow users in such networks to post textual comments or record check-ins to share their experiences in visiting certain businesses. Defining the popularity labels of such businesses is open ended and ambiguous due to different viewpoints for measuring popularity across business categories and geographical regions. The popularity labels of businesses can be estimated using features related to social influence across visiting users, geographical proximity of users to the business and inherent preference of users to visit the business. The major focus here is to study the impact of these diverse features on the popularity of businesses and develop a recommendation model suggesting relevant areas for placement of new businesses so as to maximize its success. In the context of microblogging sites such as Twitter, information diffuses in the form of messages called tweets. Few tweets achieve widespread popularity over the global underlying network when the content is sufficiently stimulating to get repeatedly chosen by multiple users for forwarding via retweets. Such long chain of retweets form cascades. Though predicting the volume of audience reached by a tweet has been studied extensively in the context of tweet virality, but the potential of temporal retweet patterns to study the diffusion process of cascades in the underlying follower network has been largely overlooked. Our major interest lies in studying cascade transition across multiple diffusion localities since this transition is not uniform, rather the cascade gets diffused from one locality of the network to another in bursts. Study reveals that saturation of a tweet within a diffusion locality makes its content redundant in that locality and subsequently increases the latency between two consecutive retweets. We aim to identify transitions between diffusion localities associated with a cascade only from the inter-retweet intervals.

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Ayan Mondal is presently pursuing his Doctor of Philosophy (Ph.D.) degree from the Department of Computer Science and Engineering, Indian Institute of Technology Kharagpur, India. His current research interests include algorithm design for Smart Grid, Wireless Sensor Networks and Big Data Networking. He received his Master of Science (by Research) (M.S.) degree from the School of Information Technology, Indian Institute of Technology Kharagpur, India in 2015. His M.S. Thesis is entitled as "Distributed Energy Management in Smart Grid". He received his Bachelor of Technology degree in Electronics and Communication Engineering from St. Thomas' College of Engineering and Technology, West Bengal University of Technology, India in 2012. He is a graduate student member of IEEE and ACM.

Task Management in MapReduce for Big Data Networks

Big Data Network (BDN) is one of the important issues which is drawing attention of many researchers. BDN can handlw large-scale datasets created in each second over the World. Therefore, we plan to design different schemes for Map and Reduce Tasks scheduling, inter- and intra-data center networks, and Edge networks for handling massive generated data while analyzing performance of the existing scheduling approach used for distributed file systems.

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Bidisha Samanta received her Master's degree in Computer Science and Engineering from Indian Institute of Technology Kharagpur, in 2013. She has completed her Bachelors in the same discipline from Heritage Institute of Technology, under West Bengal University of Technology, 2011. After her postgraduation she worked with Yahoo! India for one and half years then in Amazon for another one year. She has been a research scholar at the department of computer science and engineering since January 2016

Supervisor: Prof. Niloy Ganguly

Rank tweets based on future popularity

It is an interesting problem related to dynamically evolving social network to study the popularity dynamics of an item in microblogging sites like Twitter. It is extremely important to predict the popularity of a tweet and rank them based on the tendency of gaining attention. For instance, Sachin Tendulkar's tweet "Angry Disappointed and Frustrated.. #BAdserviceBA Family member's Waitlisted ticket not confirmed despite seats being available" on British Airways went viral, and it had a negative impact on the authorized organization.

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Bijju Kranti Veduruparthi *has been a PhD student in the Department of Computer Science and Engineering, IIT Kharagpur, since July 2013. His research interests are in the areas of Computer Vision, Medical Image Processing and Pattern Recognition*

Supervisors: Prof. Jayanta Mukhopadhyay, Prof. Partha Pratim Das

Growth & decay modeling for prognosis of lung cancer patients under radio-therapeutic treatment

Lung Tumor Volume estimation on imaging modalities is required to assess the extent of the tumor for diagnosis. Adaptive Radiation Therapy(ART) aims at using serial on treatment ConeBeam Computer Tomography(CBCT) scans for accurate estimation of the Planning Target Volume(PTV) after taking patient movement, tumor growth, deformations with respect to organs into account. Our

work aims at minimizing the PTV to allow radiologists to give more focused radiation treatment thereby reducing the chance of tumor regrowth and also reducing side effects of radiation. We want to build novel techniques for understanding tumor growth, decay and treatment response. We work in the areas of Medical Image Segmentation and Image Registration.

Binny Mathew
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Joined the Department in: July 2016

Binny Mathew completed his M.Tech(CSE) from IIT Kharagpur in 2016 with a CGPA of 9.3. He is currently working on Language dynamics in text and social media under Prof. Animesh Mukherjee and Prof. Pawan Goyal.

Language dynamics in social media

Currently he is working on the Language dynamics in social media sites like Quora. His work involves analysing the dynamics of topic creation and merging in Quora. Another part of his work involves analysing the anonimity of users in Quora.

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Debapriya Basu Roy received a B.Tech. degree in Electronics & Communication Engineering from RCC Institute of Information Technology, Kolkata in 2011. Since December 2011, he has been a research scholar in the department of Computer Science & Engineering in IIT Kharagpur. He has completed his MS and currently enrolled as joint MS-PhD scholar. His research interests are in the areas of Cryptography and VLSI design, Hardware Security, FPGA based system design, Side Channel Analysis and Elliptic curves.

Supervisor: Dr. Debdeep Mukhopadhyay

Indigenous Design Methodologies for Elliptic Curve Cryptography with Inherent Side Channel Countermeasure

Designing light-weight implementation of public key algorithm has gathered significant interest in the research community in recent years. Due to the recent development of IoT, employing lightweight crypto-solutions for resource constrained devices is an absolute necessity. Public key algorithms which are generally much more resource hungry compared to private key algorithms, poses serious design challenge in its integration with the light weight devices. The most popular algorithm for public key applications are RSA and Elliptic Curve Cryptography (ECC). RSA is much more resource hungry compared to ECC, making ECC an automatic choice for IoT applications. The objective in this scenario is to reduce the area consumption of the ECC without affecting the timing performance drastically. On the other hand, there are some cases very fast implementations of ECC is required. For example, in case of autonomous cars, authentication and verification procedures need to be completed very rapidly. Hence, in this scenario, the objective would be to reduce the timing requirement of the design without increasing the area significantly. Thus, in different situations, system may require two

different versions of ECC, one with minimal area and other with minimal time. Our objective in this research will be to address these two different flavors of implementations with architectural and algorithmic level optimizations. Additionally, all of these implementations are needed to be protected against side channel attacks to ensure security. In case of symmetric key ciphers, differential power attack (DPA) is considered as a main side channel threat. However, for ECC, single trace attack like horizontal collision correlation attack (HCCA) are a more serious threat compared to DPA. HCCA can act on implementations which are protected by DPA countermeasures and can still retrieve the secret key with single or very few side channel traces. Hence, protection against HCCA demands more efficient countermeasure strategies which are not yet covered by the traditional DPA countermeasures. However, new countermeasures which will protect the implementations against HCCA should neither increase the area consumption of the minimal area design nor it should increase the timing requirement of the minimal timing requirement design. These additional constraints make the countermeasure design more challenging and difficult. Additionally, in a post quantum world, elliptic curve based discrete logarithm problem would not remain a computationally hard problem and ECC would be replaced by post quantum secure public key algorithms (code based cryptography, lattice based cryptography, isogeny based ECC). Designing efficient and secure implementations of these post quantum secure public key algorithms are actually much more challenging as they are based on extremely complex mathematical structure and computationally much more intensive compared to traditional ECC.

Debashis Mukherjee

Joined the department in January 2014

Debashis Mukherjee received the BE and MSc (Engg.) degrees in mechanical engineering from Javadpur University, in 1996, and IISc, Bangalore, in 1998, respectively. He received his MTech degree in computer technology from computer science and engineering department in Jadavpur University, in 2013. Debashis was employed as software engineer/consultant with Macmet Interactive Tech., Kolkata, Lucent Tech., Bangalore, Sun Microsystems, Bangalore, Intel Tech., Bangalore, Evolving Systems Networks, Bangalore, IBM, Kolkata, and Cognizant Tech. Systems, Kolkata since 1999 through the decade. From 2014, Debashis is a student in the computer science and engineering department at IIT, Kharagpur, pursuing his PhD under the supervision of Prof. Rajib Mall. Debashis is investigating into effective test coverage in program testing

Supervisor: Prof. Rajib Mall

Program Analysis and Testing

Program analysis and testing using machine learning approaches.

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Debopriyo Banerjee received his M.E. degree in Computer Science and Engineering from Indian Institute of Engineering Science and Technology, Shibpur. Currently enrolled as a PhD Research Scholar at the Department of Computer Science and Engineering, Indian Institute of Technology, Kharagpur.

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Data Analytics

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Supervisor: Prof. Dipanwita Roychaudhury

Cryptanalysis of Hash Functions and Authenticated Encryption Schemes

Cryptography encompasses a plethora of things that determine how information is securely transmitted over an un-trusted network. Certain texts refer to cryptology as the study of cryptography and cryptanalysis, where the later consists of techniques used to analyze a cryptosystem so as to gain some useful information which may help in breaking it. Thus, here we are both concerned about making and breaking a cryptosystem. This particular property makes this field of research interesting and challenging. This has also had led to the constructive development of cryptography from ancient

times when constructions were based on unproven assumptions to the age of modern cryptography which is heavily based on mathematical theory and the theory of computer science. Modern cryptography can be broadly classified into two streams viz., symmetric-key, where the same key is used to encrypt and decrypt and asymmetric key where the encryption and decryption keys are different. This work primarily focuses on symmetric-key constructions and analysis of their properties.

Cryptographic hash functions play a major role in providing data integrity and authenticity. These one- way functions essentially operate on arbitrary length input and provide a fixed length hash/digest as output. In the last 5 years, the cryptographic community has seen remarkable progress in the design and analysis of hash functions and the credit mainly goes to the introduction of the Secure Hash Algorithm-3 (SHA-3) contest [1] by NIST following the concerns over the security flaws in SHA-1 and SHA-2. The primary outcome of the SHA-3 contest was the submission of innovative designs for compression functions and new modes of operation. The contest declared 5 finalists and in October 2012 announced KECCAK [2] as the next SHA-3 standard. This work focuses on the cryptanalysis of the new generation hash functions with special attention to KECCAK. This includes finding collisions, pre-images as well as devising distinguishers.

Cryptography has been successful in addressing the issues of providing privacy and integrity/authenticity *separately* by providing constructions that have sound theoretical analysis and at the same time are highly optimized for both software & hardware implementations. Authenticated encryption aims at combining the goals of privacy and authenticity under a single crypto-primitive to achieve both, preferably, at the cost of one. During the last decade, authenticated encryption has received considerable attention from the crypto community. This has also resulted in the evolution of the field from the initial realms of using just generic compositions to the present day where standalone algorithms are being proposed. The announcement of **CAESAR**: **C**ompetition for **A**uthenticated **E**ncryption: **S**ecurity, **A**pplicability, and **R**obustness [3] in 2013, has laid the foundation for further research in this domain. This precludes the need for analyzing the submissions to the CAESAR competition. In this work, we try to concentrate on analysis of the state-of-the-art authenticated encryption schemes and evaluate them in the light of both theoretical and side-channel cryptanalysis.

References

[1] National Institute of Standards and Technology, *Announcing Request for Candidate Algorithm Nominations for a New Cryptographic Hash Algorithm (SHA-3) Family,* Federal Register, 27(212):62212–62220, November 2007. Available at http://csrc.nist.gov/groups/ST/hash/ documents/FR_Notice_Nov07.pdf

[2] Guido Bertoni, Joan Daemen, Michael Peeters, and Gilles Van Assche. *The KECCAK SHA-3 Submission. Submission to NIST (Round 3)*, 2011. Available at http://keccak.noekeon.org/Keccak-submission-3.pdf.

[3] CAESAR: Competition for Authenticated Encryption: Security, Applicability and Robustness April 2013. Available at http://competitions.cr.yp.to/caesar.html

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Supervisor: Dr. Rajat Subhra Chakraborty

Digital Forensic Technique

Feature-Based Detection and Localization of Multiple Forgeries in JPEG Images Images store the visual impact of significant events as well as it can be used as evidences from digital forensics perspective. However, with the rapid rise in cyber-crime, information exchanged over public channels have become highly vulnerable to interception and manipulation, resulting misjudgment. Such attacks are not at all permissible in applications dealing with sensitive information, such as in legal, criminal investigation, medical, military and broadcast industries. Protection of authenticity and legitimacy of images is the major concern for such applications. Moreover, now-a-days there exists many highly sophisticated and easy-to-use image processing tools, in which making image forgeries are extremely easy. Hence the authenticity of images are at a stake. Digital Image Forensic techniques provide solutions for such important problems of protection of image authenticity, investigation of image forgeries as well as identification of image sources. In this work we are developing a digital forensic technique to detect manipulations as well as localize forgeries in digital images. We are currently dealing with detection of forgeries in Joint Photographic Experts Group (JPEG) images. Joint Photographic Experts Group (JPEG) is the most widely used format, prevalent today as a world-wide standard, for compression and storage of digital images due to its efficient compression features and optimal space requirement. JPEG forgery mainly involves the following three steps. (1) Loading the JPEG image to a photo editing software, (2) altering some parts of the image, and (3) re-saving the modified image in JPEG format or in any other format. Re-saving the tampered image in JPEG format leads to re-compression of the image. Re-compression features can be exploited to expose the forgeries. Finally, in this work we aim to devise a feature-based forgery detection and localization technique. Also, the technique aims towards the detection and localization of not only a single forgery but also multiple forgeries within an image.

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Supervisors: Prof. Rajat Subhra Chakraborty, Prof. Debdeep Mukhopadhyay

Design and Analysis of Composite Physically Unclonable Functions

Counterfeiting of hardware devices and its impact on economy has become a big concern to modern society. The most well-known aspect of counterfeiting is product cloning. In order to deal with this aspect of counterfeiting, a secret unclonable identifier is required. The idea of using intrinsic random physical features to identify objects has led to the development of the concept of Physically Unclonable Function (PUF). The fact that PUFs are unclonable implies that they can be used for anti-counterfeiting purposes. When PUFs are used for the detection of the authenticity of a product, a physical property of the PUF is measured, translated into a bit string and verified. The physical unclonability of PUFs prevents building of a similar physical structure that upon interrogation produces a similar bit string that would pass the verification test as the original one.

However, recent studies on PUFs have challenged claims of unclonability by demonstrating that the behavior of PUFs, especially those implemented as solid-state electronic circuits, can be modeled by using machine learning techniques such as logistic regression, perceptron learning, support vector machine, etc. Most common type of PUFs those are candidate for machine learning based attack are Ring-Oscillator PUFs and Arbiter PUFs. As a part of my research, I am attempting to construct modeling-attack resilient PUF by the composition of standalone existing PUF designs and a mathematical framework to evaluate the robustness of PUF design against modeling attack.

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Supervisor: Prof. Debasis Samanta

Fingerprint Biometric-Based Approaches to Remote User Authentication Schemes

The use of information exchange across the Internet, and storage sensitive data on open networks, cryptography is becoming an increasingly important future of data security. Feature extraction and detection are an important component of fingerprint verification. Some existing system use fingerprints database, fingerprints feature database with different instance for authentication but our Proposed approach doesn't use any database for authentication. Same user can encrypt and decrypt his message/data using his fingerprints without using any database for authentication. The main focus of proposed approach is on similar feature extraction and Cryptography key generation using Biometric fingerprint. One user will generate unique cryptographic key using his fingerprint. Next time user will generate another cryptographic key and he can decrypts message using same fingerprints.

Messages encrypted with keys based on randomness have the advantage that there is theoretically no way to "break the code" by analyzing a succession of messages. Each encryption is unique and bears no relation to the next encryption. The decrypting party must have access to the same key used to encrypt the message and this raises the problem of how to get the key to the decrypting party safely or how to keep both keys secure. So, the idea is to use the same cryptographic key for same session and another key for different session. So same user can encrypt and decrypt message using his fingerprints in same session only. Here, we present a proficient approach for the secure cryptographic key generation based fingerprint image. Our Proposed System focus on "One User, Different Session, Different Keys" to encrypt and decrypt message.

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Ilora Maity, is presently pursuing he Doctor of Philosophy (PhD) degree from the School of Information Technology, Indian Institute of Technology Kharagpur, India. Her current research interests include Wireless Sensor Networks and Big Data Networking. She has completed her M. E. degree in Computer Science and Engineering from Bengal Engineering and Science University, Shibpur, India in 2011. Her M. E. Thesis is entitled as "A Cellular Automata based Scheme for Diagnosis of Faulty Nodes in WSN". She received her Bachelor of Technology degree in Computer Science and Engineering from MCKV Institute of Engineering, West Bengal University of Technology, India in 2008. She has worked as Technical Analyst of Banking & Financial Services in Cognizant Technology Solutions India Pvt. Ltd. Kolkata, India from September 2011 to July, 2015. She is a member of Smart Wireless Applications & Networking (SWAN) Research Group, Indian Institute of Technology Kharagpur.

Supervisor: Prof. Sudip Misra, Prof. Chittaranjan Mandal

Addressing Scalability Challenge of SDN

Software Defined Networking is an emerging technology at present. In SDN forwarding rules are stored in flow tables of OpenFlow switches. Each switch has Ternary Content Addressable Memory (TCAM) of limited size. This capacity constraint is a major issue . As data generation volume is increasing everyday, the need of the hour is to improve performance of SDN so that it can manage this large data set. In this scenario, our work is to compress the flow rules to allow more rules to be stored in each switch. We also plan to devise efficient rule update mechanism and controller placement technique which works with large volume of data in an optimised manner.

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Supervisor: Dr. Animesh Mukherjee

Analyzing Social Dynamics of Code Mixing and Code-Borrowing

The dynamics of a language plays an important role in effective user query processing, information retrieval, and natural language processing. Some of the factors that can influence this dynamicity stem from the social interactions among speakers with different native languages and the extent to which words/phrases are adopted by them from other languages. Detailed investigation of such dynamics is only recently becoming possible due to the availability of data from different social media platforms that reflect various levels of code-switching, code-mixing, and code borrowing before a linguistic change is formally admitted into a lexicon. The primary goal of this research would be to investigate the dynamics of code-mixing, code-switching and code-borrowing and how each of these are socially influenced. Such studies can have a very strong impact on how to handle IR and NLP applications in an extensively multilingual setting.

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Supervisor: Prof. Shamik Sural, Prof. Arobinda Gupta

Expressing Access Control Security in Multiple Distributed Environments

Development and maintenance of secure information systems is a challenging goal in today's distributed computing environment. Rapid expansion of distributed environments such as cloud, Internet of Things (IoT) and smart environments makes the systems increasingly heterogeneous and applications overly complex. The purpose of collaboration in multiple distributed environments is to share information and to exchange resources across organizational boundaries. The types of collaborations can generally be classified as Federated, Loosely Coupled and Ad hoc collaborations. The security goals of such multi-domain environments are to protect resources from unauthorized accesses and to ensure availability of services to the authorized users. The security services required to meet these security goals are authentication and access control. Security requirements of such systems can be specified as security policies. The autonomous and heterogeneous natures of policies of different domains often lead to conflicts among policies. The policy conflicts which violate the principles of security under collaborations among multiple domains are called security conflicts. Complete disclosure of access control policies of participating domains is essential for federated type of collaborations. In this type of collaboration, a mediator domain is used to compose a global access control policy and the applications should be developed according to the

global policy. Loosely Coupled collaborations are work flow based applications. In this type of collaboration, a global directory service can be used to store resources, interfaces and access control policies. Tasks in a work flow must be verified with the policies of the resources. Applications that run on on-demand basis require lowest degree of interoperability and which uses ad hoc collaborations. Such applications run on mediator free environments. They use either use trust based approaches or access history based approaches to ensure secure collaborations.

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Image Processing

Indian classical dance has existed since over 5000 years and is widely practised and performed all over the world. However, the semantic meaning of the dance gestures and body postures as well as the intricate steps accompanied by music and recital of poems is only understood fully by the connoisseur. The common masses who watch a concert rarely appreciate or understand the ideas conveyed by the dancer. Can machine learning algorithms aid a novice to understand the semantic intricacies being expertly conveyed by the dancer? In this work, we aim to address this highly challenging problem and propose deep learning based algorithms to detect hands in order to identify gestures in order to comprehend the intended meaning of the dance performance. Interestingly in this work skin segmentation also used to enhance the performance of hand detector. Motion blur estimation and removal in Indian Classical Dance images is also a real problem where camera sensor noise can also occur in the low light condition. Both motion blur and multiplicative noise make the work very challenging. In the recent advancement of machine learning this low level image recovery problem can be done from the data itself.

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Supervisor: Prof. Niloy Ganguly

Utility of Online social networks during disaster events

Online social networks (OSNs) like Twitter and Facebook are currently important sources of information on the web. They are not only used to keep in touch with friends, but also to gather information on various topics and current events. Especially, the Twitter OSN is increasingly being used to gather real-time information on events happening "now," including disasters, emergency situations, political / social movements, and so on. In fact, recent research shows that Twitter reports

the same events as news media sites (e.g. Newswire), and even captures many minor events which are ignored by news providers.

In particular, recent studies have shown the utility of online social media as a sentinel in emergency situations. During crisis events – which include natural emergencies such as earthquakes, tsunami and cyclones, as well as man-made emergencies such as bomb blasts, and riots – a lot of valuable information is available via online social media. However, not all information obtained through OSNs are trustworthy. Again, it is a challenge to extract important updates about an ongoing event (known as situational updates) from among the large amounts of generic comments being posted. Hence, it is evident that utilizing OSNs during emergency situations involves several research challenges, some of which require further investigation than what has been done till now. There are additional challenges while dealing with disaster situations in countries such as India where usage of OSNs is not so common, including scarcity of data, lack of updates by authoritative users, and so on. Hence mechanisms to utilize OSNs during emergency situations in India need to be developed.

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Demultiplexing Activities and storage reduction in IoT enabled smart home

My research interests lie in the field of Internet of Things and Mobile Computing. I work in the area of human activity detection in IoT enabled smart homes. Once detected, these activities of daily living (ADLs) can be used to derive indicators of a person's well-being and thus provide remote health monitoring. Also, in IoT, there are a large number of perception devices that continuously and automatically collect information, leading to a rapid expansion in data scale. In order to manage such huge data scale. We also try to focus on efficient management of storage space by leveraging the different properties of internet of things.

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Managing Multi-dimensional Multi-granular Security Policies using Data Warehousing

Over the past few decades, sophisticated access control models have been proposed to take into account different dimensions such as time, space, role, context, attribute, etc. These enable specification of fine grained access control policies and can better express evolving organizational needs. However, the key problem is that, there is no comprehensive solution that can uniformly specify, evaluate, maintain and analyze these multitudes of policies in a consistent fashion. In this work, we show that specifying and enforcing access control policies of multiple granularities and dimensions can be transformed to the problem of specifying data of multiple granularities and dimensions. We show how the techniques and tools developed to specify, query and maintain data warehouses can be employed to solve complex access control problems. Specifically, we develop a unified schema to represent various access control policies such as Discretionary Access Control (DAC), Mandatory Access Control (MAC) and Role Based Access Control (RBAC) policies, and show how they can be automatically evaluated.

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Supervisor: Prof. Sudip Misra

Characterizing Collision and Optimizing Energy consumption in Nanoscale Communication Networks

Nanoscale communication networks (henceforth termed as "nanonetworks") consist of at least one synthetic network component of size ranging 1–100 nm and exploit nanoscale properties of those nano-components, and incorporate the basic elements of information theory—transmitter, message, message carrier, medium, and receiver. Limited energy capacity and small magnitude of harvested energy of such nanonetworks render the design of robust networking protocols challenging. Furthermore, potential applications based on nanonetworks are expected to adopt multi-hop communication strategy due to the limited communication range and stringent power budget of such nanonetworks. Therefore, the study on characterization of the phenomenon of collision, and optimization of energy consumption of such nanonetworks is of paramount importance for providing foundations on enabling robust multi-hop nanoscale communication networking.

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Computer hardware is increasingly getting shared between multiple, potentially untrusted programs, ranging from cloud services, to mobile phones, to web browsers. Security is imperative for most of these applications, but in spite of developments of strong cryptographic algorithms, confidentiality or integrity of information is threatened on these platforms due to the presence of covert information leakage channels. The attacks target the micro-architecture of the platforms and can collapse the strongest of crypto-algorithms, like the Advanced Encryption Standard (AES) or the mathematically elegant RSA or Elliptic Curve Cryptosystems. Modern microprocessors contain a set of special purpose registers to measure hardware related activities known as hardware performance counters, which leak valuable information regarding the encryption algorithm. Some attacks analyse these performance counters for compromising the security of the system. It is now well-established that modern computers will exhibit information leakages and we have to develop our security defences amidst the presence of these leakage avenues. Many state-of-the-art countermeasures prevent these types of breach of security, but with the cost of a severe extra overhead, which cuts down the performance and increases the energy consumption of the device manifold. Implementations of these countermeasures are not feasible in resource-constrained environments like IoT devices, Smartphones etc. Side-by-side with the threats of these attacks, modern computer security is also plagued with the presence of malware proliferation, driven by its tremendous profitability and interest received from both private and government sectors. Security researchers have done monumental efforts in developing prevention techniques for such malware. But in spite of these defences, these methods have failed to produce error-free programs, thus showing the necessity of developing suitable detection techniques as an extra line of defence. We aim to develop a novel machine learning based approach for mitigation of the above security threats. Our approach would be to generate significant volumes of low-level data by profiling the performance counters using the perf tool which allows for a granular profiling at a chosen frequency, albeit with some lower error margin. Then this data would be processed through suitable data analysis and machine learning methods to raise alarms in the system.

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Scientific publications are means to communicate the results, ideas and innovation among the research community. These research

documents are increasing with an annual rate of 2.5%. There are several metrics that are used over the years to measure the quality of these documents. Most of them are based on citations and H-index. Our idea is to use the Document content as a foundation and as support to get insight into document quality quantification. We would propose a metric based on a number of content features that will quantify scientific document quality and how the quality determines its impact. This impact could be measured at different levels: at the level of the document, or at the level of the venue where the document got published or at the level of individual scientists who published it.

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Supervisor: Prof. Soumya K. Ghosh

Spatio-temporal Prediction of Time Series Data

The focus of our research is to explore data-driven modeling for spatio-temporal (ST) prediction of time series data. A generic data-driven prediction framework has been proposed for this purpose. The objective is to extend various computational intelligence (CI) techniques to plug into this framework for better modeling of the spatio-temporal inter-relationships, and thereby deriving various data-driven models to deal with different contexts of ST prediction. In this regard, our major contributions are: (i) proposing data-driven model, based on Bayesian network with residual correction, for ST prediction under paucity of influencing variables; (ii) proposing data-driven model, based on spatial Bayesian network (SpaBN), for ST prediction under plethora of influencing variables; and (iii) proposing spatially explicit data-driven model, based on a semantic Bayesian network (semBnet), for ST prediction with incorporated domain knowledge. In future, we like to explore data-driven modeling for spatio-temporal change pattern mining and large-scale data analysis purpose.

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Supervisor: Prof. Pabitra Mitra

Indian Monsoon Modelling

Climate Informatics is the branch of study lies at the intersection of climate science, computer science and information science. Climate Science relates to defining weather condition averaged over a period of time. Computer Science deals with extracting useful pattern in the climate or predicting the climate change. Information science brings broader societal and philosophical questions of the nature of information and why people need it.

Climate analysis task can be modeled from two directions - machine learning based model and physics based model. Machine learning approach is directed at moving from data towards knowledge; it outputs a mathematical model that describes the discovered relationships and pattern in the data. However, physics based model moves from knowledge (in form of physical theories of climate process) towards data. It is a way of exploring how well current theory explains the data. Clearly, two approaches are complementary; it is required to combine them together to build a strong bridge between data and wisdom.

The problem of identification of climate indices and study and modeling of Indian monsoon system is focused. Agriculture is the backbone for stability in India. It relies heavily on the monsoon season since the irrigation system is not proper throughout the country. Proper planning and provision are required for devising agricultural strategies. Small variation in the timing and quality of Indian monsoon has immense potential to impact agricultural output. Thus, prior knowledge of monsoon behavior for a year will help agricultural policy makers to devise proper scheme for best growth of appropriate crops. Different statistical and machine learning approaches are applied to identify different Climate Indices affecting Indian monsoon. The techniques are also utilized to study Indian monsoon pattern and finally to devise a prediction system for Indian monsoon.

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Supervisor: Prof. K. Sreenvasa Rao

Source Modeling for Improvement of Quality of HMM-based Speech Synthesis

Speech is the most natural way for humans to communicate with each other. Synthesis of artificial human speech provides efficient human-computer communication. Nowadays, the speech synthesis systems are widely used in various applications such as screen readers for visually challenged people,

speech interface for mobile devices, navigation, and personal guidance gadgets. As humans are very sensitive in perceiving even the slightest distortions in the speech signal, the speech synthesizers with suboptimal quality make them unfit for usage in commercial applications. The main goal of this work is to improve the quality of HMM-based speech synthesizer by efficiently modeling the source or excitation signal.

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Topical Search in Twitter Online Social Network

Twitter is increasingly being used to search for information and current news on various topics. Recent studies [2, 4] have observed that the most common reasons for searching Twitter are obtaining information on trending topics and recent events. This motivates developing better services for topical search on the Twitter platform.

One of the primary requirements for implementing topical search, on an OSN is to discover topical attributes of the users who are the primary sources of information in an OSN [1, 5, 6]. To identify the topical attributes of Twitter users, we utilize social annotations of users (i.e., how other users describe a given user), which are collected by exploiting the Lists feature.

Lists are an organizational feature, using which an user can group related Twitter accounts that is of interest to him/her, and view their collective tweet-stream. When creating a List, a user typically provides a List name and optionally adds a List description. The key observation is that many users carefully curate Lists to include important Twitter users related to a given topic, e.g. a List on music that includes Lady Gaga, Britney Spears, and so on. Furthermore, the creators of Lists generate meta-data, such as List names and descriptions, that provides valuable semantic cues to the topics of the users included in the List [3, 6].

We leverage our knowledge of topical experts to enable search for content on specific topics. We have designed a novel topical search system for Twitter, which, given a topic, identifies the tweets and trends (hashtags) being discussed by the community of experts on that topic. In brief, our system works as follows. We collect, in near real-time, the tweets being posted by the experts on a topic (as identified by the List-based methodology). We use a two-level clustering scheme to cluster the tweets that are related to the same news-story – we cluster the hashtags based on their co-occurrence in tweets, and cluster the tweets based on the hashtags they contain. Results (clusters of tweets and hashtags, which correspond to a news-story) are ranked by the number of distinct experts who have posted on the particular news-story. Based on a user-survey, we found that our methodology successfully mines tweets and hashtags relevant to a wide variety of topics. Additionally, since we rely on the content posted by a carefully identified set of topical experts, the results are trustworthy, i.e., free from spam.

References

[1] S. Dill, N. Eiron, D. Gibson, D. Gruhl, R. Guha, A. Jhingran, T. Kanungo, S. Rajagopalan, A. Tomkins, J. Tomlin, and J. Zien, "SemTag and Seeker: bootstrapping the semantic web via automated semantic annotation", ACM World Wide Web Conference (WWW), 2003.

[2] G. Golovchinsky and M. Efron, "Making sense of Twitter search", ACM CHI Workshop on Mi-croblogging: What and How Can We Learn From It?, 2010.

[3] N. Sharma, S. Ghosh, F. Benevenuto, N. Ganguly, and K. Gummadi, "Inferring Who-is-Who in the Twitter Social Network", ACM Workshop on Online Social Networks (WOSN), 2012.

[4] J. Teevan, D. Ramage, and M. R. Morris, "#TwitterSearch: a comparison of microblog search and web search", Web Search and Data Mining (WSDM), 2011.

[5] X. Wu, L. Zhang, and Y. Yu. "Exploring social annotations for the semantic web", ACM World Wide Web Conference (WWW), 2006.

[6] P. Bhattacharya, S. Ghosh, J. Kulshrestha, M. Mondal, M. B. Zafar, N. Ganguly, and K. P. Gummadi "Deep Twitter Diving: Exploring Topical Groups in Microblogs at Scale", ACM Computer Supported Cooperative Work and Social Computing (CSCW), 2014

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Speech based access of Agricultural commodity price information retrieval

Automatic Speech Recognition (ASR) aims at extracting useful information from a stream of speech and figures out what a person is saying. Considerable progress has been made in ASR research over

the past few decades. However only a few work has been reported in the area of ASR in Indian Languages where there is a huge dialect variations among different regions of the states. Also ASR technique is being less deployed to adopt in the practical environments because of the lack of robustness in performance of the system. India being developing nation, work has to be concentrated on those backbones of the nation, the farmers. The farmers in India are expected to be benefited from both increased production and higher price realizations — leading to rising rural incomes and declining poverty rates. But they are not getting enough information about the current price that Government provides for the commodities because of the lack of information for each commodity in different markets of a particular state. Even though there is a AGMARK website which provides the price information based on the daily update, the farmers are still not familiarize with the use of Internet access and not affordable to smart phones. So an easy way must be to ask for commodity information, recognize speech and respond the price information. In this work, the focus is on Speech based access of Agricultural Commodity price information for the state of Bihar.

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Approximation Algorithms and Inapproximability Results for Art Gallery Problems

The art gallery problem, which is a classic problem in the domain of computational geometry, originates from the real-world problem of finding the minimum number of guards (or cameras) required to have an art gallery (represented by a polygon) under complete surveillance. Discovering good algorithms for solving these problems leads to several practical applications, particularly in the areas of military surveillance and robot-motion planning. Unfortunately however, most standard variations of the art gallery problem have been established to be NP-hard, implying that exact solutions for them cannot be computed efficiently. Therefore, the focus is on designing efficient algorithms that output an approximate solution, but at the same time provide a relative performance guarantee that the value of the solution is within some (preferably constant) factor of the optimal value. While trying to improve the approximation ratio, parallel efforts are also made to establish inapproximability bounds. We have already designed a quadratic time 6-approximation algorithm for finding the minimum number of vertex guards required to guard a polygon without holes that is weakly visible from an edge, and proved an inapproximability result for the same problem in the case of polygons containing holes. The importance of our result lies in the fact that it proves, for a special class of polygons, a long- standing conjecture by Ghosh regarding the existence of constant factor approximation algorithms for vertex guarding. Currently, our focus is on extending our earlier results to obtain constant factor approximation algorithms for finding the minimum number of vertex guards required for the general class of all simple polygons, thereby settling the decades-old conjecture by Ghosh completely. In parallel, we are also investigating the problem of vertex guarding in a setting where the guards are allowed to see points within the polygon directly as well as via a single diffuse

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Identifying Personality Traits from Enterprise Social Network for Mining Enterprise Group Behavior

It is well known that modern organizations rely heavily on unstructured information to capture expertise and knowledge that otherwise exist in the minds of its employees. Computational linguistics and text mining techniques have made it possible to analyze and extract meaningful insights from the unstructured text collections and transform them into actionable intelligence as and when required. In this work our aim is to look at methods and techniques that can be employed to exploit content from enterprise social media with the explicit purpose of understanding individual behavioral traits and group interactions. It is expected that such analysis can be further used to simulate enterprise workers and study group dynamics for better team selection and management. Understanding group dynamics can contribute towards better group formations in future to accomplish tasks more efficiently, amicably and effectively. It can also help in automated monitoring of text communications to make it more effective.

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Guided Reconstruction of Corner Cases in Architectural Validation of processor design

Functional verification is widely acknowledged as one of the main challenges in the design cycle of modern microprocessor based systems. The industrial practice for functional verification of microprocessors relies heavily on extensive simulation. In a simulation based verification environment, the RTL is simulated with test programs with the hope that any design fault shall be revealed either by failure of correctness assertions or by back propagating through a simulation trace that generates a functionally wrong output. When such design bugs are found, the designer patches the RTL descriptions and restarts the verification process in order to check whether the bug fix is complete and correct. However, the bug fix can be local in nature in the sense that the bug may possibly manifest itself in an alternate execution trace. The present work leverages AI planning to develop techniques for automatic construction of test programs for sensitizing deep architectural bugs by reproducing a bug scenario as different possible sequences of micro-architectural events given that the scenario was initially observed as one such sequence in a simulation trace. Automated generation of such test programs 1) help to evaluate the robustness of a given bug fix or alternatively 2) identify the root cause of the bug so that a proper fix can be carefully planned.

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Validation of Embedded Real Time Control

An Embedded System is a specialized computer system that is part of a larger computer or machine. A Real-Time System is a type of system in which the performance of the system not only dependent on their logical correctness but also on the time at which the results or outcomes are produced. A Control system is a system that manages, commands, directs or regulates the behavior of other device or systems. Hence, a Real-Time Embedded Control System is can be quoted as a system, which is an integrated part of a larger system and controlling the system behavior, performance with some timing constraints [1, 5].

It has a vast area of application in many Industries such as Automotive control, Home appliances, Telecommunication systems, Automated manufacturing systems, medical equipments, Defense and military applications etc. Examples of embedded systems are Mobile Phones, Modern Car safety systems like Anti-lock braking system (ABS) Controller, Adaptive Cruse Control system(ACC) etc.

- Multi-mode Sampling Period Selection for Embedded Real Time

Control: In Embedded Real Time Control systems, the computational resources are generally limited and must be used as efficiently as possible. At the same time demand for integrating more and more functionality to the system is also increasing. Thus several concurrent tasks need to be executed using the limited available resources. Hence, it is preferable to have efficient methods that optimize the performance of control loops in the system with scare computing resources[2]. Embedded software-

based control systems have traditionally been implemented by assuming fixed sampling rates and fixed task periods[6]. Adaptive regulation of the sampling rate may theoretically determine the optimal balance between computational efficiency and control performance [4, 3] but such schemes are difficult to implement in practice due to non-determinism in timing introduced by the computational infrastructure (including message delays, execution time variations in different paths of the control software, etc).

So we are currently working on proposing a Mode Based Scheduling of Embedded Control System, where scheduling will be different in every mode of execution. The mode selection is done using control theoretic analysis and also based on certain scenarios the controller is going to work. Sampling rates in each of these modes will vary depending upon the above analysis measures. Further, we are working on to provide a supervisory automata which will supervise the mode switching as well as the scheduling. Formally establishing a verification methodology the properties of this Mode Based Scheduling scheme is also a prospective area of our future research.

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References

[1] K.°Astr öm and B. Wittenmark. Computer controlled systems: theory and design. Prentice-Hall information and system sciences series. Prentice-Hall, 1984.

[2] G. Buttazzo. Research trends in real-time computing for embedded systems. SIGBED Rev., 3(3):1–10, July 2006.

[3] A. Cervin, M. Velasco, P. Marti, and A. Camacho. Optimal online sampling period assignment: Theory and experiments. Control Systems Technology, IEEE Transactions on, 19(4):902–910, 2011.

[4] D. Henriksson and A. Cervin. Optimal on-line sampling period assignment for real-time control tasks based on plant state information. In Decision and Control, 2005 and 2005 European Control Conference. CDC-ECC '05. 44th IEEE Conference on, pages 4469–4474, 2005.

[5] Q. Li and C. Yao. Real-Time Concepts for Embedded Systems. CMP books. Taylor & Francis, 2003.

[6] D. Seto, J. Lehoczky, L. Sha, and K. Shin. On task schedulability in real-time control systems. In Real-Time Systems Symposium, 1996., 17th IEEE, pages 13–21, 1996.

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Energy Efficient Navigation Systems

Navigation, be it pedestrian or vehicular is of prime importance now-a-days. Vehicular navigation, although in a very good stage in developed countries, is marred by several problems. These bring out a whole bunch of interesting research problems which can help not only the common public in developing countries but also of the developed countries. The first set of problems fall into this category of outdoor navigation and development of improved systems and maps for the same. The next set of problems decided upon is related to pedestrian localization where we plan to give a complete interference free navigation experience to the user. The idea of actuated navigation comes into play here.

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Evolution of structural properties in temporal networks

Information diffusion is one of the most common phenomena that occurs on a network and the most elementary model of this process is SI (Susceptible- Infected) and its different variations. Epidemic/adoption models have recently found a renewed interest with the formulation of temporal networks and realization that most of the real-world networks are temporal in nature (network structure changes with time). For example, Takaguchi et. al. in presents a model whereby adoption behavior of a node is driven by the number of recent contacts with already adopted individual. Through simulations on real-world temporal networks the authors further show that burstiness affects spreading rate. Similar empirical study was also performed by Karimi et. al. A further modification to the model has been proposed by Backlund et. al. which considers that adoption is driven by the number of contacts with different adopted neighbors within a chosen time instead of a particular neighbor multiple times. The fundamental difference between static and temporal epidemic (SI) models is that in temporal models every agent within a population is not equally susceptible to a disease or equally amenable to a rumor - the one which has been exposed more number of times (in recent past) are more amenable. This difference however is not well formulated and hence not well modeled - the primary contribution of this work is to succinctly define the problem in terms of a simple model and then theoretically calculate the rate of spread of the epidemics. We consider a spreading model where each susceptible node needs to communicate with the infected nodes multiple times to contract infection. More importantly, unlike memoryless systems, we assume that each node comprises a memory which keeps track of the number of contacts it makes with infected ones. Note that this model is completely different from threshold models where a node gets infected when majority of its neighbors are infected or probabilistic SI-models where an infected node, on coming in contact, infects a susceptible node with a probability p, as those are memoryless systems and the transition depends only on the activity of present time step. The analytical results are obtained considering simple yet important topologies like the complete graph and the infinite d-regular trees which accounts for two extreme variants of network topology in terms of edge density. An important inference we draw from the theoretical analysis is that irrespective of the topology the diffusion process could be divided into two phases: (i) an initial phase where the diffusion rate is very slow and (ii) a residual phase where the diffusion is almost exponentially fast. This inference is the central contribution of this letter which can help in containing the spread of infectious diseases with minimum overhead if acted upon in the initial phase.

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Software-Defined Networking for Internet of Things

The inherent features of internet of things (IoT) opens a new direction to fulfill the objectives toward fully connected world in near future. The IoT environment is comprising of wireless sensor networks (WSNs) and heterogeneous nodes in both the infrastructure-based or the infrastructure-less (i.e., ad-hoc manner) fashion with the capability of establishing smart systems (such as smart health-care, smart energy system, video surveillance, and intelligent transportation systems). Consequently, adequate networking aspects need to be enabled to support such devices in real-time in a ubiquitous and seamless manner. Therefore, the traditional network architecture needs to be modified to enable the networking aspects in the connected world in which the huge number of devices are expected to participate.

Concurrently, software-defined networking (SDN) is one of the promising approaches to support user- defined networking aspects, while separating the control plane from the data plane. Thus, we have a global view of the network and can control the network traffic according to different applications. Additionally, it is also possible to use the same physical devices to support different applications, while modifying the control strategies. However, existing works on SDN mostly focused on high-speed network platforms such as data center networking and certain extends to wifi enterprise networks, and are applicable to wired networks.

In view of the above, he is focusing on the software defined networking aspects in the future internet of things architecture while addressing different challenges of implementing SDN in both the infrastructure-less and infrastructure-based scenarios.

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Deep learning and optimization based techniques for image de-fencing and super-resolution

Image de-fencing/inpainting is the task of replacing the content of an image or video with some other content which is visually pleasing. Now a days, with the availability of inexpensive smartphones/tablets equipped with cameras has resulted in the average person capturing cherished moments as images/videos and sharing them on the internet. However, at several locations an amateur photographer is frustrated with the captured images. For example, the object of interest to the photographer might be occluded or fenced. Currently available image de-fencing methods in the literature are limited by non-robust fence detection and can handle only static occluded scenes whose video is captured by constrained camera motion. The objective of this research is to resolve the challenges and eventually build an efficient system for the detection and removal offences/occlusions from images/videos. Current objective necessitates the solution of three sub-problems: (a) segmentation of fences/occlusions in the frames of the video, (b) estimation of optical flow between the observations under occlusions, (c) information fusion to fill-in the occluded pixels in the reference image. Detection of blurred and non-blurred regions in a single image without needing to perform blur kernel estimation is a challenging task in computer vision. Semantic segmentation of partially blurred regions in images/videos is another goal of my research. Robust and accurate blurred region segmentation algorithms are useful in many computer vision problems including but not limited to depth of field estimation, image segmentation, object recognition, partial image deblurring, blur magnification, image inpainting and information retrieval etc. In this work, we propose a convolutional neural network (CNN) based algorithm for detection and classification of partially blurred image regions.

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Impact of Micro-architecture on Side-channel Attacks

With the ever-increasing proliferation of e-business practices, great volumes of secure business transactions and data transmission are routinely carried out in an encrypted form in devices ranging in scale from personal smart cards to business servers. These algorithms are often computationally intensive and most implementations of these algorithms leak information through side-channels such as power, timing, and electro-magnetic radiation of the device. These side-channels can be exploited by an adversary to gain information about the secret encryption key. Preventing these side-channel attacks is difficult because the leakage not only depends on the cipher algorithm but also on the implementation and its execution platform. Further, several of these leakages stem from vulnerabilities in the underlying hardware. For example, attacks on systems have been demonstrated using inherent vulnerabilities present in architectural components such as cache-memories, branch-prediction units, hyper-threading units, etc. These attacks were called micro-architectural attacks. Countermeasures proposed for micro-architectural attacks so far are generally ad-hoc and applied at the application layer. There are several drawbacks of countering side-channel attacks in the application layer. First, most of the countermeasures are heavy and inefficient. Further, all applications sharing the same host require to apply these countermeasures to protect against a common vulnerability. This adversely affects performance and energy requirements of the system. Second, a countermeasure to prevent one attack may lead to new attack techniques, which use the same vulnerabilities. The alternative is to develop CPUs that are inherently secure against side-channel attacks. That is, the CPU architecture is designed with innate abilities to contain information leakage. To build such systems requires the identification and quantification of information leakage due to various components in the micro-architecture, and then the development of new micro-architectural components that considers security as a per-requisite along with other design parameters such as performance and power consumption. The effect of the conflict misses, scheduling algorithms, performance counters which are implemented for the processors can be exploited to show that they leak information. The analysis can be actually helpful in designing secure systems that inherently prevent these leakages.

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Optimal network resource allocation in the presence of MRATs

With advances in wireless communication systems, Next Generation wireless networks promise coexistence of multiple radio access technologies (MRATs). These RATs are characterised by different parameters such as coverage area, data rate and supported class of services. Co-existing all the RATs under a single umbrella, strengths the service providers to attract the users, demanding the different class of services. In addition to that, the omnipresence and omnipotent of single RAT is infeasible hence MRAT(s) can be viewed as a potential solution for seamless and persisted connectivity, which is highly recommended for critical and real-time applications. For my PhD degree, I am working in the direction of optimal network resource allocation in the presence of MRATs.

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Spatio-temporal signatures of GPS traces

The spatio-temporal signatures of GPS traces of moving agents (mobile-user/taxi-cab/bike-trip) represent significant knowledge about human movement behaviour (intent of the move) and the geographical region, which in turn facilitates location-aware services. Specifically, analysing human trajectories both from individual and aggregate level provide personalized recommendation alerts, detection of anomaly trajectory, better resource allocation and traffic flow analysis which helps in various applications car-pooling, dynamic ride-sharing etc. The major issues triggered by rapid urbanization in the developing countries are increasing carbon footprints, growing traffic problems and high-energy consumption. Clearly, analysing city-wide traffic flow from GPS traces of vehicles is strategically important for the improvement of people's life and environment.   Analysing individuals' GPS traces and taxi-cab movements consists of following modules: i) Trajectory data pre-processing and efficient storage and indexing of huge volume of data based on Spatio-temporal properties, partitioning trajectory data in similar zones for parallel processing, deploying cloud-based trajectory data management system. ii) Spatio-temporal clustering techniques to generate signature movement patterns and similarity measurements and transferring the mined knowledge using multimodal multi-label transfer learning. iii) Analysing city-wide traffic flow and proposing efficient scheduling algorithms of taxi-cabs using space-time prism to find out a global optimal solution.   In this work, we aim to capture behavioural differences in the movement patterns of the individuals and utilize the knowledge to cluster users having similar movement patterns. We also classify mobile users (say student/ professor of an academic institute) based on the Spatio-temporal and semantic features of the GPS traces which is an interesting and challenging task.

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Early Analysis of System Reliability using Probabilistic Program Models

The reliability of a system is increasingly being considered as a first class criterion in the design space of mission critical as well as soft real-time systems. However, automated synthesis and verification tool flows for such reliable embedded systems are still in their infancy. Another drawback of such works would be that the granularity of the analysis is (un)fairly coarse grained.

Existing techniques for component based software reliability analysis constructs a task graph based representation of modular software systems. The estimates thus derived do not take the following points into consideration:
- The probability distribution of the possible inputs.
- The execution semantics of the program.
- The failure probability of the underlying hardware of a hardware software co-designed system.
- The absence of an initial model for functional reliability analysis.

Probabilistic programs can serve as initial models for functional modeling of reliable systems and formal analysis methods can be used for validating such models, leveraging model checkers and theorem proves for counter example based refinement of probabilistic programs. A subsequent step is integrating such analyses into synthesis tools for embedded system design.

To this end, we propose RELSPEC, a framework for early reliability analysis and refinement of embedded applications with support for explicit reliability constructs. The behavioral description of a system can be captured via RELSPEC, for reliability analysis at an early stage of its design flow. RELSPEC can also provide reliability refinement if the system does not meet its desired reliability.

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Prediction of Meteorological Parameters and Knowledge Discovery in Geographic Information System

Meteorological attributes, related to earth surface, are considered to be the important factors for modeling climate dynamics. Modeling land-atmospheric interaction for these attributes, nearby to the earth surface is mandatory to achieve better precision for their prediction, as well as for investigating spatio-temporal atmospheric patterns. Examples of these attributes include land surface temperature, vegetation index, built-up index, etc. According to NASA Earth Observatory, the land surface temperature is an influential factor for warmth rising of Earth's landscapes, and influential to determine the climate patterns. Our research work focuses on the prediction and forecasting of these meteorological attributes. We have proposed a new Kriging based spatial interpolation technique, namely Semantic Kriging, considering the semantic relationships among geospatial objects for better prediction.

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Fog Computing

His research interest is in fog computing. He is currently doing literature survey on fog computing.

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Supervisors: Prof. Pralay Mitra

Protein machinery on Bacterial Chemotaxis

Our research aims to study the proteins causing bacterial motility to favour chemotaxis in bacteria. The detailed mechanism about how a bacterium switches its flagellar rotational direction in response to attractants or repellants present in its surrounding environment is to be studied at the protein level. Monitoring and tracking of the trajectory of bacterial motility by biologists specifically for a given chemical gradient can be done easily if we get the deep insight into this mechanism of bacterial chemotaxis.

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Sikhar Patranabis completed his B. Tech in Computer Science and Engineering from the Indian Institute of Technology Kharagpur. He is the recipient of the President of India Gold Medal Award for the batch of 2015. He is currently pursuing his PhD at IIT Kharagpur. His research interests include cryptography and hardware security.

Supervisors: Prof. Debdeep Mukhopadhyay

Design of Public-Key Cryptosystems for Data Sharing on the Cloud

The recent advent of cloud computing has pushed the limits of data sharing capabilities for numerous applications that transcend geographical boundaries and involve millions of users. Governments and corporations today treat data sharing as a vital tool for enhanced productivity. Cloud computing has revolutionized education, healthcare and social networking. However, such applications are also vulnerable to attacks from malicious service providers and third party intruders that could lead to catastrophic consequences. In this dissertation, we aim to propose online data sharing schemes based on key aggregate cryptosystems with strong cryptographic properties that ensure data security without compromising on the scalability and efficiency of the system. We prove the indistinguishability based security and collusion resistance of our proposed schemes in the standard game-based cryptographic model. We further aim to use this scheme to design identity based online data sharing schemes that are practically deployable in real world data sharing scenarios.

He is currently working on developing provably secure cryptosystems for encrypted analytics on the cloud. In particular, his focus is on developing functionally rich predicate encryption systems supporting a wide variety of queries on encrypted data. His other research interests include design of fault tolerant cryptosystems and lightweight cryptography.

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She is a PhD student at the Department of Computer Science and Engineering, Indian Institute of Technology Kharagpur. She completed M.S. by research from Indian Institute of technology, Kharagpur in 2015 and B.Tech from West Bengal University of Technology in 2010. She has two years (July 2010 - Sep 2012) of work experience from Computer Sciences Corporation India. She is working under the supervision of Dr. Bivas Mitra and Dr. Sandip Chakraborty. Her research interest lies in Activity Sensing. She is part of Complex Network Research Group.

Community based activity recognition

Human activity recognition is a process by which a system can identify different human activities based on the observations on the individual's action and his/her surroundings. However, human beings are social by nature and like to build community depending upon a common point of interest and common characteristics. Therefore, for getting complete knowledge of an individual's activities, community based activity recognition – an extension of single activity recognition and group activity recognition is necessary. Presently we have setup an android-based system in our group to track the research scholars' and professors' daily activities such as walking, running, climbing up, climbing down, and stationary. We are currently working on the sub-group formation and detection in the

group.

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Supervisors: Prof. Arobinda Gupta, Prof. Sandip Chakraborty

Handover in High-speed Heterogeneous Wireless Networks

With many wireless radio technologies such as LTE, WiFi, Wimax and possibilities of upcoming radio access technologies(RATs), it is required to ensure that they can co-exist and work together. The network of all the technologies aka the heterogeneous wireless network, with their omnipresence, has potential to pose new challenges when it comes to provide seamless experience to the end user. Such a problem is the handover problem. While a mobile node moves from one point to another, it is very essential to make proper decisions to choose the next access point such that it gives the desired experience in terms of quality of service, energy efficiency etc. Also the decisions are to be made in such a way, so that the overall system throughput also maximize. With higher speed of the mobile node the problem becomes more challenging. It becomes more complex with addition of multiple RATs. This problem takes such a system of highly mobile users such as vehicles in a road network or in a train. The system also has multiple RAT components available. These nodes, being on a defined track has the opportunity of mobility prediction.

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Supervisor: Prof. Bivas Mitra.

Information Propagation in Multi-Layer Social Networks

Information propagation is a very well-studied phenomenon. From long ago, people are trying to

understand how a piece of information travels from one person to another. Two types of information flows which have drawn most of the attentions of the researchers, are i) knowledge information flow (flow of ideas, innovations etc. mainly among scientists) and ii) social information flow (flow of news, gossips, opinions etc.). In every information propagation, there exist some hidden factors which are generally dormant and not given much importance, but if handled carefully, they can play crucial roles in deciding the properties (like size, speed etc.) of the diffusion. In our work, we want to analyze both types of information flows to identify those dormant factors and propose new models for information diffusion dynamics keeping them in consideration. Banking on that knowledge, we want to build novel techniques to accelerate and expand an on-going information diffusion and deploy them in large scale for the benefit of end-users.

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B.Tech 2012 -- RCC Institute of Information Technology
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Analysis of Noise In Networks and Applications

Developing algorithms which can find meaningful information from Complex Networks which have been disrupted by various external agents. Analyse stability of the results of network mining algorithms under circumstance of random change or targeted change.

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Soumyadeep Dey received his B.Tech. in Computer Science and Engineering from West Bengal University of Technology, Kolkata, and his M.E. from Indian Institute of Engineering Science and Technology, Shibpur in 2009 and 2011, respectively. Currently, he is a PhD student in Indian Institute of Technology Kharagpur. His primary research interests include image processing, pattern recognition and computer vision.

Supervisors: Prof. Jayanta Mukherjee, Prof. Shamik Sural

Preprocessing of Document Images

Optical Character Recognition (OCR) systems are in demand for their application in automated document processing. Various stages of document image processing are data acquisition, preprocessing, feature extraction, classification and postprocessing. Among these stages, preprocessing is the preliminary step which transforms the data into a format convenient for the next stages of processing. Preprocessing is necessary to modify the data either to overcome deficiencies in the data acquisition process due to limitation of the capturing device sensor, or to prepare the data for subsequent activities in the later stages of description, as the performance of the subsequent phases depends on the quality of input data. A document consists of various layout and components. With digitization of huge amount of document, automated document processing by machines become important. The process of identification of homogeneous components from a document image is

termed as document segmentation. Binarization, noise removal, etc. are some typical varieties of segmentation processes. Binarization is a process of segmenting an input image into foreground and background based on a threshold value. Noise removal is a technique to segment noise from original content of the document. There are several types of noise that may creep into a document at different stages of data acquisition. Margin noise, rubber stamp, underline, annotated text, etc may be present in a document image. Text-graphics separation is also another type of preprocessing task, often required to segment input data into a suitable format for processing in the later stage. Our research primarily focuses on different preprocessing tasks, involving layout detection and separation of text and non-text portions of document images.

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Sourya Bhattacharyya received B.E. degree from Jadavpur University, Kolkata in 2006, and obtained M.S. degree from Indian Institute of Technology Kharagpur in 2012. From July 2012, he is pursuing PhD in the field of Computational Phylogenetics. His research focuses on algorithms for constructing phylogenetic supertrees, deriving species trees from a set of (incongruent) gene trees. He is a TCS research scholar.

Supervisors: Prof. Jayanta Mukhopadhyay

Species Tree from Incongruent gene trees due to Incomplete Lineage Sorting

Phylogenetic trees represent evolutionary relationships between 'taxa' (entities such as genes, populations, species, etc.). Every leaf of the tree uniquely represents one taxon. From a species set, their representative common gene (in the form of either nucleotide or protein sequences) is used to construct phyloegentic trees, often termed as the gene tree. Different genes from same set of species may generate different gene tree topologies, since different genes often exhibit different evolutionary histories among a group of species. Further, few genes may not cover all of the input species, resulting partial gene trees. One major reason of such conflicts among gene trees is the Incomplete Lineage Sorting (ILS) or deep coalescence (DC). Such discordance can be so high that no single gene tree topology predominates in the input gene tree set. Topology of the species tree. Thus often it considerably differs from the input gene trees. Our research focuses on analyzing such ILS based discordance among gene and species trees, and developing computationally efficient algorithms to derive species trees from a set of incongruent gene trees.

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Presently, Souvik Sur is pursuing my Ph.D. degree from the Department of Computer Science and Engineering at IIT Kharagpur under the supervision of Prof. Dipanwita Roy Chowdhury and Dr. Abhijit Das since August, 2016. Prior to that, he was a student of M.S (by Research) program in G. S. Sanyal School of Telecommunications at IIT, Kharagpur, till July, 2016. Earlier, he obtained B.Tech in Computer Science and Engineering from West Bengal University of Technology in 2010.

Blockchains
In the beginning, I started my research in the domain of symmetric key cryptography. Later, it turns

into a more specific topic, namely, Blockchain. Briefly and peripherally, blockchains are the rudimentary components behind crypto-curriencies, digital coins, online banking transactions and many more. For example, in a peer-to-peer system blockchains can be used to authenticate and validate transactions in a distributive manner. In view of this, my research primarily concentrates on three different aspects of blockchains, specifically known as, security, privacy and efficiency analysis.

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I received my B.Tech in Information Technology and M.E in Computer Science Engineering from Anna University, Chennai, in the year 2010 and 2014 respectively. Now pursuing my Ph.D degree in the department of Computer Science and Engineering.

Supervisors: Prof. Debasis Samanta (Supervisor), Prof. Pabitra Mitra (Joint Supervisor)

Brain computer Interface augmented Human Computer Interface for people with Special Needs

Human brain is one of the most wondrous organs that distinguishes humans from all of other organisms. The brain does not just control the organs, but also can think and remember. This ability to feel, adapt, reason, remember and communicate makes human a social being. Typically, people with disabilities have limited opportunities to socialize and pursue social and leisure activities that most people enjoy. The 15% of the world's population lives with some form of disability, and this requires a call to change, to empower people with disabilities. With the recent advancement in brain-computer interface (BCI) technology, researchers are exploring if BCI can be augmented with human computer interaction (HCI) to give a new hope of restoring independence to disabled individuals. This motivates us to lay down our research objective, which is as follows. In this study, they propose to work with a hands-free/touch-free text entry system based on the brain signals, for the task of communication for people with less mobility. Here, the BCI system translates the intentions of the user, left and right hand motor imagery signals, captured using an electroencephalography (EEG) device into device commands with no involvement of peripherals. Although EEG signals provide a great deal of information about the brain, research in signal preprocessing, feature extraction, classification and evaluation of these signals are limited. Even today the EEG is often examined manually by experts. A big challenge in BCI systems is to remove the artifacts from the EEG signals without any loss of information. Then to correctly and efficiently identify different EEG signals of different motor imagery tasks using appropriate feature set and classification algorithms to assist motor disabled people in communication. Hence, the greatest effort was focused on designing and implementing an appropriate preprocessing technique, data representation and classification techniques in order to enhance the differentiation of individual neurological states and to get near to accurate motor command signals.

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Subhrangsu Mandal received a B.E.. degree in Computer Science and Technology from Bengal Engineering and Science University, Shibpur in 2009. From July 2009 to July 2010, he worked as an Associate System Engineer in IBM India Pvt. Ltd. After that he received M. Tech. degree in Computer Science and Engineering from IIT, Guwahati in 2012. From July 2012 to January 2014, he worked as a Software Engineer 2 in Citrix R&D India. Since January 2014 he has been a research scholar in the department of Computer Science and Engineering. His research interests are in the areas of Distributed Systems.

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Distributed Algorithms on Dynamic Graphs

In last few decades the advent of various mobile computing devices like smart phone, laptops etc. has introduced networks where the network topology changes very frequently. The appearance and disappearance of nodes and edges are very common in those networks. There are also other types of networks, such as vehicular networks where nodes move very fast, distortion tolerant network where nodes and communication links can disappear at any time because of extreme conditions etc., which exhibit very frequent change in topology. Research in these areas has shown that the traditional static graph model is not enough to model and analyze these systems. So the concept of dynamic graph where edge and node set changes very frequently, has been introduced by researchers.

Construction and maintenance of certain graph structures like spanning tree, connected dominating set, independent set etc. are important problems in the area of distributed computing. As an example, a spanning tree provides an efficient communication path between all nodes in a network, which can also be used to collect different network-wide information such as total number of nodes present in the network, maximum id of any node in the network etc. These information are very useful to solve other fundamental problems such as leader election, information dissemination, termination detection etc. Hence efficient algorithms to construct and maintain spanning trees on dynamic graphs can be used as basic building block to solve many fundamental distributed computing problems on dynamic graphs. Note that the problem is more challenging in dynamic graphs as in many cases the structure itself is not defined clearly. For example, the definition of a spanning tree in static graph does not carry over directly to a dynamic graph as the dynamicity may imply that any spanning tree may not exist at a single time step, though a spanning tree may be established by taking union of the graphs over several time steps. There are many other example of such graph structures such as dominating sets and connected dominating sets, independent sets etc. Building and maintenance of graph structures in distributed environment has been well-explored for static networks but has hardly been dealt with in the context of dynamic networks. Hence, construction and maintenance of graph structures on dynamic graph is the focus of my research.

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Supervisors: Prof. Dipankar Sarkar

Validation of parallelizing transformations of sequential programs on arrays

The parallelizing compilers have become very relevant in the prevalent high performance computing systems. To get significant speedup for a specific parallel architecture, suitable parallel programs have to be written. These compilers are used to automatically parallelize sequential program which is

easier to write for an user. The parallelizing compilers apply parallelizing transformations such as, loop parallelization and loop vectorization to sequential programs. They transform a sequential source program to its parallel version with the same functionality. Moreover, various scheduling techniques such as, trace scheduling, percolation scheduling exist which enhance the process of parallelization. These techniques optimize usage of resources in the process of parallelization and produce an even more effective set of parallelizing transformations. Often parallelizing compilers apply various enabling transformations such as, induction variable elimination, scalar expansion, etc., at the earlier stages to eliminate data dependences that hinder the application of the parallelizing transformations. The enabling transformations cover some loop transformations such as, loop interchange, loop fission, loop fusion, etc. With the commencement of the new era of massively parallel computers, there is a growing need to verify the correctness of the parallelizing compilers. To the best of our knowledge, none of the available literature has given a complete procedure for validation of the parallelizing process of existing parallelizing or vectorizing compilers. We have enhanced the methods of equivalence checking method for array handling programs for validating such parallelizing transformations. We also localize faulty application of enabling transformations when more than one of them are applied.

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Supervisors: Professor Pallab Dasgupta

Formal Methods for Verification of Power Management in Mixed Signal Design

The increasing complexity and safety-criticality of modern systems has created a need for validation and safety assurance of designs based on formal analysis. Formal methods have been used to check functional correctness of systems using methods such as model checking and design intent verification. Apart from checking for functional correctness, performance parameters such as power, reliability etc. have also been verified in recent research works. Architectural Power Intent Validation is a significant area of formal verification research, in which a large repertoire of work already exists. This work studies power intent validation for purely digital power domains using UPF (Unified Power Format) specifications for expressing power intent. With the increase in integration, today most SoCs in use contain not only digital domains, but analog power domains as well, introducing a new dimension to the verification problem. This shifts the domain of formal verification from purely digital to that of mixed-signal verification of power intent, which is an entirely new line of research. The same methodologies employed for the verification of power intent of digital cannot be employed for the verification of mixed-signal, because the UPF standard does not provide structures for the specification of intent for mixed-signal, and no known techniques exist that can generate formal proofs of correctness of mixed-signal power intent specifications. Our work is focused on the architectural power intent validation of Analog Mixed Signal power domains, which is substantiated by our past experience working on the power intent validation of digital power domains and in the formal analysis of features for analog and mixed-signal systems. This report provides a high level outline of the strategy we intent on using toward this unique verification problem, along with an introduction to our past work on formal analysis of AMS features.

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Sukla Satapathy joined as a research scholar in Computational Vision Lab in Computer Science and Engineering Department of IIT Kharagpur , under the supervision of Prof. Rajiv Ranjan Sahay . He has completed his M.Tech(Computer Science) and M.Sc (Mathematics) from Utkal University. He worked as an Asst Prof. in Indic Institute of Design and Research, Bhubaneswar, Odisha (Degree Engineering college) for 5 years. Theory of computation , Computer graphics, Data structure and programming, System programming, Optimization Engineering,numerical methods are the subjects he taught.

Supervisors: Dr. Rajiv Ranjan Sahay

3D shape reconstruction using Shape from focus

My broad area of research is Image processing and computer vision.   1)   3D shape reconstruction using Shape from focus (SFF) method : Shape-from focus is a method which estimates the 3D structure of an object by measuring the degree of focus from a stack of space-variantly blurred frames obtained due to relative motion between camera and the specimen. This is an inverse, ill-posed problem. From optimization point of view it can be categorized as total variation regularized optimization problem and Split Bergman technique can be used for solving it.   2) Depth image inpainting and super-resolution: Depth images often suffer from issues like low resolution (LR) due to low-cost depth sensors and presence of missing regions due to poor reflectivity, and occlusions. Depth image inpainting and super-resolution can be done by using the nonlocal information either from internal or external dataset.

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Suman Kalyan Maity received his B. Tech. degree in Computer Science and Engineering from NIT Durgapur in 2011 and his MS degree in Computer Science and Engineering from IIT Kharagpur in 2013. He is a recipient of Microsoft Research India PhD Fellowship. His research interests broadly include Social computation: with key focus on popularity of entities in social QA (Quora, Stack Overflow etc.), hashtag popularity and evolution of linguistic entities like lexical compounding, lexical blending on social media.

Supervisors: Animesh Mukherjee

#Bieber + #Blast = #BieberBlast: Early prediction of popular hashtag compounds

Hashtag is the new "paralanguage" of Twitter. What started as a way for people to connect with others and to organize similar tweets together, propagate ideas, promote specific people or topics has now grown into a language of its own. As hashtags are created by people on their own, any new event or topic can be referred to by a variety of hashtags. This linguistic innovation in the form of hashtags is a very special feature of Twitter which has become immensely popular and are also widely adopted in various other social media like Facebook, Google+ etc. and have been studied extensively by researchers to analyze the competition dynamics, the adoption rate and popularity scores. One of the

interesting and prevalent linguistic phenomena in today's world of brief expressions, chats etc. is hashtag compounding where new hashtags are formed through combination of two or more hashtags together with the form of the individual hashtags remaining intact. For example, #PeoplesChoice and #Awards together form #PeoplesChoiceAwards. #KellyRipa and #CelebrationMonth make #KellyRipaCelebrationMonth; #WikipediaBlackout is formed from #Wikipedia and #Blackout; #OregonBelieveMovieMeetup is formed from #Oregon, #BelieveMovie and #Meetup; #Educational, #Ipad, #Apps together make #EducationalIpadApps etc. There are marketing strategic needs, needs for fulfilling communicative intents (affective expression, political persuasion, humor etc.) as well as spontaneous needs for use of hashtag compounds. For example, the e-commerce company Amazon used #AmazonPrimeDay to promote the discounted sale of its product. The hashtag is a compound of #Amazon and #PrimeDay whereas the individual hashtag #PrimeDay was also popular. So, there is a trade-off whether to use hashtag compounds or the uncompounded constituents. Similarly, assume another scenario where an event is taking place, say the premiere of a movie 'The Imitation Game'. Here one can use both the hashtags #TheImitationGame and #Premiere or can use a hashtag compound #TheImitationGamePremiere. In this context, one needs to identify which version one should use so that the hashtag being used gains a higher frequency of usage in the near future. #CSCW2016 is being used to tag the activities taking place related to the 2016 CSCW conference. This is also a compound hashtag made of #CSCW and #2016 where #CSCW refers to all CSCW conferences and #2016 refers to all the events/activities going to take place in 2016. The hashtag #CSCW2016 is used for a more focused purpose and refering to only the 2016 edition of the conference whereas #CSCW could also have served the purpose. Hashtag compounds also serve the communicative intents like political campaign hashtags (#PresidentTrump = #President + #Trump : hashtag that shows support for Donald Trump for the 2016 US Presidential election). Hashtag compounding also happen spontaneously. These hashtags are generally conversational or personal themed hashtags like #TheBestFeelingInARelationship (#TheBestFeeling + #InARelationship), #ThrowbackThursday (#Throwback + #Thursday), #ComeOnNowDontLie (#ComeOnNow + #DontLie). In this work, we identify for the first time that while some of these compounds gain a high frequency of usage over time (even higher than the individual constituents) many of them are soon lost into oblivion. We focus and investigate in detail the reasons behind the above observations and propose a prediction model that can identify with 77.07% accuracy if a pair of hashtags compounding in the near future (i.e., 2 months after compounding) shall become popular. At longer times T = 6, 10 months the accuracies are 77.52% and 79.13% respectively. This technique has strong implications to trending hashtag recommendation since newly formed hashtag compounds can be recommended early, even before the compounding has taken place. As an additional contribution, we ask human subjects to guess whether a hashtag compound will become popular from the structural information of the hashtags. Humans can predict compounds with an overall accuracy of only 48.7%. Notably, while humans can discriminate the relatively easier cases, the automatic framework is successful in classifying the relatively harder cases.

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Supervisors: Prof. Pallab Dasgupta, Prof. Soumyajit Dey

Formal Verification of Real Time Embedded Control

Software control is widely used today in embedded hybrid dynamical systems, such as automotive and avionic control systems. The increasing complexity of such systems and our reliance on these systems demand rigorous guarantees on the safety and correct operation of such control. Providing formal guarantees about the safety and reliability of such systems require accurate modeling and validation of the interaction between the software, the control architecture and the hybrid dynamical system being controlled. Ms. Ghosh aims to study the underlying formalism for model based design and validation practices in embedded system development and develop new formal methods, tools and practices for verifying closed loop software based control of hybrid dynamical systems.

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Sumana Maiti received a B.Tech degree in Computer Science & Engineering from College of Engineering and Management, Kolaghat. She received an M.Tech degree in Multimedia & Software System from NITTTR, Kolkata. Since January 2016, she has been a research scholar in department of Computer Science & Engineering in IIT Kharagpur. Her research areas are in the area of Network security, Cloud computing, and IoT.

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Sumit Goswami
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Joined the department in: December 2011

Supervisors: Dr. Sudip Misra

Behavioral and Security Analysis of Future Generation Networks

Public key infrastructure based security for low power sensor networks like ZigBee, 6LoWPAN and specific use WSN.

Surjya Ghosh

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I am a Ph.D. student in the Department of Computer Science and Engineering, IIT Kharagpur, since Jan 2015. My supervisors are Prof. Bivas Mitra and Prof. Niloy Ganguly. My research interest lies in the area of Mobile Networks and Applications.

Supervisors: Prof. Bivas Mitra, Prof. Niloy Ganguly

Inferring Emotion from Smartphone Usage

I am working in the area of Mobile Affective Computing. Currently, I am focusing on to identify emotional state of the user based on the smartphone application usage. For this purpose we are collecting data from the smartphone and trying to classify the emotional state of the user by applying some machine learning techniques.

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Swapan Maiti received his B.E. degree in Computer Science and Engineering from Jadavpur University in 1998 and M. Tech. degree from the Department of Computer Science and Engineering, IIT Kharagpur in 2011. He worked as a faculty in Birbhum Institute of Engineering & Technology (BIET) from February 2000 to July 2012, and in Hooghly Engineering & Technology College (HETC) from August 2012 to December 2014. Since December 2014, he is pursuing his PhD Programme in the Department of Computer Science and Engineering, IIT Kharagpur, India. His current research interests are in the field of Cellular Automata, and Cryptography.

Supervisor: Prof. Dipanwita Roy Chowdhury

Design and Analysis of Fault-Resilient Symmetric Ciphers

Symmetric-key cryptography refers the same cryptographic key for both encryption of plaintext and decryption of ciphertext. Symmetric-key ciphers are implemented as either stream ciphers or block ciphers. Side Channel Attacks (SCA) are one of the most effective means in breaking symmetric key ciphers. This kind of attacks analyze the side channel leakages of the implementations of the ciphers, such as, power consumption, electromagnetic radiation, scan-chains etc. to deduce information about the key of the cipher. Fault attacks constitute one of the most interesting Side Channel Attacks (SCA) primarily because of their ease of implementation. In this kind of attack, faults are injected into the implementation of a cipher in order to obtain information about the secret key by analyzing the fault-free and faulty ciphertexts. It is shown in the body of literature available on fault attack that most of the symmetric ciphers are vulnerable against fault attacks. Stream ciphers and Block ciphers have been popular targets of fault based cryptanalysis. The advances in the field of fault analysis necessitate the design of fault-resilient ciphers. We are working in designing fault-resilient symmetric ciphers.

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Tamoghna Ojha is currently pursuing PhD at the School of Information Technology, Indian Institute of Technology Kharagpur. He has completed MS from the Indian Institute of Technology Kharagpur in 2014. His research interests are in Internet of Things (IoT), sensor-cloud, mobile computing, underwater acoustic networks. Besides, he has several years of research experience working on research projects funded by different agencies such as ITRA and DeitY, Govt. of India. Previously, he has received the Post Graduate Diploma in Embedded Systems from CDAC, Mohali in 2009, and B. Tech in Electronics & Communication Engg. from Haldia Institute of Technology, Haldia affiliated to West Bengal University of Technology, Kolkata in 2008. Mr. Ojha is a graduate student member of IEEE and student member of ACM. Currently, he is serving as the Chair of the Executive Committee at IEEE Student Branch, IIT Kharagpur. He is also the Organizing Chair of IEEE TechSym 2016 to be held at IIT Kharagpur. He serves as a TPC member for IEEE ScalCom 2014, IEEE TechSym 2014 and ICACIE 2016 and reviewer for several conferences and journals. He was the winner of GE Edison Challenge 2013 with cash prize of INR 10 Lakhs. He is a co-founder of SkinCurate Research.

Supervisors: Dr. Sudip Misra, Dr. Narendra Singh Raghuwanshi

Architecture and Resource Management for Green Sensor-Cloud Applications

The sensor-cloud framework refers to the advent of cloud computing for enhanced monitoring of on-field distributed WSNs. This integrated framework empowers the typical WSNs in terms of improved processing power and storage capacity. Sensor-cloud provides efficient data management and access in a WSN deployment spanning a vast geographical area. Also, the sharing of computing resources in a cloud computing framework increases the resource utilization. This facilitates the development of real-time decision support system for use with multiple WSN applications at the same time. Using the principle of virtualization, the sensor-cloud architecture attains complete abstraction of deployed nodes and underlying topology. Typically, the on-field WSNs periodically update the sensed information in the cloud framework. However, frequent update of information increases energy consumption, and at the same time, increases the bandwidth requirement. In resource constrained networks such as WSNs, it is desirable to minimize energy consumption to maximize the sensor lifetime, while maintaining the delay constraint. In this thesis, we propose an architecture for sensor-cloud which can facilitate resource management. Also, we present how dynamic duty scheduling of the sensor nodes can significantly minimize the energy consumption of the on-field WSNs and consequently facilitate resource management.

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Tanwi Mallick

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Tanwi Mallick is a TCS Research Scholar. She received her B.Tech and M.Tech in Computer Science from Jalpaiguri Govt. Engineering College (2008) and NIT, Durgapur (2010) respectively. From July 2010 to December 2011, she taught at DIATM College, West Bengal as an Assistant Professor. Tanwi joined the Department in December 2011 as an Institute Research Scholar and received the TCS Fellowship in October 2012. Her research interests are in the area of Computer Vision.

Supervisors: Partha Pratim Das, Arun Kumar Majumdar

Computer analysis of Indian Classical Dance

The broad goal of my research is Computer analysis of Indian Classical Dance Bharatanatyam. It is an ancient heritage of India, consists of visual, auditory and textual information that tell a story through body movements, hand gestures or hasta-mudras, vocal and instrumental music, facial expression or emotions (nava-rasa)'s, costume, and make-up. With time, these dance forms have been immersed with various sets of complex rules have emerged for body postures and gestures.

My objective is to analyse the multimedia aspects of Bharatanatyam Adavu using Kinect. Analysis of Adavu involves analysis of the component parts like video, audio, and their relations in making up a complete dance. We solve the problem using a three-tier approach. In this approach the lower tier is data acquisition and pre-processing, middle tier is data-driven tier for dance sub-sequence recognition and the upper tier is knowledge-based to support Adavu recognition based on the inherent structure of Bharatanatyam Adavu.

Tapas Kumar Mishra

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Tapas Kumar Mishra received a B.Tech. Degree in Computer Science & Engineering from Veer Surendra Sai University of Technology, Burla in 2010. He received a M. Tech. Degree in Computer Science & Engineering from Indian Institute of Technology, Kharagpur in 2013. Since July 2013, he has been a research scholar in the department of Computer Science & Engineering at IIT Kharagpur. His research interests are Combinatorics, Graph and Hypergraph Theory, Analysis of Algorithms and Ramsey Theory.

Supervisors: Prof. Sudebkumar Prasant Pal, Prof. Rogers Mathew

Bisecting families of Hypergraphs

Let n be any positive integer and F be a family of subsets of [n] = {1,...,n}. Another family F' of subsets of [n] is called a bisecting family for F, if for each subset f in F, there exists a subset f' in F' such that $|f \cap f'|$ is floor(|f|/2), or ceil(|f|/2). Let \beta(F) denote the minimum cardinality of a bisecting family for F. We define \beta(n) as the maximum of \beta(F) over all families F on [n]. We study the problem of computation/estimation of \beta(F) and \beta(n).

Application:

Given an bicoloring B, an path {v_1,...,v_k} is said to be alternating if any pair of consecutive vertices are colored with different colors. Consider a two player game consisting of an adversery A and a player

P. A first chooses a natural number n. Then, P has to generate a set of bicolorings C={B_1,...} of n vertices. Now, A gives any set f consisting of even number of vertices. Player P wins if given f as input, P has a bicoloring in C where there is an alternating path consisting of only the vertices of f. The minimum cardinality of C that P has to choose in order to win is equal to \beta(n).

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Urbi Chatterjee received her B.Tech. in Computer Science and Engg. from Asansol Engineering College, Asansol in 2011. Then she had opted the M.Tech Program in Indian School of Mines, Dhanbad and completed it in 2013. Since then, she had worked in TATA Consultancy Services Limited, Kolkata as Assistant Systems Engineer. She joined the department of Computer Science & Engineering in Indian Institute of Technology Kharagpur as a Ph.D. scholar in December,2014 under the supervision of Dr. Rajat Subhra Chakraborty and Dr. Debdeep Mukhopadhyay. Her broad area of research is Design of Lightweight Authentication and Secure Communication Protocols based on Physically Unclonable.

Functions for Internet of Things framework

In recent years, the Internet-of-Things (IoT) has been foreseen to become an essential landmark in the growth of smart cities and smart homes in the near future. IoT is a setup in which an unique identifier is assigned to each object, and data exchange between the objects takes place without any human or computer supervision. Hence, special methods must be deployed to enable authentication and secure data transmission, and ensure that the IoT nodes are free from the threats of active and passive attacks. Since the IoT nodes are inherently resource-constrained, an additional challenge in this context is that the implementation of the security measures must be sufficiently lightweight. This often means that traditional cryptographic algorithms and protocols cannot be directly used in IoTs, and novel measures must be adopted. In recent years, Physically Unclonable Function (PUF) has been introduced as a promising hardware security primitive for different emerging applications. In this work, our major contributions are: 1. We have presented a complete authentication, key sharing and secure communication architecture where each IoT node has an integrated PUF instance, and the identity of the node is created by the CRP signature of its PUF instance. 2. We have considered the Identity based Encryption scheme and Weil Pairing on elliptic curves which was proved to be secure against CPA and CCA Secure. 3. We demonstrate through theoretical analyses that our proposed scheme is resistant against different active and passive attacks in Session Key Security model and Universally Composite Framework. Our security proofs are based on reduction of the problem of attacking the proposed scheme to the problem of cloning (either physically or mathematically) a particular PUF instance. 4. We have also implemented the major software and hardware components of the protocols and demonstrated that they incur low hardware and software overhead.

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I am presently pursuing her Master of Science (by Research) (M.S.) degree from Department of Computer Science and Engineering, Indian Institute of Technology Kharagpur, India. Prior to this, I received my Bachelor of Technology degree in Electronics and Communication Engineering from Institute of Engineering and Management, Kolkata, Maulana Abul Kalam Azad University of Technology (Formerly knows as WBUT), India in 2015. I am a graduate student member of IEEE. I am also a member of Smart Wireless Applications & Networking (SWAN) Research Group, Indian Institute of Technology Kharagpur, India.

Research Work: I am currently working on Sensor-cloud. Sensor-cloud is conceptualized as the integration of cloud computing and wireless sensor networks using virtualization. It has been envisioned to provide Sensor-as-a-Service (Se-aaS) based on pay-per-use model. I am focusing on the pricing model of Se-aaS and virtualization of physical sensor nodes.

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Joined the department in: December 2013

Amit Samanta is pursuing MS By Research in Department of Computer Science and Engineering, Indian Institute of Technology Kharagpur. He has completed my B.Tech degree in Electronics and Communication Engineering from West Bengal University of Technology.

Supervisor: Dr. Sudip Misra

QoS-Aware Resource Provisioning in Wireless Body Area Networks

The constant miniaturization of electronic devices and the development of low-power, invasive/non- invasive, lightweight wireless sensor nodes have triggered an evolution in sensor-based event monitoring systems in varied domains. Wireless Body Area Networks (WBANs), in recent times, have gained popularity in the context of remote, ubiquitous, and seamless monitoring of human physiological parameters contentiously around the clock. Although WBANs provide remote and ubiquitous healthcare services but mobility of limbs, and in turn, the on-body sensor nodes causes the network topology to change periodically. This significantly deteriorates the link-quality between the sensor nodes and the LPU. Also, the group-based mobility of WBANs hampers the communication link between the LPUs and APs considerably. Consequently, the variation in the link-quality unnecessarily depletes the available resources of the sensor nodes and also increases the packet delivery delay. Thus, a need to provide eefficient solutions to these technical challenges is imminent. The main focus of this problem is to improve the data transmission techniques, while minimizing the packet delivery delay and maximizing the throughput of WBANs in the presence of body movements and mobility of WBANs. We also analyze the performance of MAC protocol | IEEE 802.15.6 to provide the reliable communication to WBANs.

Ananda Das

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Pursuing MS at Computer Science & Engineering Department.

Research Work: To create multimedia ontology human gesture , activity needs to be recognized from multimedia content. I am focusing to obtain such information to construct multimedia ontology.

Anindya Ganguly

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I have completed B.Sc. in Mathematics from Bankura Christian College under the University of Burdwan in 2014 and M.Sc. in Mathematics from Department of Mathematics, IIT Kharapur in 2016. During my M.Sc. I have worked in Cryptography under the supervision of Dr. Sourav

Mukhopadhyay. Currently, I am pursuing M.S.(by Research) from Department of Computer Science & Engineering, IIT Kharapur under the supervision of Prof. Abhijit Das and Prof. Dipanwita Roy Chowdhury. My area of interest is Curve based Cryptography, Computational Number Theory.

Research Work: Presently, I am working in Curve Based Cryptography. Curve based cryptography is an approach to public-key cryptography based on the algebraic structure of elliptic curves and hyperelliptic curves over finite fields. Algebraic curves have a broad range of application in cryptology: on the one hand, elliptic and hyperelliptic curve cryptosystems are increasingly employed as public-key cryptosystems. On the other hand, cryptanalytical algorithms for attacking cryptosystems utilize algebraic curves. Examples include the elliptic curve method for solving the Factorization Problem(FP) or Pollard's Rho method for solving the Elliptic Curve Discrete Logarithm Problem (ECDLP). Improvements of computational primitives such as the elliptic and hyperelliptic curve group operation and its underlying arithmetic functions inevitably implicate an increased performance of a affected cryptosystems and cryptanalytical algorithms.

Aniket Roy
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Aniket Roy received B.Tech in Electronics and Communication Engineering from Kalyani Govt. Engineering College in 2014. Presently, he is pursuing M.S by research in the department of Computer Science and Engineering, IIT Kharagpur under guidance of Dr. Rajat Subhra Chakraborty.

Research Work: My research domain is primarily multimedia security. I have done the information theoretical analysis of optimal colour space selection for reversible watermarking and the complexity theoretical analysis of optimal prediction error expansion based reversible watermarking. Recently, I am also working on digital image forensics problems, such as, camera source identification, image forgery detection etc.

Arijul Haque
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Joined the department in: January 2013

M. S.: *Pursuing*
Broad research topic: Speech processing.
Research area: Emotion conversion in speech.
Research interests: DSP, Machine Learning, Audio Signal Processing. Publications: Two international conference papers published.

Supervisor: Krothapalli Sreenivasa Rao

Emotion Conversion in Speech
Given a speech signal in neutral style, the target is to process that signal so as to mimic a target emotion, for example, sadness or anger.

Ayan Chandra
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Last educational qualification: B.Tech (information Technology), West Bengal University of Technology, Department of CSE & IT, 2012-16. Currently Pursuing, MS(Research), Information Retrieval, CS, 2017-Onward.

Research Work: Project: National Digital Library of India MS research area: Digital Library and Information Retrieval Supervisor: Prof. Sudeshna Sarkar Abstract of Proposal: We propose to build a fully functional system architecture which will be able to provide insight and inference on different verticals such as Law, medicine, competitive examinations, school education, engineering based on the meta-data pool present in National digital library. The proposed system will thus introduce topical relevance in document retrieval based on user query, will enhance domain-specific search and re-ranking of documents. To meet the objectives, we will have an universal Named entity recogniser and relation extraction mechanism which will again have topic-specific named entity recognition and relation extraction as its sub-modules. In vertical/topic specific sub-module we have started working on Legal named entity extraction, labelling and relation

graph establishment as our priority. The model developed for legal relation extraction and analysis of juridical system through the extracted relations and entities will serve as the standard example for other topic-specific sub-modules as well.

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Debasmita Lohar is pursuing Master of Science (MS) by Research under the supervision of Dr. Soumyajit Dey in the Department of Computer Science & Engineering of Indian Institute of Technology, Kharagpur. She did her Bachelor's in Computer Science and Engineering from Heritage Institute of Technology , Kolkata. Prior to this, she completed high school from Jadavpur Vidyapith , Kolkata.

Research Work: A behavioral specification is often employed for modeling a complex software system at a high level of abstraction. Well known failure conditions of such systems can be naturally specified as assertions defined over system variables. In that way, the situation transforms to an imperative program with annotated failure assertions. This research work presents a framework for computing failure probability of such programs under the fail-stop failure model along with the design and implementation of a path based tool named ProPFA (Probabilistic Path-based Failure Analyzer) developed for this purpose. In the analysis, loops are abstracted out using invariant relations. More importantly, the imprecision in the estimation process resulting from coverage loss due to time, memory bounds and approximation involved in invariant synthesis, are captured as a confidence measure. This framework can be seamlessly employed in reliability estimation and validation of complex component based software systems. Another application of this framework involves risk analysis of control software. The exact program implementation is considered for both the cases.

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Gurunath Reddy M

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Gurunath Reddy M is from Bangalore, India. Pursuing MS (by research) at School of Information Technology, IIT Kharagpur on the thesis titled "Predominant Melody Extraction from Indian Classical Vocal Polyphonic Music Signals ". Parallel to MS, he is working as a Research assistant for developing on-line pedagogical music learning tools for tutoring applications and Children story speech synthesis in Indian Languages. His research interests includes : Music signal processing, Speech processing and Machine Learning.

Supervisor: Dr. K Sreenivasa Rao

Melody Extraction from Vocal Polyphonic Music Signals

Melody extraction is the task of automatically extracting the dominant melodic line in a polyphonic music signal. Here, polyphony refers to the music signal in which two or more instruments may sound simultaneously (e.g. voice, tanpura and tabla) or it can be a single instrument which is capable of playing more than one note at a time (e.g. the violin). The term melody is a musicological concept which is based on the judgment of human listeners and we can expect to find different definitions for the melody in different contexts. The melody representation adopted in this work is fundamental frequency (F0) values correspond to the perceived pitch of the dominant instrument. The dominant instrument can be either the human singing voice or the lead instrument in the polyphonic music signal. The accurate extraction of the melody is remained as challenging and unsolved task in the research community because the complexity of the task is two folds. Firstly, the polyphonic music signal contains superposition of all instruments which play simultaneously. Hence, it is hard to attribute specific frequency bands and energy levels to specific instrument. Secondly, the task of determining which pitches constitute the main melody needs to be addressed. This in turn entails three main challenges: (i) determining when the melody is present and when it is not, (ii) ensuring the estimated F0 is in the correct octave and (iii) selecting the correct melody pitch when there is more than one note present at the same time.

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Harikrishna D M received his B.E. degree in Computer Science from Siddaganga Institute of Technology, Tumkur in 2010. After receiving B.E., he worked as software developer in Laurus Infosystems, Bangalore. Since December 2012, he is doing his MS in the school of information technology, IIT Kharagpur. His current research interests are in the areas of Speech and natural language processing.

Supervisor: K. Sreenivasa Rao

Multi-stage Children Story Speech Synthesis
 Story speech synthesis aims at synthesizing story-style speech from the text using text-to-speech (TTS) systems. Synthesizing expressive speech involves embedding natural expressions into speech, according to the semantics present in the text. Generating an expressive, naturally sounding, story like speech from text using a neutral TTS system is a highly challenging task. We have attempted this task by dividing it into multiple stages such as: (i) identifying whether the given text is related to story or not, (ii) identifying the story genre from the story text, (iii) identifying emotions specific to story genres, (iv) deriving prosody modification factors (rules) for story specific emotions and (v) synthesizing the story style speech from neutral TTS by incorporating the derived prosody modification factors.

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K Sai Ram is an MS student in the Department of Computer Science and Engineering, IIT Kharagpur, since Dec 2014 under the joint guidance of Prof. Jayanta Mukhopadhyay and Prof. Partha Pratim Das. He graduated from Indian Institute of Technology, in the department of Electronics and Electrical Communication Engineering, and then worked in Philips India Private Limited, Noida, India, as Assistant Manager in LED Development Labs. His research interests are in the areas of Robotics, Computer Vision, Image Processing and Pattern Recognition.

Supervisor: Prof. Jayanta Mukhopadhyay, Prof. Partha Pratim Das

Design autonomous aerial vehicles to navigate in unknown outdoor and indoor environments

The aim of this project is to create an autonomous quadrotor, capable of balancing itself, and will be capable of stable flight. It will also be able to   track moving robots on the ground and interact with them in a new innovative way. It will be self-aware and able to navigate autonomously in a own environment. Develop an autonomous unmanned aerial vehicle which is aware of its surroundings and capable of navigating in indoor and outdoor environments. It would be useful in several applications in the fields of surveillance, 3D environment mapping and further applications which can be achieved using a team of such robots.

Malay Pramanick
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Malay Pramanick graduated in 2014, from the Department of Computer Science and Engineering. After receiving his B.Tech, he joined Abzooba Infotech as a Research Associate. He left Abzooba to join IIT Kharagpur in 2015, to pursue academic research, as a Junior Research Fellow. His primary research interests are in Natural Language Processing, Cognitive Science, Machine Learning and Artificial Intelligence.
Supervisor: Pabitra Mitra

Research Work: Non-Literal Language for Computers Malay Pramanick works on detection and analysis of various types of figurative (non-literal) speech with primary focus on English language. Currently he is working on detection of metaphors in any given sentence by computers.

Niloy Saha
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B.Tech in Electronics & Communication Engineering from IEM, Kolkata Pursuing MS degree in the Dept. of CSE under Prof. Sudip Misra
Research Work: Traffic-Aware QoS in Software Defined Networking; Effect of OpenFlow rule capacity on SDN.

Omprakash Chakraborty
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Omprakash Chakraborty *is currently pursing his M.S degree in the field of Computer Science and Engineering at IIT KGP under the guidance of Dr. Soumya K. Ghosh and Dr. Pabitra Mitra. He has graduated in the year 2015 with a B Tech degree in Information Technology from the Haldia Institute of Technology, Haldia. He mainly works in the field of Spatial informatics with specializations in web service orchestration and graph theoretic approaches towards disaster management. Omprakash is also associated in collaborative work with the department of Architecture and Regional Planning of the institute and works for a MHRD based project concerning the efficient routing of hazards vehicles. He is staying in Kharagpur since 2015, with his hometown being in Kolkata.*

Research Work: The road network of a region forms the most vital infrastructure for the inhabitants, to access the available relief facilities and also provide aids during disaster situations. Besides, the setting up of various relief centers and facilities, the safeguarding of the roads should be one of the primary motives to ensure robust connectivity. Therefore the analysis of the roads is a critical challenge to identify its usability along the different disaster layouts. There is a need for development of an efficient framework to analyze the road network of a region to identify the most vital links in terms of its spatial

vulnerability and infrastructural properties that are optimal for generating reliable access routes to help the regional inhabitants to reach certain reliefs facilities for aids and amenities during disaster times. We attempt to propose importance metric measures to assign with every edge or link, an importance weight value based on both the spatial attributes and infrastructural characteristics of the links, that make them apt for optimal access routes during disasters. The transport network is examined as a weighted graph with the road segments as edges and the intersection points as the nodes. We incorporate the multi-layer modeling to highlight the different usability characteristics of the links. The individual links are explored to determine the respective spatial properties along with the infrastructural parameters which contribute towards its utilization during disasters. The primary advantage of the approach is to highlight the utility based road usages and distinguish the facility-oriented mobility characteristics. The multi-layer approach based on dividing the road graph into community based sub-graphs also results in a more efficient computational work-flow, unlike typical single-layered approach, where every link of the entire road network have to be analyzed for all the collective parameters, even if some of them do no contribute to the importance evaluations, making it computational intensive.

Paheli Bhattacharya

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Paheli Bhattacharya is a Master of Science (MS, by Research) student in the Department of Computer Science and Engineering at IIT Kharagpur. She completed her BTech from Government College of Engineering and Textile Technology, Semaphore (WBUT). Her areas of interest include Natural Language Processing, Information Retrieval and Machine Learning.

Supervisor: Prof. Pawan Goyal, Prof. Sudeshna Sarkar

Improving Cross Lingual Word Embeddings for Indian Languages

I am currently working on improving vector space representation of words in Indian languages, that can help in Machine Translation, Cross-Language Information Access and expanding the low amount of resources we have for Indian languages (for example, inducing bilingual lexicons)

Rijula Kar
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Rijula Kar is pursuing M.S in the department of CSE in IIT,Kharagpur. Her broad area of research is Machine Learning. She has received B.E degree from IIEST,Shibpur in 2015.

Supervisor: Sourangshu Bhattacharya

Collective classification of rumors spreaded in Social Media
A rumor is defined as an unverified or unconfirmed statement or report circulating in a community. These rumors are created either intentionally or unintentionally, but carry false or even malicious information and spread widely via social media. We have seen that after a disaster event a rumor propagates very fast. So,it is very important to detect rumor and to stop its spreading as soon as possible. Collective classification refers to the combined classification of a set of interlinked objects. We are collectively classifying the rumors and the users spreading the rumors.

Saptarshi Pal
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Joined the department in: June, 2015

He has *received Bachelor of Engineering from Indian Institute of Engineering Science and Technology, Shibpur (IIEST Shibpur)*

Supervisors: Prof. Soumya K. Ghosh

Prediction in spatio temporal data
With the advent of remote sensing technologies, there is a lot of data which has spatial and temporal context. For example, USGS provides landsat images so that analysis can be done on it. Satellite images produces a lot of useful information as climate, built-up, landuse etc. My current work is based on prediction of these parameters from satellite data using machine learning techniques

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Sankarshan Mridha completed his B.E in Computer Science and Engineering from Jadavpur University in 2013. He is currently pursuing MS under the guidance of Prof. Sourangshu Bhattachraya and Prof. Niloy Ganguly in the Department of Computer Science and Engineering from IIT Kharagpur. His broad area of research is Learning Problems in Transportation Network.

Research Work: Accurate estimation of urban link travel times is essential for traffic operators and travellers, not only because link travel time is an important index for monitoring and evaluating the state of the traffic on an urban road network, but also because it is a critical input to dynamic route guidance systems which helps travellers make better route choices and avoid congestion. The estimation of urban link travel times relies on traffic data collection. In the past, traffic data were mainly collected by loop detectors. However, due to the high cost of installation and maintenance, loop detectors are often only installed on a few links in the urban road network, which leads to unavailability of most of the network traffic data. In recent years, most vehicles are equipped with GPS devices such as GPS navigators or smartphones, which provide a type of probe vehicle which can collect traffic data from the entire road network at low cost. These GPS probe vehicles can continuously collect traffic data by travelling on the road. Now The aim of this project is to propose a citywide model for estimating the travel time of any path (represented as a sequence of connected road segments) in a city using partial information obtained from large scale yellow cab GPS data from New York City over a period of one year. The idea here is to infer the road network from the partial data followed by estimation of the link travel time and capture the uncertainty to provide a better service to the city commuters.

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Sanku Kumar Roy
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I have completed my B-Tech from West Bengal University of Technology and currently pursuing Master of Science (by Research) (MS) from the Department of Computer Science and Engineering, Indian Institute of Technology, Kharagpur, India under the supervison of Prof. Sudip Misra and Prof. Narendra Singh Raghuwanshi.

Research Work: Interoperability in Internet of Things (IoT)
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Saptarshi Misra
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Currently an MS by Research student in the department of Computer Science and Engineering from IIT Kharagpur. Passed B.Tech from Kalyani Government Engineering College, West Bengal in 2015.

Research Work: My broad research area is maching learning with major focus on deep learning. Currently, I am working on developing state of the art deep learning models for statistical downscaling of climatic variables like rainfall. Statistical downscaling is a method of climatic prediction in which coarse resolution well correlated climatic variables (like air temperature, pressure, humidity, wind velocity) are downscaled to a fine resolution climatic variable of interest, like rainfall and temperature. Accurate rainfall prediction is a very important task as it directly affects decisions in agriculture, flood control, etc.
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Satadal Sengupta
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Satadal is a 2nd year MS Student since January, 2016 and a Junior Research Fellow in the Department of Computer Science and Engineering at Indian Institute of Technology Kharagpur, India. He works with Dr. Sandip Chakraborty and Prof. Niloy Ganguly. His research interests lie in the fields of Mobile Computing and Wireless Networks. Satadal completed his Bachelor of Technology in Computer Science and Engineering from National Institute of Technology Durgapur, India in 2013. He worked as an Associate Applications Developer in Oracle Financial Services Software Ltd., Bangalore, India from September, 2013 to April, 2015. He has also worked with Microsoft IT, Hyderabad, India as a Software Development Engineer (SDE) during his summer internship from May to July, 2012.

Research Work: Network Traffic Analysis: Network administrators of large networks, such as enterprise and academic networks, require information regarding the various types of services being accessed by the users of the network. Knowledge regarding the types of applications being used, volume generated by each such application, the types of devices accessing the network, links that are congested, viral trends, etc., enable the administrator to plan his resources more optimally. However, such monitoring and measurement tasks are increasingly made more difficult due to the introduction of more and more apps, and the practice of encrypted traffic generation by a large section of these apps. Besides, protocols such as QUIC, and strategies such as VPN, which enable tunneled connections between machines, further complicate the task. The aim of this project is to alleviate such issues by introducing payload-agnostic features of data-packets, which can help differentiate between different kinds of traffic even when the packets are encrypted. Such features include packet-level features, such as packet-size and inter-arrival time, and burst-level features, such as average burst-size, average burst duration, and average burst inter-arrival time. Even features such as the bit-pattern of the payload of a packet, have shown promising differentiating abilities. Using combinations of these features, we train a machine learning-based classifier which can classify individual packets into different origin apps.

Webpage: https://satadalsengupta.github.io/

Subhendu Khatuya
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Joined the department in: June 2015

Subhendu Khatuya received his B.Tech degree from Kalyani Govt. Engg. College in CSE in 2014. Currently he is doing his M.S in Computer Science from IIT Kharagpur.

Supervisor: Dr. Bivas Mitra, Dr. Niloy Ganguly

EMS Log Analytics for Anomaly Detection
Predicting the system anomaly as early as possible.

Sulagna Gope
Email: sulagna.student12@gmail.com
Joined the department in: July 2014

Sulagna Gope is presently pursuing MS in dept. of Computer Science and Engineering, IIT Kharagpur. She did her B.Tech from Heritage Institute of Technology(WBUT), Kolkata.

Supervisor: Prof. Sudeshna Sarkar, Prof Pabitra Mitra

Weather prediction using Machine Learning techniques
Climate modelling is an extremely difficult task as it involves a huge range of parameters. The traditional models are mainly physics based that require a lot of manual intervention for designing. We want to automate the process by using a datacentric approach of model training and learning. For this purpose we are using the latest techniques in machine learning.

Tapadyoti Banerjee
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I was born and brought up in Howrah, West Bengal. I have completed my schooling from Bengal Engineering College Model School, Shibpur Howrah. I received my B.Sc. Hons in Computer Science from Bethune College, Kolkata in 2013, under University of Calcutta and achieved the prestigious PC Chandra Gold Medal Award

(Award of Excellence) for all-round achievements from my college. Then completed my Post B.Sc. B.Tech. Degree in Computer Science and Engineering in 2016 from University of Calcutta. Since 7th October 2016, I have been doing research, in the department of Computer Science & Engineering, IIT Kharagpur and now I am doing MS by Research, under the supervision of Prof. Dipanwita Roy Chowdhury. My research interest is in Cryptography and Security. Beside this academic career, I am interested in the field of dancing and drawing and have received several degrees and awards in these fields.

Research Work: Authenticated Encryption (AE) or Authenticated Encryption with Associated Data (AEAD) is a form of encryption (In cryptography, encryption is the process of encoding a message or information in such a way that only authorized parties can access it) which simultaneously provides confidentiality (It is a security service that keeps the information from an unauthorized person. It is sometimes referred to as privacy or secrecy), integrity (Integrity service confirms that whether data is intact or not since it was last created, transmitted, or stored by an authorized user), and authenticity (Authentication provides the identification of the originator) assurances on the data communicating over an insecure channel. My research area is design and cryptanalysis of Authenticated Encryption.

Our Mentors:
Faculty of the Department

Abhijit Das
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Research Interests: *Arithmetic and algebraic computations with specific applications to cryptology*

Abhijit Das is an Associate Professor in the Department of Computer Science & Engineering, Indian Institute of Technology Kharagpur. Before joining IITKGP, he held academic positions at the Indian Institute of Technology Kanpur and Ruhr-Universität Bochum, Germany. Dr. Das received his BE degree from Jadavpur University, Calcutta in 1991, and ME and PhD degrees from Indian Institute of Science, Bangalore, in 1993 and 2000, respectively. His research interests include arithmetic and algebraic algorithms and their parallel implementations, with specific applications to cryptology. He is the author of two graduate textbooks: "Public-Key Cryptography: Theory and Practice" (Pearson Education, 2009, coauthored by Prof. C. E. Veni Madhavan, IISc Bangalore) and "Computational Number Theory" (CRC, 2013).

Animesh Mukherjee
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Research Interests: *Complex systems, language dynamics, social computation, web social media*

Presently, Animesh Mukherjee is an Associate Professor in the Department of Computer Science and Engineering, Indian Institute of Technology Kharagpur. Prior to this, he worked as an Assistant Professor in the same Department for the last four and a half years. Immediately before that he was a post-doctoral researcher in the Complex Systems Lagrange Lab, ISI Foundation, Italy. He received his PhD from the Department of Computer Science and Engineering, Indian Institute of Technology Kharagpur with a thesis on "self-organization of human speech sound inventories". His main research interests centrearound applying complex system approaches (mainly complex networks and agent based simulations) to different problems in(a) Human language evolution and change,(b) Web social media, (c) Information retrieval, and (d) Natural language processing. He has received many notable awards including the INAE Young Engineer Award 2012, INSA Medal for Young Scientists 2014 and the IBM Faculty Award 2015. He has authored more than 60 articles in top-tier CS conferences and high impact journals.

Anupam Basu
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Research Interests: *Emdedded systems, cognitive science and language processing with particular focus on intelligent interface design and human computer interaction*

Prof. AnupamBasu is a Professor at the Dept. of Computer Science &Engineering, IIT Kharagpur, India. He has been in the faculty since 1984. Hisresearchinterests include Intelligent Systems, Embedded Systems and LanguageProcessing.Hisresearch has been directed to develop a number of cost effectiveAssistiveSystems for the physically challenged as well as for development educationalsystems for the rural children. In all these applications, he has synthesized hisresearch to lead to products, which are presently in use in several village knowledge centres as well as in several organizations for the physically challenged. He isconsidered to be a pioneer in Assistive Technology research in India.

Presently, he is also serving as the Director of the Society for Natural Language Technology Research, an R&D institute aimed at carrying out language localization research and development.

Prof. Basu had taught at the University of Guelph, Canada, University of California, and Irvine and at the Dortmund University, Germany. He is an Alexander von Humboldt Fellow and a Fellow of the Indian National Academy of Engineering.

He has won several awards and honors for his research contributions. These include the National Award for the Best Technology Innovation for the Physically Disabled (2007), the Da Vinci Award 2004, and Outstanding Young Person Award 1996.

Arobinda Gupta
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Research Interests:*Distributed systems,networks*

Arobinda Gupta received his Ph.D. in Computer Science from the University of Iowa, Iowa City, in 1997, an M.S. in Computer Science from the University of Alabama in 1992, and an M.E. and a B.E. in Electronics and Telecommunication Engineering from Jadavpur University, Kolkata, India in 1990 and 1987 respectively. From February 1997 to September 1999, he was with the Windows 2000 Distributed Infrastructure groupin Microsoft Corp., Redmond, Washington, USA. Since Oct. 1999, he is a faculty in Indian Institute of Technology Kharagpur, where he is currently a Professor in the Department of Computer Science & Engineering. His current research interests are broadly in the areas of distributed systems and networks.

Bivas Mitra
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Research Interests: *Technological network modeling, complex and dynamic networks, interdependent networks, mobile networks*

Bivas Mitra is an Assistant Professor in the Department of Computer Science & Engineering at IIT Kharagpur, India. He earned his Ph.D in Computer Science & Engineering from IIT Kharagpur in 2011. During PhD tenure, he was the recipient of National Doctoral Fellowship and SAP Labs India Doctoral Fellowship, etc. After PhD, he worked as a postdoctoral researcher for two years (May 2010– July 2012) at the French National Centre forScientific Research (CNRS), Paris, France and Universite Catholique deLouvain (UCL), Belgium. He also spent a short stint in industry with Samsung Electronics, Noida as a Chief Engineer. Dr. Mitra is associated with the Complex Networks Research Group (CNeRG), IIT Kharagpur, India. His research interests include complex and dynamical networks, social networks and mobile networks.

Chittaranjan Mandal
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Research Interests: *Formal modelling and verification, high-level design, network and web technologies*

Chittaranjan Mandal received his Ph.D. degree from IIT, Kharagpur, India, in 1997. He is currently a Professor with the Department of Computer Science and Engineering and also the School of Information Technology, IIT, Kharagpur. Earlier he served as a Reader with Jadavpur University. His research interests include formal modelling and verification, high-level design and network and web technologies. He has about seventy publications and he also serves as a reviewer for several journals and conferences. Prof. Mandal has been an Industrial Fellow of Kingston University, UK, since 2000. He was also a recipient of a Royal Society Fellowship for conducting collaborative research. He has handled sponsored projects

from government agencies such as DIT, DST and MHRD and also from private agencies such as Nokia, Natsem and Intel.

Debasis Samanta
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Research Interests: *Augmentative and Alternative Communication Systems, Human Computer Interaction, Model-Based Testing, Cognitive Science, Biometrics*

Debasis Samanta received his Ph.D from Indian Institute of Technology Kharagpur, M.Tech. from Jadavpur University, and B.Tech. from Calcutta University. Before joining IIT Kharagpur in 2004, he was a Senior Lecturer in North Eastern Regional Institute of Science and Technology (NERIST), Itanagar. His research includes logic synthesis for low power high performance VLSI CMOS circuits, models and algorithms for design of scanning keyboards, automatic synthesis of test cases with some UML behavioural models, test coverage analysis of object-oriented programs, multimodal biometric authentication systems, integration testing of object-oriented systems using UML, and multimodal user interface to Internet for common people. He is a senior member of IEEE since 1999 and the Chair of IEEE Kharagpur Section during 2009-2010.

Debdeep Mukhopadhyay
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Research Interests: Cryptography, side channel analysis, VLSI of cryptographic algorithms, cellular automata

Dr. Debdeep Mukhopadhyay is currently an Associate Professor at the Department of Computer Science and Engineering, Indian Institute of Technology at Kharagpur, India and a visiting scientist at School of Computer Science and Engineering at NTU, Singapore. Prior to this he worked as a visiting Associate Professor of NYU-Shanghai. He had also served as an Assistant Professor at IIT Madras, India and as a Visiting Researcher at NYU Polytechnic School of Engineering under the Indo-US STF Fellowship. He holds a PhD, an MS from Computer Sc & Engg, and a B. Tech from Electrical Engg, IIT Kharagpur, India. At IIT Kharagpur he initiated the Secured Embedded Architecture Laboratory (SEAL), with a focus on Embedded Security and Side Channel Attacks (http://cse.iitkgp.ac.in/resgrp/seal/). Dr. Mukhopadhyay's research interests are Cryptography, Hardware Security, and VLSI. His main research results include the best reported fault attack on Advanced Encryption Standard (AES) to show a single fault is sufficient to retrieve the secret key of AES. Besides his research on designing Elliptic Curve Cryptosystems on FPGAs are among the foremost in India, which has been transferred to several defence projects of the country. He has mentored 6 PhD students, and is presently guiding 7 PhD students.
His books include Cryptography and Network Security (Mc Graw Hills), Hardware Security: Design, Threats, and Safeguards (CRC Press), and Timing Channels in Cryptography (Springer). He has written more than 100 papers in peer-reviewed conferences and journals and has collaborated with several Indian and Foreign Organizations. He is in the Program Committees of several prestigious international conferences.

Dr. Mukhopadhyay is the recipient of the prestigious Swarnajayanti DST Fellowship 2015-16, Young Scientist award from the Indian National Science Academy, the Young Engineer award from the Indian National Academy of Engineers, and is a Young Associate of the Indian Academy of Science. He was also awarded the Outstanding Young Faculty fellowship in 2011 from IIT Kharagpur, and the Techno-Inventor Best PhD award by the Indian Semiconductor Association.
StartUp and Technology Transfer. He has recently incubated a start-up on Hardware Security, ESP Pvt Ltd at IIT Kharagpur (http://esp-research.com/). The purpose of the start-up is to transfer his research in the domain of cryptography and security into tangible products.

Dr Mukhopadhyay is the PI of several projects in the domain of hardware security. He is currently collaborating with Department of Information Technology, Intel Labs (USA), Synopsys Inc., Hindustan Aeronautics Limited (HAL), Defence Research and Development Organization (DRDO), and Department of Science and Technology (DST). His current focus in the DRDO and DST funded projects are on developing secured authentication protocols and deploy

them for IoT and smart grids respectively. The core of the design architecture is the concept of Physically Unclonable Functions (PUFs), which would be designed in CMOS technologies and would be integrated with commercial IoT devices.
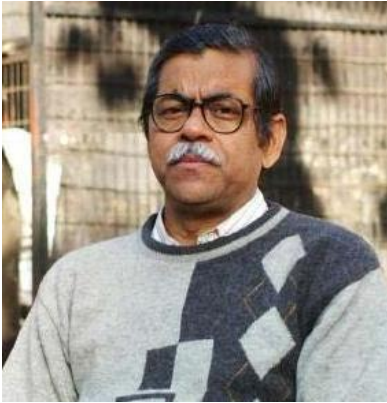
Dipankar Sarkar
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Research interests: Formal verification and symbolic reasoning

Dipankar Sarkar did his B.Tech., M.Tech. in Eletronics and Electrical Communication Engg. and PhD in Engineering from IIT Kharagpur. He has served IIT Kharagpur as a faculty member since 1981.

Dipanwita RoyChowdhury

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Research Interests: Design and analysis of cryptographic algorithms, theory and application of cellular automata, and VLSI design and testing

Dipanwita Roy Chowdhury is a Professor in the Department of Computer Scienece and Engineering, Indian Institute of Technology, Kharagpur, India. She received her B.Tech and M.Tech. Degrees in Computer Science from University of Kolkata in 1987 and 1989 respectively, and the PhD degree from the department of Computer Science & Engineering, Indian Institute of Technology, Kharagpur, India in 1994. Her current research interests are in the field of Cryptography, Error Correcting Code, Cellular automata and VLSI Design & Testing. She has published more than 140 technical papers in International Journals and Conferences. Dr. Roy Chowdhury has supervised 11 PhD and 8 MS thesis and she is the Principal Investigator of several R&D projects. She is the recipient of INSA Young Scientist Award and Associate of Indian Academy of Science. She is a fellow of the Indian National Academy of Engineering (INAE).

Indranil Sengupta
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Dr. Indranil Sengupta obtained his B.Tech., M.Tech. and Ph.D. degrees in Computer Science and Engineering from the University of Calcutta. He joined Indian Institute of Technology Kharagpur, as a Lecturer in 1988, in the Department of Computer Science and Engineering, where he is presently a Professor. He served as Head of the Computer Science and Engineering Department and the School of Information Technology of IIT Kharagpur. A Centre of Excellence in Information Assurance has been set up at IIT Kharagpur under his leadership, where a number of security related projects are executed. He has over 24 years of teaching and research experience, and over 100 publications in international journals and conferences. His research interests include cryptography and network security, VLSI design and testing, and mobile computing.

Jayanta Mukhopadhyay
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Research Interests: Image and video processing, pattern recognition, and multimedia systems

Dr. Jayanta Mukhopadhyay (Mukherjee) received his B.Tech.,M.Tech., and Ph.D. degreesin Electronics and Electrical Communication Engineering from the Indian Institute of Technology (IIT), Kharagpur in 1985, 1987, and 1990, respectively. He joined the faculty of the Department of Electronics and Electrical Communication Engineering at IIT Kharagpur in 1990 and later moved to the Department of Computer Science and Engineering where he is presently a Professor. He served as the head of the Computer and Informatics Centre at IIT Kharagpur from September 2004 to July 2007. He also served as the head of the Department of Computer Science and Engineering and the School of Information Technology from April 2010 to March 2013. He was a Humboldt Research Fellow at the Technical University of Munich in Germany for one year in 2002. He also held short term visiting positions at the University of California, Santa Barbara, University of Southern California, and the National University of Singapore. His research interests are in image processing, pattern recognition, computer graphics, multimedia systems and medical informatics. He published about 200 research papers in journals and conference proceedings in these areas. He received the Young Scientist Award from the Indian National Science Academy in 1992. Dr. Mukherjee is a Senior Member of the IEEE, and a fellow of the Indian National Academy of Engineering (INAE).
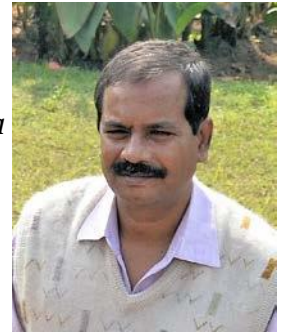
Krothapalli SreenivasaRao
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*Research Interests: Speech Processing, Image Processing, Multimedia Signal Processing, VLSI and Signal Processing*

K. Sreenivasa Rao obtained his PhD from IIT Madras in 2005, M.E (Comm. Sys.)from PSG Tech., Coimbatore in 1993, and B.Tech (ECE) from Nagarjuna University, Guntur, in 1990. Before joining IIT Kharagpur in 2007, he held faculty positions in IIT Guwahati and Baptala Engineering College, and was a project officer in IIT Madras. Dr. Rao started the activity of speech processing in the School of Information Technology, since 2007. The basic objectives of his group are: (1) Development of speech systems in Indian languages, (2) Characterization and incorporation of natural emotions in speech systems, (3) Development of speech systems for mobile devices and (4) Screen readers in Indian languages applicable to visually challenged people. Dr. Rao has about one hundred publications as book chapters and papers in reputed journals and conferences.

Niloy Ganguly
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Research Interests: Social Networks modeling, complex network theory, Mobile Systems

Niloy Ganguly is a professor in the department of Computer Science and Engineering, Indian Institute of Technology, Kharagpur. He has received his PhD from Bengal Engineering and Science University, Calcutta, India and his Bachelors in Computer Science and Engineering from IIT Kharagpur. He has been a post-doctoral fellow in Technical University of Dresden, Germany where he has worked in the EU-funded project Biology-Inspired techniques for Self-Organization in dynamic Networks (BISON). He presently focuses on dynamic and self-organizing networks especially online social networks (OSN), mobile network etc. He has worked on various aspects of OSN like understanding the importance of link farming in OSN and how to discover
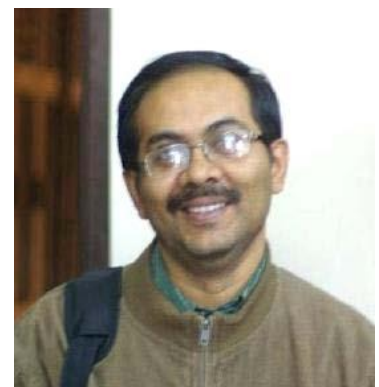
experts in OSN. In peer-to-peer networks he has worked on optimizing various services like search, topology management and applications like IP telephony, publish subscribe system etc. He has also simultaneously worked on various theoretical issues related to dynamical large networks often termed as complex networks. In this line he has been instrumental in organizing the workshop series Dynamics on and of Complex Networks in European Conference on Complex Systems. He has published around 100 papers in international conferences and journals. He has also edited a book on Complex Networks published by Birkhauser, Boston. He currently publishes in various top ranking international journals and conferences including ACM CCS, PODC, SIGCOMM, ACL, WWW, INFOCOM, Euro Physics Letters, Pysical Review E, ACM and IEEE Transactions, etc. For more information, please visit: http://www.facweb.iitkgp.ernet.in/~niloy/

Pabitra Mitra

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Research Interests: Machine learning, information retrieval, data mining

Pabitra Mitra did his PhD from Indian Statistical Institute Calcutta in 2003. Hisresearch interests are in the fields of machine learning, data mining, information retrieval, and pattern recognition. He has authored a book on Data Mining and about twenty papers in international journals. He is a recipient of the Indian National Academy of Engineering Young Engineer Award in 2007. His hobbiesare painting and reading story books.

Pallab Dasgupta
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Research Interests: Formal verification, artificial intelligence, and VLSI

Dr. Pallab Dasgupta did his B. Tech, M. Tech and PhD in Computer Science fromthe Indian Institute of Technology Kharagpur and is currently a Professor at the Dept. of Computer Sc. & Engg. His research interests include Formal Verification, Artificial Intelligence and VLSI. He has over 160 research papers and 3 books inthese areas. The Formal Methods Group (http://cse.iitkgp.ac.in/~fmres) under his leadership works in the validation of integrated circuits, cyber-physicalsystems, railway signalling, smart grids, and safety critical software in collaboration with several companies,including Intel, Synopsys, General Motors, SRC, Indian Railways and Hindustan Aeronautics. Dr. Dasgupta has been a recipient of the Young Scientist awards from the Indian National Science Academy (INSA), IndianNational Academy of Engineering (INAE), and the Indian Academy of Science (IASc). He is a Fellow of INAE, Fellow of IASc, and Fellow of IETE. Dr. Dasgupta serves as an Associate Editor of the IEEE Transactions onComputer Aided Design of Integrated Circuits and Systems. Presently he holds the additional position ofDean of Sponsored Research and Industrial Consultancy (SRIC), IIT Kharagpur.

Partha Bhowmick
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Research Interests: Digital geometry, shape analysis, computer graphics

Partha Bhowmick graduated from Indian Institute of Technology Kharagpur, India, and received his Masters and PhD from Indian Statistical Institute, Kolkata, India. He is currently an Associate Professor in Computer Science and Engineering Department, Indian Institute of Technology, Kharagpur, India. His research focus primarily is digital geometry, but he works also in algorithmic art, combinatorial image analysis, and computer graphics. He has coauthored over 90 research papers in these areas, which

have been published in peer-reviewed international journals, edited volumes, and international conference proceedings. He has also co-authored one book in digital geometry, and he holds 3 US patents.

Partha Pratim Chakrabarti

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Research Interests: Artificial intelligence, algorithms for design automation in VLSI and embedded systems
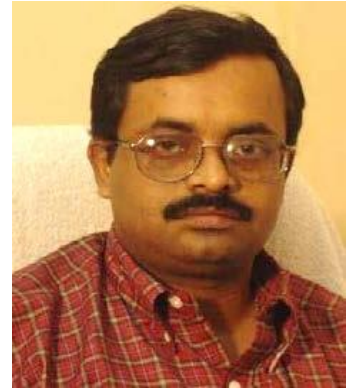
Partha Pratim Chakrabarti is a Professor in the Department of Computer Science and Engineering at Indian Institute of Technology Kharagpur. Currently, he is holding the post of the Director of IIT Kharagpur. He also held the positions of Dean, Scientific Research and Industrial Consultancy (SRIC), and of Head of the Advanced Technology Development Centre (ATDC). He received the Bachelor's degree in Computer Science from IIT Kharagpur, India, in 1985. He received Ph.D. in Computer Science & Engineering from IIT Kharagpur. His specific interests include Heuristic and Exploratory Search Techniques, Automated Problem Solving and Reasoning, Algorithms for Synthesis and Verification of VLSI Systems, Scheduling, Verification and Fault Tolerance Analysis of Multi-Processor Embedded Systems, etc. He has over 200 publications, and has supervised around 16 Ph.Ds. He is the principal investigator of several research projects, and is a consultant to industry and government. He helped found the Advanced VLSI Design Laboratory and the General-Motors-IIT-Kharagpur Collaborative Research Laboratory on ECS at IIT Kharagpur. As Dean SRIC, he has helped grow the sponsored research at IIT Kharagpur multiple-fold including setting up of several Advanced Research Centres of Excellence and the Entrepreneurship Programme. He is a Fellow of Indian National Science Academy, Indian Academy of Science,Indian National Academy of Engineering and The West Bengal Academy of Science & Technology. He is the recipient of several awards, including the President of India Gold Medal, Shanti Swarup Bhatnagar Award, Swarnajayanti Fellowship, INSA Young Scientist Award, Indian National Academy of Engineering (INAE) YoungEngineer Award, Anil Kumar Bose Award from INSA, Best Paper Awards in International Conference on VLSI Design and National Scholarship.

Partha Pratim Das

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Research Interests: Image processing and computer vision, technology-enabled education, object-oriented analysis and design, software engineering, compiler technology, digital geometry, and embedded systems

Dr.Partha Pratim Das received his BTech, MTech and PhD degrees in 1984, 1985 and 1988 respectively from IIT Kharagpur. He served as a faculty in Department of Computer Science and Engineering, IIT Kharagpur from 1988 to 1998 and guided 5 PhDs. In 1998, he joined Alumnus Software Ltd as a Business Development Manager. From 2001 to 2011, he worked for Interra Systems, Inc as a Senior Director and headed its Kolkata Center. In 2011, he joined back to the Dept of Computer Science and Engineering, IIT Kharagpur as Professor. He is currently the Head of Rajendra Mishra School of Engineering Entrepreneurship at IIT. Dr. Das also served as a Visiting Professor with Institute of Radio Physics & Electronics, Calcutta University from 2003 to 2013.

Dr. Das has received several recognitions including UNESCO/ROSTSCA Young Scientist (1989), INSA Young Scientist Award (1990), Young Associate-ship of Indian Academy of Sciences (1992), UGC Young Teachers' Career Award (1993), INAE Young Engineer Award (1996), Interra Special (Process) Recognition (2009), and Interra 10 Years' Tenure Plaque (2011). He served as Co-General Chair for International Conference on VLSI Design & Embedded Systems in 2005, and as Co-Program-Chair in 2016 and in various capacities for International Symposium on VLSI Design & Test in 2007, 2008 and 2012. He is currently the Editor-in-Chief of The Journal of Institution of Engineers: Series B, reviewer for Pattern Recognition Letters and a Review Writer for ACM Computing Surveys.

Dr. Das has published over 40 technical papers in international journals in areas of Digital Geometry, Image Processing, Parallel Computing and Knowledge-based Systems. In 2013 he has co-authored a research

monograph titled "Digital Geometry in Image Processing" (CRC Press). His current interests include Image Processing and Computer Vision (human activity tracking using Kinect), Technology-enabled Education (Digital Library and Distance Education), Object-Oriented Systems Analysis and Design (UML, Design Patterns and C++11), Software Engineering (automated program analysis using static and dynamic instrumentation), Compiler Technology (multi-threaded debugging), Digital Geometry, and Embedded Systems.

       Dr. Das is a member of Association of Computing Machinery (ACM), The Institute of Electrical & Electronics Engineers (IEEE), Indian Unit for Pattern Recognition and Artificial Intelligence (IUPRAI) and VLSI Society of India (VSI).

Partha Sarathi Dey

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ResearchInterests:Digital logic design,data structures ,computer organization and architecture

M.Tech.(IITKharagpur)
Lecturer, Computer Science & Engineering.
PS Dey joined the Institute in 1985.
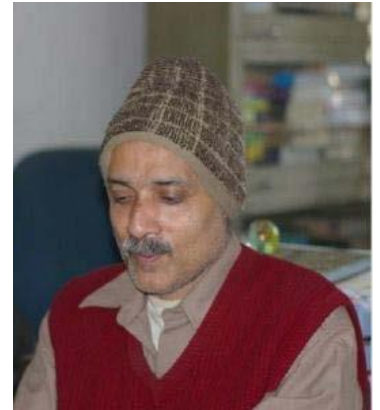
Pawan Goyal

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Research Interests: Computational linguistics, information retrieval, digital humanities, semantic computing

       Pawan Goyal joined the Department of Computer Science and Engineering, Indian Institute of Technology Kharagpur as an Assistant Professor in July 2013. Prior to that, he worked at INRIA Paris-Rocquencourt as a post-doctoral fellow with Prof. Gérard Huet on The Sanskrit Heritage Site.

       Dr. Goyal did his B. Tech. in Electrical Engineering from Indian Institute of Technology, Kanpur. He received his Ph.D. from Intelligent Systems Research Centre, Faculty of Computing and Engineering, University of Ulster, UK. His PhD advisors were Prof. Laxmidhar Behera and Prof. T. M. McGinnity. The topic of his PhD dissertation was "Analytic Knowledge Discovery Techniques for Ad-Hoc informationRetrieval and Text Summarization."

       His main research interests include Sanskrit Computational Linguistics, Natural Language Understanding, Information Retrieval and Digital Humanities.

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Research Interests: Computational biology and bioinformatics

       Pralay Mitra received the Bachelor of Science (Physics as a major) and Bachelorof Technology (Computer Science and Engineering) from University of Calcuttain 1999 and 2002 respectively. After finishing his Master of Engineering(Computer Science and Information Technology) from Bengal Engineering and Science University, Shibpur, he joined Indian Institute of Science, Bangalore. In2010, he awarded Ph.D. from the Indian Institute of Science, Bangalore.

       Dr. Mitra is attached with this department as an Assistant Professor since 2013. Before that he was the Senior Research Fellow (2011-2013) at the University of

Michigan Medical School, Ann Arbor and the Research Associate (2010-2011) of the Indian Institute of Science, Bangalore. He also worked (2004-2005) in the Avisere Technology Pvt. Ltd as a Senior Computer Engineer.

Dr. Mitra is totally focused on Computational Biology and Bioinformatics. Particularly, he is interested to realizing the biological phenomenon by developing sophisticated computational tools. Towards this end, he developed methods for predicting protein-protein interactions, for assembling macromolecules and for designing novel protein sequences. He is also actively engaged in the development of the computational methods for whole cell simulation.

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Research Interests: Hardware security, VLSI design, and digital content protection through watermarking

Rajat Subhra Chakraborty is an Associate Professor in the Computer Science and Engineering Department of Indian Instutute of Technology Kharagpur. He has a Ph.D. in Computer Engineering from Case Western Reserve University and a B.E. (Hons.)in Electronics and Telecommunication Engineering from Jadavpur University (India) in 2005. He has work experience at National Semiconductor and AMD. His researchinterests include: Hardware Security, VLSI Design and Design Automation, and Reversible Watermarking fordigital content protection. He is the co-author of three published books five book chapters, and close to 70 publications in international journals and conferences of repute. His work has been cited close to 1200 times.He is one of the recipients of the "IBM Faculty Award" for 2012, and a "Royal Academy of Engineering (U.K.)Fellowship" in 2014. He holds 1 U.S. patent, and 2 more international patents and 3 Indian patents have beenfiled based on his research work. Dr. Chakraborty is a member of IEEE and ACM.

RajivRanjanSahay

Research interests: Image Processing, Computer Vision, Multimedia

Rajiv Ranjan Sahay obtained his PhD from IIT Madras. He was a post-doctoral fellow at the School of Computing, National University of Singapore (NUS). He joined the School of Information Technology of IIT Kharagpur in 2012. Currently, he is an Assistant Professor in the Department of Electrical Engineering of IIT Kharagpur. He is a member of IEEE. He has more than 20 research papers and a patent on recovering 3D structure using blur and parallax.

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Research Interests: Programming languages and software engineering, embedded and multimedia systems, evolutionary computing

Rajeev Kumar received his Ph.D. from University of Sheffield and M.Tech. from University of Roorkee (now, IIT Roorkee) both in computer science and engineering. Currently, heis a professor of computer science and engineering at IIT Kharagpur. Prior to joining IIT, he was with the BirlaInstitute of Technology & Science (BITS), Pilani and the Defense Research and Development Organization (DRDO). His research interests include programming languages & software engineering, embedded & multimedia system, and evolutionary computing for combinatorial optimization. He has supervised 8 Ph.Ds and published over 150 research articles. He is a senior member of ACM and IEEE, and a fellow of IETE.

Rajib Mall
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Research Interests: program analysis and testing

Rajib Mall has been with the Computer Science and Engineering at IIT, Kharagpur since in 1994. Dr. Mall is the current head of the department. Prior to joining IIT, Kharagpur, he worked with Motorola India for about three years. Dr. Mall completed all his professional education: Ph.D., Master's, and Bachelor's degrees from the Indian Institute of Science, Bangalore. He has guided 12 Ph.D. dissertations and has authored two books. He has published more than 150 research papers in International refereed conferences and Journals. Dr. Mall works mostly in the area of program analysis and testing.

Rogers Mathew
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Research interests: Graph Theory, Combinatorics, Graph Algorithms

Rogers Mathew obtained his ME (CSE) and PhD from Indian Institute of Science Bangalore in 2007 and 2012, respectively, and BTech (CSE) from College of Engineering, Trivandrum in 2003. Before joining IIT Kharagpur in 2015, he held post-doctoral positions in University of Haifa, Israel and Dalhousie University, Halifax, Canada. His teaching and research focus on combinatorics, graph theory, and graph algorithms. He has about 20 publications in reputed journals and conferences.

Sandip Chakraborty
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Research interests: Computer Systems and Networks, Mobile Computing, Distributed Computing

Sandip Chakraborty joined the Department of Computer Science and Engineering, IIT Kharagpur as an Assistant Professor on December, 2014. He obtained his PhD and MTech in Computer Science and Engineering from Indian Institute of Technology, Guwahati in 2014 and 2011, and BE in Information Technology from Jadavpur University in 2009. He has bagged many awards for his research and academic activities, and leading several Government and Industry funded research projects.

The research interest of Sandip spans the domain of systems and networks, mobile/smart-phone computing and distributed computing. He is particularly interested in system development for communication, ranging from broadband wireless to smart city communication. He is collaborating with various industry partners on the development of cutting edge systems like Hyperconvergence (collaboration with HPE India) and Blockchain technologies (collaboration with IBM Singapore Research Lab).

Saptarshi Ghosh

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Research Interests: Social Networks and Online Social Media, Information Retrieval, Data Mining and Natural Language Processing, Complex Networks

Saptarshi Ghosh is an Assistant Professor at the Department of Computer Science and Engineering, IIT Kharagpur. He received his PhD from the same department with a thesis on "Online Social Network: Evolution and Search". He was a Humboldt Postdoctoral research fellow at

the Max Planck Institute for Software Systems, Germany. He has also been an Assistant Professor at the Department of Computer Science and Technology, Indian Institute of Engineering Science and Technology, Shibpur, India. His research interests include Online Social Media, Information Retrieval, Data Mining, and Complex Network Analysis. He has published several papers in top-ranked journals and conferences, including WWW, SIGIR, ICWSM, CSCW, ACM Trans. Web, IEEE JSAC, and so on. For more information, visit http://cse.iitkgp.ac.in/~saptarshi.

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Shamik Sural is a professor at the Computer Science and Engineering Department, IIT Kharagpur. He received the Ph.D. degree from Jadavpur University. He is a recipient of the Alexander von Humboldt Fellowship for Experienced Researchers. Shamik has published more than 150 researchpapers. His research interests include computer security, data mining anddatabase systems.

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Research Interests: *Formal methods in system design, computer architecture, assistive technologies*

Soumyajit Dey received a B.E. degree in Electronics and Telecommunication Engg. from Jadavpur University, Kolkata in 2004, an M.S. degree in Computer Science from Indian Institute of Technology, Kharagpur in 2007 and PhD fromthe same department in 2011. Post PhD, he has worked as Research Associatein the School of Computing, National University Singapore in Autumn 2011. Hehas also worked at IIT Patna as assistant professor in CSE Dept. from beginning of Spring 2012 to end of Spring 2013. He joined the Dept. of CSE, IIT Kharagpur in May 2013.

Soumya K Ghosh
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Research Interests: *Spatial Data Science, Spatial Database, Spatial Web Services, Cloud Computing*

Soumya K Ghosh is a Professor in the Department of Computer Science and Engineering, Indian Institute of Technology, Kharagpur, India. His primary areas of research include Spatial Data Science, Spatial Database, Spatial Web Services, and Cloud Computing. Prior to IIT Kharagpur, he worked for Indian Space Research Organization in the area of Remote Sensing and Geographic Information Systems for natural resource management. He did his PhD and MTech from the Department of Computer Science and Engineering, IIT Kharagpur. He has published more than 200 research papers.

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Sourangshu Bhattacharya is a Computer Scientist who is interested in Machine Learning and Optimization. Currently, his research focuses on Machine Learning on Big Data / Distributed Machine Learning. He has applied Machine Learning tools to various problems in Bioinformatics, Computer Vision, and Text Mining.

Prior to joining IIT Kharagpur as an Assistant Professor, he was working as a Scientist in Yahoo! Labs, Bangalore. At Yahoo!, he worked on improving the "Click Through Rate" prediction system for the "RightMedia Ad Exchange." He also worked on learning from crowd sourced labels and learning word segmentation. Dr. Bhattacharya did his PhD in Computer Science from the Department of Computer Science & Automation,
Indian Institute of Science, Bangalore. His advisor was Dr. Chiranjib Bhattacharyya, and he was a part of theMachine Learning Lab. His PhD research areas included Bioinformatics and Machine Learning .Dr. Bhattacharya did his M.Tech. in Computer Science from Indian Statistical Institute, Kolkata and B.Tech. in Civil Engineering from IIT Roorkee.

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Research Interests: Design and analysis of computer algorithms, computational and combinatorial geometry, graph theory and algorithms, combinatorics

Sudebkumar Prasant Pal has research interests in the design and analysis of computer algorithms, particularly in the domains of geometry and graph/hypergraph theory. In the area of computational geometry, his contributions include results on weak visibility and convex visibility in polygons, and on the computational and combinatorial complexity of regions visible with multiple specular and diffuse reflections.
He has also worked on algorithms for channel routing, and robust high-precision algebraic and geometric computation. Later he worked on (i)combinatorial characterizations of LOCC incomparable ensembles of multipartite quantum entangled states, (ii) entanglement-assisted multiparty protocols, and (iii) purely caching based video feeds as opposed to streaming, for scalable video service by introducing the notion of virtual caching in internet proxies. In recent times, he has worked on hypergraph coding and coloring, constrained reflection paths in polygons, applications of Lovasz' local lemma, and bisecting bicoloring coverings for hypergraphs. He has held positions such as (i) Convenor, Advisory Committee for the Centre for Theoretical Studies, IIT Kharagpur, and (ii) Member Executive Council: Indian Association for Research in Computing Science. Currently he is a governing body member of the Association for Computer Science and Discrete Mathematics. He received the Rajiv Gandhi Research Grant for Innovative Ideas in Science and Technology, 1993, from the Rajiv Gandhi Foundation and Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Jakkur, Bangalore. He worked as Visiting Associate Professor in the Mathematics and Computer Science department in the University of Miami, Florida, USA during the period August 1999 to May 2000.

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Research Interests: Artificial intelligence, machine learning, information retrieval, natural language processing

Sudeshna Sarkar is a Professor in the Department of Computer Science and Engineering at Indian Institute of Technology, Kharagpur. She received the BTech degree in Computer Science & Engineering from IIT Kharagpur, India, in 1989, an MS in Computer Science from University of California, Berkeley in 1991 and Ph.D., in Computer Science & Engineering from IIT Kharagpur in 1996. She has served inthe faculty of IIT Guwahati and at IIT Kanpur before joining IIT Kharagpur. Herbroad research interests are in Artificial Intelligence and Machine Learning. She iscurrently working in the fields of natural language processing, text mining and information retrieval andcontent recommendation systems. She has been a principal investigator in a number of sponsored projects inthese areas. Some of these are Cross language information access, Machine Translation between Indian languages, NER and POS tagging, and building of a Bengali tree bank. She is also working on applications of Artificial Intelligence in Climate Mining and in Transportation and Logistics.

Sudip Misra
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Research Interests: Wireless Sensor Networks, Cloud Computing, Big Data Networking, Software Defined Networking, Internet of Things, Smart Grid, Delay Tolerant Networks, Nano-Sensor Networks

Dr. Sudip Misra is an Associate Professor in the Department of Computer Scienceand Engineering at the Indian Institute of Technology Kharagpur. Prior to this hewas associated with Cornell University (USA), Yale University (USA), Nortel Networks (Canada) and the Government of Ontario (Canada). He received his Ph.D. degree in Computer Science from Carleton University, in Ottawa, Canada. He has several years of experience working in the academia, government, and the private sectors in research, teaching, consulting, project management,architecture, software design and product engineering roles.

His current research interests include Wireless Ad Hoc and Sensor Networks, Internet of Things (IoT), Computer Networks, Learning Systems, and algorithm design for emerging communication networks. Dr. Misra is the author of over 260 scholarly research papers, including 140+ reputed journal papers. He has won seven research paper awards in different conferences. Recently, he and his students won Samsung Innovation Award and the IEEE ComSoc Student Competition. He was also awarded the IEEE ComSoc Asia Pacific Outstanding Young Researcher Award at IEEE GLOBECOM 2012, Anaheim, California, USA. He was also the recipient of several academic awards and fellowships such as the Young Scientist Award (National Academy of Sciences, India), Young Systems Scientist Award (Systems Society of India), Young Engineers Award (Institution of Engineers, India), (Canadian) Governor General's Academic Gold Medal at Carleton University, the University Outstanding Graduate Student Award in the Doctoral level at Carleton University and the National Academy of Sciences, India - Swarna Jayanti Puraskar (Golden Jubilee Award).

Dr. Misra was also awarded the Canadian Government's prestigious NSERC Post-Doctoral Fellowship and the Humboldt Research Fellowship in Germany. Dr. Misra has been serving the editorial boards of distinguished journals such as the International Journal of Communication Systems (Wiley) and the IET Wireless Sensor Systems (UK). In the past, he served as the Associate Editor/Editorial Board Member of the IEEE Transactions on Mobile Computing , Telecommunication Systems Journal (Springer), Security and Communication Networks Journal (Wiley), and the EURASIP Journal of Wireless Communications and Networking, IET Communications Journal, and the Computers and Electrical Engineering Journal (Elsevier).

Dr. Misra has published 9 books in the areas of wireless ad hoc networks, wireless sensor networks, wireless mesh networks, communication networks and distributed systems, network reliability and fault tolerance, and information and coding theory, published by reputed publishers such as Cambridge University Press, Springer,

Wiley, and World Scientific.

Dr. Misra was invited to chair several international conference/workshop programs and sessions. He served inthe program committees of several international conferences. He was also invited to deliver keynote/invited lectures in over 30 international conferences in USA, Canada, Europe, Asia and Africa.

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Research Interests: Design of algorithms, artificial intelligence, and computer Networks

Sujoy Ghose received the B.Tech. degree in Electronics and Electrical Communication Engineering from the Indian Institute of Technology, Kharagpur, in 1976, the M.S. degree from Rutgers University, Piscataway, NJ, and the Ph.D. degree in computer science and engineering from the Indian Institute of Technology, Kharagpur. He is currently a Professor in the Department of Computer Science and Engineering, Indian Institute of Technology. His research interests include design of algorithms, artificial intelligence, and computer networks.

PhD Students

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MS Students

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1. Suman Kalyan Maity, Aishik Chakraborty, Pawan Goyal, Animesh Mukherjee , "Detection of Sockpuppets in Social Media ", 20th ACM Conference on Computer-Supported Cooperative Work and Social Computing CSCW 2017.

2. Manaar Alam, Debapriya Basu Roy, Sarani Bhattacharya, Vidya Govindan, Rajat Subhra Chakraborty, Debdeep Mukhopadhyay , "SmashClean: A hardware level mitigation to stack smashing attacks in OpenRISC ", MEMOCODE'16, 14th ACM-IEEE International Conference on Formal Methods and Models for System Design.

3. Pritam Bhattacharya , "Switching in Boolean Circuits and Modelling Cognition through Neuroids ", Lambert Academic Publishing, 2016 .

4. Soumajit Pramanik, Midhun Gundapuneni, Sayan Pathak, Bivas Mitra , "Predicting Group Success in Meetup ", ICWSM 2016, Colonge, Germany, May 2016.

5. Soumajit Pramanik, Maximilien Danisch, Qinna Wang, Anand Kumar, Sumanth Bandi, Jean-Loup Guillaume and Bivas Mitra , "On the Role of Mentions on Tweet Virality ", IEEE DSAA 2016, Montreal, Canada, Oct. 2016.

6. Mayank Singh, Ajay Jaiswal, Priya Shree, Arindam Pal, Animesh Mukherjee and Pawan Goyal , "Understanding the Impact of Early Citers on Long-Term Scientific Impact ",

7. Suman Kalyan Maity, Aman Kharb, Animesh Mukherjee , "Language Use Matters: Analysis of the Linguistic Structure of Question Texts can Characterize Answerability in Quora ", 11th International Conference on Web and Social Media ICWSM 2017 , Montreal, Canada, May 15 - 18, 2017.

8. Rohit Verma, Surjya Ghosh, Aviral Shrivastava, Niloy Ganguly, Bivas Mitra and Sandip Chakraborty , "Unsupervised Annotated City Traffic Map Generation ",   ACM SIGSPATIAL 2016 (short paper), San Francisco Bay Area, California, USA.

9. Antara Ain, Antonio A. Bruto da Costa, Pallab Dasgupta , "Feature Indented Assertions for Analog and Mixed-Signal Validation ", IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems Volume: 35, Issue: 11, Nov. 2016.

10. Sudipa Mandal, Antonio A. Bruto da Costa, Aritra Hazra, Pallab Dasgupta, Bhushan Naware, Chunduri Rama Mohan and Sanjib Basu , "Formal Verification of Power Management Logic with Mixed-Signal Domains ", In the 30th Proceedings of International Conference on VLSI Design (VLSID), pp. 239-244, Jan 2017 (Awarded as the BEST STUDENT PAPER).

11. S. N. Das, S. Bera, S. Misra, and S. K. Pal , "Introduction to Wireless Sensor Networks. ", in Book Soft Computing Applications in Sensor Networks edited by S. Misra and S. K. Pal .

12. Soumajit Pramanik, Midhun Gundapuneni, Sayan Pathak, Bivas Mitra , "Can I Foresee the Success of My Meetup Group? ", ASONAM 2016, San Francisco, USA, August 2016.

13. S. Bera, S. Misra, and D. Chatterjee , "C2C: Community-Based Cooperative Energy Consumption in Smart Grid. ", IEEE Transactions on Smart Grid, 2016.

14. Inner collisions in ECC: Vulnerabilities of complete addition formulas for NIST curves, "Poulami Das, Debapriya Basu Roy, Harishma Boyapally, Debdeep Mukhopadhyay", AsianHOST 2016.

15. Monidipa Das and Soumya K. Ghosh , "Spatio-temporal Autocorrelation Analysis for Regional Land-cover Change Detection from Remote Sensing Data ", In Proceedings of the 4th ACM IKDD Conference on Data Science (CoDS), ACM, Chennai, India, 2017.

16. Monidipa Das and Soumya K. Ghosh , "A cost-efficient approach for measuring Moran's index of spatial autocorrelation in geostationary satellite data ", In IEEE International Conference on Geoscience and Remote Sensing Symposium (IGARSS 2016). pp. 5913-5916. IEEE, 2016.

17. Amrith Krishna, Madhumita Mallick, Bivas Mitra , "SleepSensei: An Automated Sleep Quality Monitor and Sleep Duration Estimator ", Workshop on IoT enabled Healthcare and Wellness Technologies and Systems (Jointly organized with ACM Mobisys 2016).

18. Urbi Chatterjee, Rajat Subhra Chakraborty, Debdeep Mukhopadhyay , "A PUF-based Secure Communication Protocol for IoT", accepted in ACM Transaction on Embedded Computing Systems.

19. Mayank Singh, Abhishek Niranjan, Divyansh Gupta, Nikhil Angad Bakshi, Animesh Mukherjee and Pawan Goyal , "Citation sentence reuse behavior of scientists: A case study on massive bibliographic text dataset of computer science ", Joint Conference on Digital Library , JCDL, 2017.

20. Surjya Ghosh, Niloy Ganguly, Bivas Mitra and Pradipta De , "Towards Designing an Intelligent Experience Sampling Method for Emotion Detection ", IEEE CCNC 2017, Las Vegas, USA.

21. Khan, and S. K. Ghosh , "Analysing the impact of poor teaching on student performance ", Teaching, Assessment, and Learning for Engineering (TALE), 2016 IEEE International Conference on. IEEE, 2016.

22. Accelerating OpenSSL's ECC with low cost reconfigurable hardware , "DB Roy, S Agrawal, C Reberio, D Mukhopadhyay ", Integrated Circuits (ISIC), 2016 International Symposium on.

23. Rajesh Basak, Niloy Ganguly, Shamik Sural, Soumya K. Ghosh , " Look Before You Shame: A Study on Shaming Activities on Twitter ", WWW, 2016.

24. Krishna Bagadia, Urbi Chatterjee, Debapriya Basu Roy, Debdeep Mukhopadhyay, Rajat Subhra Chakraborty , "Exploiting Safe Error based Leakage of RFID Authentication Protocol using Hardware Trojan Horse", accepted in IEEE International Symposium on Hardware Oriented Security and Trust (HOST) 2017.

25. Arijit Roy, Sudip Misra, Pushpendu Kar, and Ayan Mondal , "Topology Control for Self-Adaptation in Wireless Sensor Networks with Temporary Connection Impairment ", ACM Transactions on Autonomous and Adaptive Systems, Vol. 11, no. 4, pp. 21:1-21:34, January 2017.

26. Sikhar Patranabis, Debapriya Basu Roy, Praveen Kumar Vadnala, Debdeep Mukhopadhyay, Santosh Ghosh, "Shuffling across rounds: A lightweight strategy to counter side-channel attacks" , ICCD 2016.

27. Mayank Singh, Tanmoy Chakraborty, Animesh Mukherjee and Pawan Goyal , "Is this conference a top-tier? ConfAssist: An assistive conflict resolution framework for conference categorization", Journal of Informetrics, 10.4 (2016): 1005-1022.

28. Sreeja. S. R , Vaidic Joshi, Shabnam Samima, Anushri Saha, Joytirmoy Rabha, Baljeet Singh Cheema, Debasis Samanta, Pabitra Mitra , "BCI Augmented Text Entry Mechanism for People with Special Needs ", 8th International conference on Intelligent Human Computer Interaction, IHCI 2016.

29. Bidisha Samanta, Abir De, Niloy Ganguly, "STRM:A Sister Tweet Reinforcement Process for Modeling Hashtag Popularity" Accepted IEEE INFOCOM 2017.

30. Ayan Das, Agnivo Saha, Sudeshna Sarkar , "Cross-lingual transfer parsing from Hindi to Bengali using delexicalization and chunking ", 13th International Conference on Natural Language Processing (ICON 2016), December 2016, IIT-BHU, India.

31. Rajorshee Raha , "Synthesis of Sampling Modes of Multi-rate Systems for Guaranteed Stability ", 20th International Conference of System Theory, Control and Computing (ICSTCC) IEEE .

32. Monidipa Das and Soumya K. Ghosh , "Deep-STEP: A Deep Learning Approach for Spatiotemporal Prediction of Remote Sensing Data ", IEEE Geoscience and Remote Sensing Letters (GRSL), vol. 13, issue 12, pp. 1984-1988, 2016.

33. Sikhar Patranabis, Debapriya Basu Roy, Yash Shrivastava, Debdeep Mukhopadhyay, Santosh Ghosh, "Parsimonious design strategy for linear layers with high diffusion in block ciphers", HOST 2016.

34. Sandipan Sikdar, Matteo Marsili, Niloy Ganguly and Animesh Mukherjee , "Anomalies in the peer-review system: A case study of the journal of High Energy Physics", CIKM 2016.

35. K. Rudra, S. Rijhwani, R. Begum, K. Bali, M. Choudhury, and N. Ganguly , "Understanding Language Preference for Expression of Opinion and Sentiment: What do Hindi-English Speakers do on Twitter? ", EMNLP 2016 pages 1131-1141, Austin, Texas, November 1-5, 2016.

36. Sankaraganesh Jonna, Sukla Satapathy and Rajiv R. Sahay, "Stereo image de-fencing using smartphones.", 42nd IEEE International Conference on Acoustics, Speech and Signal Processing (IEEE ICASSP), New Orleans, USA, (2017).

37. P. Bhattacharya, S. K. Ghosh, and B. Roy , "Vertex Guarding in Weak Visibility Polygons ", Poster Track-I @ IBM I-CARE 2016, MSRIT-Bangalore.

38. Antonio Bruto Da Costa, Pallab Dasgupta , "Generating AMS Behavioral Models with Formal Guarantees on Feature Accuracy ", VLSI Design 2017, 13th International Conference on VLSI Design & 16th International Conference on Embedded Systems, Jan 2017.

39. Antonio Bruto Da Costa, Pallab Dasgupta, and Goran Frehse , "Formal Feature Analysis of Hybrid Automata ", MEMOCODE'16, 14th ACM-IEEE International Conference on Formal Methods and Models for System Design, November 2016.

40. Soumyadeep Dey , Jayanta Mukherjee, Shamik Sural , "Consensus-based clustering for document image segmentation ", International journal on Document Analysis and Recognition (IJDAR), 19(4), Sep 2016.

41. Poulami Das, Debapriya Basu Roy, Debdeep Mukhopadhyay, " Improved Atomicity to Prevent HCCA on NIST Curves", AsiaPKC@AsiaCCS 2016..

42. N. Balachandran, R. Mathews, T. K. Mishra, S. P. Pal. , "Bisecting and D-secting families for set systems.", Discrete Applied Mathematics (DAM) (Accepted). 2017.

43. Monidipa Das, Soumya K. Ghosh, V. M. Chowdary, A. Saikrishnaveni, and R. Sharma , "A probabilistic nonlinear model for forecasting daily water level in reservoir ", Water Resources Management (WARM), vol. 30, issue 9, pp. 3107-3122, 2016.

44. S. Bera, S. Misra, and M.S. Obaidat , "Mobility-Aware Flow-Table Implementation in Software-Defined IoT. ", in Proc. of the IEEE GLOBECOM, 2016.

45. Ayan Kumar Bhowmick, Sourav Suman, and Bivas Mitra , "Effect of Information Propagation on Business Popularity: A Case Study on Yelp ", IEEE MDM, 2017.

46. Monidipa Das and Soumya K. Ghosh , "semBnet: A Semantic Bayesian Network for Multivariate Prediction of Meteorological Time Series Data ", Pattern Recognition Letters (PRLETTERS), Elsevier, 2017 [DOI: 10.1016/j.patrec.2017.01.002].

47. S. Bera, S. Misra, S. K. Roy, M. S. Obaidat , "Soft-WSN: Software-Defined WSN Management System for IoT Applications ", IEEE Systems Journal, 2016.

48. Ayan Das, Raghuveer Chanda, Smriti Agrawal, Sourangshu Bhattacharya , "Distributed Weighted Parameter Averaging for SVM Training on Big Data ", Distributed Machine Learning Workshop (AAAI 2017), February, 2017, San Francisco, USA.

49. Prasenjit Bhavathankar, Ayan Mondal, and Sudip Misra , "Topology Control in the Presence of Jammers for Wireless Sensor Networks ", International Journal of Communication Systems, December 2016.

50. Debasmita Lohar, Anudeep Dunaboyina, Dibyendu Das, and Soumyajit Dey , "Failure Estimation of Behavioral Specifications ", Symposium on Dependable Software Engineering, Theories, Tools and Applications (SETTA), 2016.

51. Suman Kalyan Maity , "Companion Understanding Popularity of Social Media Entities: from hashtags to question topics ", 20th ACM Conference on Computer-Supported Cooperative Work and Social Computing CSCW 2017.

52. S. Bera, S. Misra, S. K. Roy, M. S. Obaidat , "Soft-WSN: Software-Defined WSN Management System for IoT Applications. ", IEEE Systems Journal, 2016.

53. Soumyadeep Dey, Jayanta Mukherjee, Shamik Sural , "Anveshak - A Groundtruth Generation Tool for Foreground Regions of Document Images ", Accepted in Workshop on Document Analysis and Recognition (DAR 2016).

54. S. Maiti and D. Roy Chowdhury , "Study of Five-Neighborhood Linear Hybrid Cellular Automata and Their Synthesis ", International Conference on Mathematics and Computing (ICMC 2017), Haldia, India. (Presented).

55. Shreya Ghosh, Soumya K Ghosh , "THUMP: Semantic Analysis on Trajectory Traces to Explore Human Movement Pattern ", Proceedings of the 25th International Conference Companion on World Wide Web 2016 [Poster Paper].

56. Sandipan Sikdar, Matteo Marsili, Niloy Ganguly and Animesh Mukherjee, "Influence of Reviewer Interaction Network on Long-term Citations: A Case Study of the Scientific Peer-Review System of the Journal of High Energy Physics", JCDL 2017.

57. Suman Kalyan Maity, Chandra Bhanu Jha, Avinash Kumar, Ayan Sengupta, Madhur Modi and Animesh Mukherjee , "Companion: A Large-scale Analysis of the Marketplace Characteristics in Fiverr ", 50th Hawaii International Conference on System Sciences (HICSS-50), Big Island, Hawaii, USA, Jan 4 - 7, 2017.

58. Chakraborty, J Das, A Dasgupta, P Mitra, and S K Ghosh , "A geospatial service oriented framework for disaster risk zone identification ", International Conference on Computational Science and Its Applications (ICCSA) Springer, 2016.

59. Sankarganesh Jonna, Krishna K. Nakka, Vrushali Khasare, Rajiv R. Sahay and Mohan S. Kankanhalli, "Detection and removal of fence occlusions in an image using a video of the static/dynamic scene.", Journal of Optical Society of America A (JOSA A), (2016).

60. Ayan Das, Pranay Yerra, Ken Kumar, Sudeshna Sarkar , "A study of attention-based Neural Machine Translation models on Indian Languages ",   6th Workshop on South and Southeast Asian Natural languages (COLING 2016), December 2016, Osaka, Japan.

61. Sayandeep Saha, Rajat Subhra Chakraborty, and Debdeep Mukhopadhyay , "Testability Based Metric for Hardware Trojan Vulnerability Assessment ", Digital System Design (DSD), 2016 Euromicro Conference on. IEEE, 2016.

62. Sikhar Patranabis, Debapriya Basu Roy, Debdeep Mukhopadhyay, " Using Tweaks to Design Fault Resistant Ciphers ", VLSI Design 2016: 585-586.

63. Satadal Sengupta, Vinay Kumar Yadav, Yash Saraf, Harshit Gupta, Niloy Ganguly, Sandip Chakraborty, and Pradipta De , "MoViDiff: Enabling Service Differentiation for Mobile Video Apps ", 15th IFIP/IEEE International Symposium on Integrated Network Management (IM), 2017.

64. Satadal Sengupta , "Predicting Social Dynamics based on Network Traffic Analysis for CCN/ICN Management ", PhD Forum of the 9th International Conference on Communication Systems and Networks (COMSNETS), Bangalore, India, January 2017.

65. Surjya Ghosh, Vatsalya Chauhan, Niloy Ganguly, Bivas Mitra and Pradipta De , "Impact of Experience Sampling Methods on Tap Pattern based Emotion Recognition ", 4th ACM Workshop on Mobile Systems for Computational Social Science - MCSS (Ubicomp.15) Osaka, Japan.

66. Marcin Bodych, Niloy Ganguly, Tyll Krueger, Animesh Mukherjee, Rainer Seigmund-Schultze and Sandipan Sikdar, "Threshold-based epidemic dynamics in systems with memory", Europhysics Letters 2017.

67. Rijurekha Sen, Hasnain Ali Pirzada, Amreesh Phokeer, Zaid Ahmed Farooq, Satadal Sengupta, David Choffness, and Krishna P. Gummadi , "Inspecting the Free Bridge Across the Digital Divide: Assessing the Quality of Facebook's Free Basics Service ", ACM Internet Measurement Conference (IMC), 2016.

68. Sujoy Saha, Subrata Nandi, Rohit Verma, Satadal Sengupta, Kartikeya Singh, Vivek Sinha, and Sajal K. Das , "Design of Efficient Lightweight Strategies to Combat DoS Attack in Delay Tolerant Network Routing ", Journal of Wireless Networks (WiNe), Springer, 2016.

69. Monidipa Das, Soumya K. Ghosh, P. Gupta, V. M. Chowdary, R. Nagaraja, and V. K. Dadhwal , "FORWARD: A Model for FOrecasting Reservoir WAteR Dynamics using Spatial Bayesian Network (SpaBN) ", IEEE Transactions on Knowledge and Data Engineering (TKDE), vol. 29, issue 4, pp. 842 - 855, 2017.

70. Rajib Lochan Jana, Shashank Kuchibhotla, Soumyajit Dey, Pallab Dasgupta , "Planning Based Guided Reconstruction of Corner Cases in Architectural Validation ", 20th International Symposium on VLSI Design and Test VDAT-2016.

71. A.Roy, R.S.Chakraborty, "Optimal Distortion Estimation for Prediction Error Expansion Based Reversible Watermarking", International Workshop on Digital-Forensics and watermarking(IWDW) 2016.

72. Ashish Sharma, Jatin Arora, Pritam Khan, Sidhartha Satapathy, Sumit Agarwal, Satadal Sengupta, Sankarshan Mridha, and Niloy Ganguly , "CommBox: Utilizing Sensors for Real-Time Cricket Shot Identification and Commentary Generation ", Demos and Exhibits Track of the 9th International Conference on Communication Systems and Networks (COMSNETS), Bangalore, India, January 2017.

73. K. Rudra, S. Banerjee, N. Ganguly, P. Goyal, M. Imran, and P. Mitra , "Summarizing Situational Tweets in Crisis Scenario ", ACM Hypertext 2016, July 10-13, 2016, Halifax, NS, Canada.

74. Palanivel Kodeswaran, Ravi Kokku, Madhumita Mallick, Sayandeep Sen , "Demultiplexing activities of daily living in IoT enabled smart homes ", IEEE INFOCOM 2016.

75. Ayan Das, Agnivo Saha, Sudeshna Sarkar , "Development of a Bengali parser by cross-lingual transfer from Hindi ",   6th Workshop on South and Southeast Asian Natural languages (COLING 2016), December 2016, Osaka, Japan.

76. P Das, DB Roy, D Mukhopadhyay, " Secure public key hardware for IoT applications ", 2016 IEEE 59th International Midwest Symposium on Circuits and Systems (MWSCAS).

77. Mayank Singh, Barnopriyo Barua, Priyank Palod, Manvi Garg, Sidhartha Satapathy, Samuel Bushi, Kumar Ayush, Krishna Sai Rohith, Tulasi Gamidi, Pawan Goyal and Animesh Mukherjee , "OCR++: A Robust Framework For Information Extraction from Scholarly Articles ", International Conference on Computational Linguistics (COLING 2016).

78. T. Ojha, S. Misra, N. S. Raghuwanshi , "Sensing-cloud: Leveraging the benefits for agricultural applications ", Computers and Electronics in Agriculture (Elsevier) .

79. Fault Based Almost Universal Forgeries on CLOC and SILC , "Debapriya Basu Roy, Avik Chakraborti, Donghoon Chang, S. V. Dilip Kumar, Debdeep Mukhopadhyay, Mridul Nandi ", SPACE 2016: 66-86

80. S. Misra, S. Bera, T. Ojha, H. Mouftah, A. Anpalagan , "ENTRUST: Energy Trading Under Uncertainty in Smart Grid Systems ", Computer Networks (Elsevier) .

81. Abhik Jana, Sruthi Mooriyath, Animesh Mukherjee and Pawan Goyal , "WikiM: Metapaths based Wikification of Scientific Abstracts ", Joint Conference on Digital Library 2017 (accepted, not yet published).

82. S. Misra, S. Bera, T. Ojha, H. Mouftah, A. Anpalagan , "ENTRUST: Energy Trading Under Uncertainty in Smart Grid Systems. ", Computer Networks (Elsevier), 2016.

83. Rajorshee Raha, Souradeep Dutta, Soumyajit Dey, Pallab Dasgupta , "Multi-rate Sampling for Power-Performance Trade-off in Embedded Control ", IEEE Embedded Systems Letters (ESL), December, 2011.

84. Sankaraganesh Jonna, Krishna K. Nakka and Rajiv R. Sahay, "Deep learning based fence segmentation and removal from an image using a video sequence. ", 2nd International Workshop on Video Segmentation, ECCV 2016, Amsterdam, Netherlands, (2016).

85. S. Das. D. J. Roy, S. Nandi, S. Chakraborty, B. Mitra, "UDAT: User Discrimination using Activity-Time Information", in Proceedings of the 18th MDM. IEEE, 2017 (accepted).