Introduction
The Department of Computer Science and Engineering at the Indian Institute of Technology Bombay is one of the largest departments in the country. The department’s teaching and research activities are handled by forty faculty members. Currently, over hundred Ph.D. students, more than two-hunder M.Tech. students and more than two-hundred and fifty B.Tech. students form the student pool of the department. While several research activities are pursued by individual faculty and external collaborators, the department houses about ten research labs spanning the areas of networks, databases, embedded systems, computer graphics, language technologies, machine learning and geospatial systems.

This academic year, Prof. Nutan Limaye joined the department as a faculty member and Prof. Amitabha Sanyal was appointed the Head of Department in April 2010.

Several students and faculty of the department won distinguished awards over the year. The following awards and honours were won by students---Rijurekha Sen was one among the five MSR India PhD Fellows for 2010, Mitesh Khapra and Jugal Garg won Microsoft Research’s rising star awards, Ruta Mehta won the 2011 research poster award at the Microsoft Research TechVista Symposium, Vijay Gabale and Mitesh Khapra were amongst IBM 2011 Ph.D. Fellowship award recipients, IITB’s NLP team comprising of Saurabh, Anup, Lipta, Meera and Mitesh secured the first two ranks in SemEval competition for word sense disambiguation. Amongst the faculty members—-Prof. Srinivas Aluru was honored as American Association for the Advancement of Science Fellow and Prof. Krithi Ramamritham was awarded the H. H. Mathur Award for Excellence in Research in Applied Sciences.

Several events were organized by the faculty and students of the department as well---Workshop on Essential Abstractions in GCC (July 2010), Indowordnet workshop (December 2010) and Workshop on Issues in Virtualization/Cloud Systems (February 2011).

Academic Programmes

<table>
<thead>
<tr>
<th>Degrees Awarded:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Tech</td>
<td>35</td>
</tr>
<tr>
<td>M.Tech</td>
<td>93</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>6</td>
</tr>
<tr>
<td>Dual Degree</td>
<td>21</td>
</tr>
</tbody>
</table>

Fellowship Details

1. Infosys fellowship for Ph.D students : 1

2. Microsoft India Research India Pvt Ltd. For Ph.D students : 2

3. Vijay Vashee and Vincent Fernandez fellowship for M.Tech & DD students
   M.Tech. :2  Dual Degree:3  Total: 5
R&D Activities

Sponsored Research Projects

Sponsored Projects

<table>
<thead>
<tr>
<th>No. of Ongoing Projects</th>
<th>97</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of New Projects</td>
<td>24</td>
</tr>
<tr>
<td>No of Completed Projects</td>
<td>7</td>
</tr>
<tr>
<td>Faculty Involved</td>
<td>39</td>
</tr>
</tbody>
</table>

New Projects

“Development and Evolution of Sanskrit Word -Net (PHASE II)” by Central Institute of Indian Languages.

“High Accuracy Sentiment Analysis with Polarity Marked Resource” by America On Line, Bangalore.

“Design and Development of Gigabit Networking Solutions for C&I Applications” by Bhabha Atomic Research Centre.

“BRNS/Analysis of SCADE Lustre models: Runtime Monitoring & Testing” by BOARD OF RESEARCH IN NUCLEAR SCIENCES.

“High-Speed Switching Fabric for Transport Networks and Distributed Processor Interconnects” by BOARD OF RESEARCH IN NUCLEAR SCIENCES.

“Fiber to the home-key Ingredient Technologies for Energy Conservation and Bridging the Indian Digital divide.” by Department of Information Technology.

"Development of Indradhanush: An integrated Word Net for Bengali, Gujarati, Kashmiri, Konkani, Oriya, Punjabi & Urdu" by Department of Information Technology.

“Virtualized Cloud Computing Infrastructure using Light Trails and very fast switching.” by Department of Information Technology.

“Network Sanitization” by Department of Information Technology.

“Deploying omnipresent Ethernet based data-centers in actual networks - Validation of project periscope.” by Department of Information Technology.

“PHASE II ---Development of Indian Language to Indian Language Machine Translation System (II-IL-MT)” by Department of Information Technology.

“Development of Cross Lingual Information Access (CLIA) System Phase II.” by Department of Information Technology.

“Immersive Digital Heritage.” by Department of Science & Technology.
“C V Raman International Fellowship Award for African Researchers (Coulibaly Naga)” by Federation of Indian Chambers of Commerce and Industry.

“Support for Cloud Computing related research” by INTERNATIONAL BUSINESS MACHINES CORPORATION.

“Cloud Collaboratory” by INTERNATIONAL BUSINESS MACHINES CORPORATION.

“Parallel Computing Research Prospects” by INTEL TECHNOLOGY INDIA PVT. LTD.

“Geo-spatial data base Management- The Ganga River Basin Management Project (GRBMP)” by MINISTRY OF ENVIRONMENT & FORESTS.

“OSCAR++ (Open Source Courseware Animations Repository)” by Ministry of Human Resource Development.

“Microsoft Research India Travel Grant” by Microsoft Research Lab India Pvt. Ltd.

“IITB-NSN: NEXT GENERATION OPTICAL ACCESS.” by Nokia Siemens Networks.

“Searching the Unstructured Web With Structured Queries” by SAP Labs India Private Limited.

“Development of Multilingual Resources and Technologies for Indian Languages” by Xerox Corporation.

“YAHOO INC./YAHOO RESEARCH GRANT 2010.” by YAHOO SOFTWARE DEVELOPMENT INDIA PVT. LTD.

“Bridging Query Intents to Catalogs and Annotated Documents.” by YAHOO SOFTWARE DEVELOPMENT INDIA PVT. LTD.

Completed Projects

“Type specific QoS based routing in Event Dissemination networks” by SAP Research, Brisbane, Austrailia.

“Research and Deployment of Next Generation metro Networks ? Roadmap for Carrier Ethernet and 100 Gigabit Ethernet (M/s. Agilent Technologies, USA)” by AGILENT TECHNOLOGIES


“Real Time Multiple Sensors To Track Multiple Targets Projected on a Screen.” by Defence Research & Development Organisation.

“Multimodal Participatory Content Repository for the Education of Rural Children” Sponsored by Private Organisations

“NETWORK SECURITY LAB (M/S.NEVIS NEWORKS INDIA PVT. LTD., PUNE)” Sponsored by Private Organisations.

“Financial Assistance for research project entitled "Ontology Based Framework for Integration of Geographic Information" by Department of Science & Technology.

“Establishment of a Nationwide Quality of Service Network Test-bed” by INFORMATION TECHNOLOGY.
On going Projects

“ITB-CommTel Multi-Service Transport Platform (MSTP) Development (Commtel Networks Pvt. Ltd., Mumbai)” by COMMTEL NETWORKS PVT LTD.

“GCC Resource Center” by Department of Information Technology.

“Indian Language Corpora Initiative” by Department of Information Technology.

“Second Generation Area Traffic Control System (CoSiCoSt2G)” by Department of Information Technology.

“Real-Time Transit Trip Planner and Route Information System” by Department of Information Technology.

“PERISCOPE: Pragmatic Efficient Reliable Internet working solution using Consumer-Centric Omnipresent Ethernet.” by Department of Information Technology.

“ENERGY & PERFORMANCE EFFICIENT MANET ROUTING PROTOCOLS FOR TACTICAL ENVIRONMENT.” by Defence Research & Development Organisation.

“DST/ Understanding Motion: Surface 3D Deformation From Video Data” by Department of Science & Technology.

“India-UK Advance Technology Centre (IU-ATC) of Excellence in Next Generation Networks Systems and Services.” by Department of Science & Technology.

“DST/ Advanced Research Lab for Geospatial Information Science and Engineering” by Department of Science & Technology.

“Large Scale Gene Expression Analysis on High Performance Parallel Computers for Functional Genomics and Systems Biology” by Department of Science & Technology.

“GEYSERS: Generalized architecture for dynamic infrastructure services.” by European Commission.

“PROF. UMESH BELLUR / VIRTUAL MACHINE PLACEMENT IN INFRASTRUCTURE CLOUDS.” by INTERNATIONAL BUSINESS MACHINES CORPORATION.

“Empowerment of Student & Teachers through Synchronous & asynchronous instruction” by Ministry of Human Resource Development.


“Empowerment of student and teachers through synchronous and asynchronous instruction” by Ministry of Human Resource Development.

“Project OSCAR++, Open Source Course-ware Animation Repository for higher education” by Ministry of Human Resource Development.

“Assimilation of open source software in science and engineering education” by Ministry of Human Resource Development.
“Creation of Machine translation tools and resources for English to Dravidian Languages” by Ministry of Human Resource Development.

“Developing suitable pedagogical methods for various classes, intellectual calibers and research in e-learning” by Ministry of Human Resource Development.

“MICROSOFT RESEARCH INDIA OUTSTANDING YOUNG FACULTY AWARD” by Microsoft Research India Outstanding Faculty Award (under IRCC).

“LOGICAL METHODS FOR COMPOSITIONAL SHAPE ANALYSIS” by Microsoft Research Lab India Pvt. Ltd.

“Unrestricted Grant for Research Support (M/s. Microsoft Research Lab India Pvt. Ltd., Bangalore)” by Microsoft Research Lab India Pvt. Ltd.

“Microsoft Grant (Microsoft Research Lab India Pvt. Ltd, Bangalore)” by Microsoft Research Lab India Pvt. Ltd.

“StrucFus (Infrastructure for information fusion System)” by VETENSKAPSRADET.

“Interference and Affinity Characterization of VMs for Server Consolidation in Infrastructure Clouds (Yahoo Software Development India Pvt. Ltd., Bangalore)” by YAHOO SOFTWARE DEVELOPMENT INDIA PVT. LTD.

“Yahoo Research Grant (Yahoo! Inc.)” by YAHOO SOFTWARE DEVELOPMENT INDIA PVT. LTD.


“Development of tool for formal verification of VHDL based data and control dominated designs used in safety critical systems” by BOARD OF RESEARCH IN NUCLEAR SCIENCES.

“Development & Evolution of Sanskrit Word-Net” by Central Institute of Indian Languages.


“National Programme on Perception Engineering” by Department of Information Technology.


“Euro-India ICT Co-Operation.” by European Commission.

“SEMANTIC LINKAGE BETWEEN THE WEB, INTRANET AND WIKIPEDIA: DISCOVERY AND EXPLOITATION IN SEARCH AND AGGREGATION.” by HP Labs.

“2008 IBM FACULTY AWARD.” by INTERNATIONAL BUSINESS MACHINES CORPORATION.

“Analyzing programs manipulating recursive data structures.” by Microsoft Research Lab India Pvt. Ltd.

“Research Collaboration on Mobile and Wireless Systems, with Microsoft Research India (MSRI)” by Microsoft Research Lab India Pvt. Ltd.

“Rural Connectivity and applications, Wireless Communications and Networking” by Tata Teleservices Ltd., Mumbai.

“Information Aggregation from tables on the Web” by Yahoo Inc.

“DESIGN AND DEVELOPMENT OF A REAL TIME OPERATING SYSTEM (RTOS) FOR SAFETY CRITICAL APPLICATION” by BARC.

“Extending Framework for WFS-based Interoperability of GIS Sources.” by Department of Science & Technology.


“IBM FACULTY AWARD/ IBURG BASED INSTRUCTION SELECTION IN GCC.” by International Collaboration Projects.

“IBM FACULTY AWARD / PROF. KRITHI.” by International Collaboration Projects.

“IBM FACULTY AWARD, Prof. P Bhattacharya/ Integrating Indian Language processing resources and tools and semantic search capabilities with the UIMA Platform.” by International Collaboration Projects.

“IBM Faculty Award/ Supratik Chakraborty/ Approximate search and coverage based verification techniques for flattened circuits with locally specified reference models.” by International Collaboration Projects.

“Microsoft Award/Soumen Chakrabarti/ Scalable annotation, search & aggregation of semistructured graph and text data models.” by International Collaboration Projects.

“Monograph of Business Incubation activities at IITB” by Wadhwani Foundation.

“Workshops on Establishing and operating a Business incubator & Marketing Mantra for Techno-Entrepreneurs” by Wadhwani Foundation.

“INTELLIGENT POWER GRID INITIATIVES IN INDIA.” Sponsored by Private Organisations.

“Microsoft India Distinguished Research Award / Linguistic Data Management of Indian Language Resources.” Sponsored by Private Organisations.

“Large Scale Application Development and Knowledge Dissemination in Natural Language Processing and Text Mining (HP Labs, Bangalore)” Sponsored by Private Organisations.

“Setting up a TePP web portal at IIT Bombay” by Technology Info. Forecasting & Assesment Council.


“Research Support for INAE Young Engineer Awardees” by Indian National Academy of Engineering.

“CROSS LINGUAL INFORMATION ACCESS (CLIA) SYSTEM” by INFORMATION TECHNOLOGY.

“Development of Indian Language to Indian Language Machine Translation System (II-IL MT) : Consortium Leader : IIIT Hyderabad” by INFORMATION TECHNOLOGY.

“English to Indian Languages Machine Translation (E-IL-MT) - Consurtium Leader - CDAC , PUNE” by INFORMATION TECHNOLOGY.


“Integrating Entities, Types and Relations into Search: Annotation, Indexing and Scoring Techniques” by InternationalCollaboration Projects.

“CROP DISEASE FORECASTING SERVICES ANE EXPERT CROP ADVISORY TO FARMERS OVER INFORMATION KIOSK NETWORKS” by InternationalCollaboration Projects.

“IBM Faculty Award of Prof. S. Sudarshan” by InternationalCollaboration Projects.


“METAMODELLING & ARCHITECURE ..UNDER PROF. R.K. JOSHI (M/S. IBM INDIA PVT. LTD)” by Sponsored Student Projects.

“FORMAL VERIFICATION OF SOFTWARE SYSTEMS (M/S. MICROSOFT INDIA (r&d) PVT.LTD., HYDERABAD)” by Sponsored by Private Organisations.

“TCS-IIT BOMBAY LABORATORY FOR INTELLIGENT SYSTEMS.” by Sponsored by Private Organisations.

“FORMAL VERIFICATION OF LARGE STATE TRANSITION SYSTEMS (M/S.GENERAL MOTORS INVDIA PVT. LTD., B’LORE)” by Sponsored by Private Organisations.

“GOLDEN JUBILEE PROJECT” by Sponsored by Private Organisations.

“E-Outreach” by Technology Info. Forecasting & Assessment Council.

“Special Manpower Development Programme for VLSI Design and Related Software (SMDP-II)” by Department of Electronics.

“Building Check-Dams for Drinking Water: A Teaching and Research Initiative.” by DONATION.

“RTL Symbolic Simulation.” by InternationalCollaboration Project.

“IBM Faculty Awards-IBM Global Services India Pvt.Ltd” by Sponsored by Private Organisations.

“DEVELOPMENTAL INFORMATICS” by Sponsored by Private Organisations.

“Ekalavya Project” by Sponsored by Private Organisations.

“OPEN SOURCE SOFTWARE (M/S.IBM GLOBAL SERVICES INDIA PVT.LTD.,B’LORE)” by Sponsored by Private Organisations.

“Association For Computing Machinery -International Collegiate Programming Contest -IBM Canada Ltd” by InternationalCollaboration Projects.

“Exchange of Ideas on Data Mining and Data Cleaning Projects-Microsoft Research” by InternationalCollaboration Projects.

“INTEREST OF ENDOWMENT FUND OF THE CFDVS” by DONATION.

“Partial redundancy elimination” by InternationalCollaboration Projects.

“Centre for formal Desing and Verification of software” by BRNS.

“PC NETWORKING & NETWORKING GROUP” by Sponsored by Private Organisations.

“Indigenous development of aircraft system maintenance simulator (ASMS) for light combat aircraft” by Aeronautical Development Agency.

“Development of Transputer based Multiprocessor Systems a Modelling Study” by Board of Research in Nuclear Sciences.

**Consultancy Projects**

<table>
<thead>
<tr>
<th>No of Jobs</th>
<th>19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty involved</td>
<td>10</td>
</tr>
</tbody>
</table>

**Extension activities**

**Workshops**

**Workshop on Essential Abstractions in GCC, 5th–8th July 2010.**

This workshop is a 4-day instructional workshop (and not a forum for contributed presentations) and involves lectures and laboratory exercises aimed at providing details of the internals of GCC (GNU Compiler Collection). GCC is the de-facto standard compiler generation framework on GNU/Linux and many variants of Unix. In the last 20 years of its existence, it has seen a rapid growth and wide acceptability.

GCC, an acronym for GNU Compiler Collection, is a compiler generation framework which generates production quality optimizing compilers from descriptions of target platforms. It follows an open development model whereby its source is available for all for inspection and modification. It supports a wide variety of source languages and target machines (including operating system specific variants) in a ready-to-deploy form. Besides, new machines can be added by describing instruction set architectures and some other information (eg. calling conventions).

Novices may want to see the Wikipedia introduction to GCC. For experts, the GCC page contains a wealth of information including installation instructions, reference manuals (which include users' guides as well as details of GCC internals), a set of frequently asked questions, a wiki page for the developers of GCC, additional reading material, and several mailing lists for more detailed issues and queries. An excellent description of GCC internals can also be found on Wikipedia. Some notes on GCC internals are available at Washington University.

**Wcloud 2011**

**Workshop on Issues in Virtualization/Cloud Systems**

**Date:** February 26th 2011, Saturday
Virtualization technology enabled cloud computing has been making rapid strides in provisioning, usage and management of large-scale systems. As popularity and applications of these techniques increase, there is increasing interest in the area, both from the academic research community and the industry. Virtualization has enabled private, public and hybrid clouds and opened problems in the following areas (and not limited to): physical to virtual consolidation, provisioning and placement techniques, flexible resource provisioning, monitoring and management of cloud systems, SLA-motivated and energy-aware migration techniques, multiplexing between types of clouds, cloud/virtualization software substrate optimization, storage virtualization, backup and replication etc. Some these issues are relevant to non-virtualization based cloud systems as well.

As part of this workshop (wcloud) at the Indian Institute of Technology Bombay, we aim to bring together the different research communities (involving student/faculty/industry) to discuss/present a set of interesting directions. A couple of keynote (directions and main problems) talks and a set of student-talks will provide a mixture of the overall problem area and work on specific instances of problems. The idea is to expose student and faculty community to both broad and specific aspects of the research directions. The event will also provide a platform for interactions and discussions between people involved in cloud computing research.

**Short-term Courses**

**Continuing Education Programme**

The following courses were offered under CEP

- Introduction to Robotics
- Co-ordinator effective teaching learning of computer programming workshop
- Introduction to Robotics
- Introduction to Robotics
- Introduction to Robotics
- Introduction to Robotics
- Advanced Programming in C++
- Essential Abstractions in GCC
- Introduction to Robotics
- Introduction to Robotics
- Introduction to Robotics
- Course for Co-ordinators, Database Management Systems
- Introduction to Embedded Systems using Robots
- Introduction to Embedded Systems using Robots
- Introduction to Robotics
- Introduction to Robotics
Course for Coordinators on
Introduction to Robotics

Visitors to the Department

Prof. Divesh Srivastava, AT&T Labs-Research. He delivered a lecture on “Dependence and Truth”.

Dr. Hugo Zaragoza, Principal Research Scientist, Yahoo! Research, Barcelona. He delivered a lecture on “Helping Computers Understand What They Search”.

Prof. Shailesh Tipnis, Illinois State University. He delivered a lecture on “Regular multigraphs of high degree and even order are 1-factorable”.

Prof. Kesav Nori, IIT Hyderabad (ex-IIT Kanpur, ex-TCS). He delivered a lecture on “A Second Software Quality Revolution”.

Prof. N. R. Aravind, IMSC, Chennai. He delivered a lecture on “Bounds for forbidden subgraph colorings”.

Prof. R. Govindarajan, Supercomputer Edn. & Research Centre, Dept. of CSA, Indian Institute of Science Bangalore. He delivered a lecture on “Points-to-Analysis as a System of Linear Equations”.

Speakers from NVIDIA and Partners, NVIDIA. They presented a “CUDA Workshop”.

Prof. Vivek Sarkar, E.D. Butcher Professor in Engineering, Professor of Computer Science, Professor of Electrical & Computer Engineering, Rice University. He delivered a lecture on “Towards a Portable Execution Model for Extreme Scale Multicore Systems”.

Professor Biswanath Mukherjee, Department of Computer Science, University of California, Davis. He delivered a lecture on “How to be a good graduate student”.

Prof. Baba Vemuri. He delivered a lecture on “Face Relighting and Morphing*”.

Dr. Sriraam Natarajan, Dept. of Computer Science, University of Wisconsin-Madison. He delivered a lecture on “Efficient Statistical Relational Learning”.

Prof. Raju Pandey, Dept. of Computer Science, University of California at Davis. He delivered a lecture on “Realizing the Promise of Wireless Sensor Networks: Technology and Applications”.

Dr. Deeparnab Chakrabarty, University of Pennsylvania, Philadelphia. He delivered a lecture on “Algorithmic Issues in Indivisible Allocations”.

Dr. Smruti R. Sarangi, IBM Research Labs, Bangalore. She delivered a lecture on “The Case for Parameter Variation Aware Processors”.

Prof. Bryan Ford, Yale University. He delivered a lecture on “Efficient System-Enforced Deterministic Parallelism”.

John SanGiovanni, Microsoft. He delivered a lecture on “Microsoft Mobility”.

Prof. John Goldwasser, West Virginia University. He delivered a lecture on “A Ramsey-type Theorem in the
Hypercube”.

Prof. John Goldwasser, West Virginia University. He delivered a lecture on “On the Turan Number of \{123,124,345\}”.

Dr. Raghuram Krishnapuram, Associate Director, IBM India Research Lab. He delivered a lecture on “Overview of Research Activities at IBM India Research Lab”.

Shuchi Chawla, University of Wisconsin at Madison. She delivered a lecture on “The Bayesian matroid secretary with applications to mechanism design”.

Aditya Akella, University of Wisconsin at Madison. He delivered a lecture on “Redundancy Elimination as a Network-wide Service”.

Dr. Ojaswa Sharma, Technical University of Denmark. He delivered a lecture on “On Object Reconstruction from Arbitrary Cross Sections”.

Dr. R. Bharat Rao, Siemens Healthcare, Inc., Malvern PA, USA. He delivered a lecture on “Mining Healthcare Systems to Personalize Patient Care & Improve Clinical Decisions”.

Prof. Thomas Mandl, University of Hildesheim, Germany. He delivered a lecture on “New Directions in Information Retrieval Evaluation”.

Dr. David Chaiken, Chief Architect, Yahoo! Inc. He delivered a lecture on “Architecture at Internet-Scale”.

Mr. M. G. Thiruvalluvan, Senior Architect, Yahoo! Inc. He delivered a lecture on “Programming for Production Quality”.

Dr. Sriram Raghavan, IBM India Research Lab, Bangalore. He delivered a lecture on “Programmable Search”.

Dr. Tat–Seng Chua, National University of Singapore. He delivered a lecture on “Extracting Knowledge from Community Question-Answering Sites”.

Mr. Shivaram Kalyanakrishnan, Dept. of Computer Science, University of Texas at Austin. He delivered a lecture on “Learning Methods for Sequential Decision Making in Practice”.

Prof. Sanjit A. Seshia, Dept. of EECS, Univ. of California, Berkeley. He delivered a lecture on “From Security to Cyber-Physical Systems: The Sciductive Approach to Verification and Synthesis”.


Prof. Poorvi L. Vora, Dept. of Computer Science, The George Washington University, Washington D. C. He delivered a lecture on “Independently-Verifiable Secret-Ballot Elections”.

Raju Rangaswami, Florida International University (School of Computing and Information Sciences). He delivered a lecture on “Building Reliable Systems using Software Persistent Memory”.

Radia Perlman, Intel Labs Fellow. He delivered a lecture on “Recent Advances in Network Routing and Bridging Protocols”.

Rick Rashid, Microsoft Research, USA. He delivered a lecture on “The Role of Basic Research in Technology”.
Mahesh Ramasubramanian and Marilyn Friedman, DreamWorks Animation SKG. He delivered a lecture on “Computer Generated Imagery in Cinematic Animation”.

Dr. Ronald Fagin, IBM Almaden Research Centre. He delivered a lecture on “P vs. NP and Community Refereeing in the Web Era”.

Prof. Vinayak Borkar, Computer Science Dept., Univ. of California, Irvine. He delivered a lecture on “Hyracks: A Flexible and Extensible Foundation for Data-Intensive Computing”.

Dr. Tom Leighton, Akamai Technologies. He delivered a lecture on “The Future of the Cloud: Making the Internet work for Business and Government”.

Dr. Hu Yoshida, Hitachi Data Systems. He delivered a lecture on “Trends in the Storage Industry”.

Prof. John E. Hopcroft, Cornell University, Ithaca, NY, IBM Professor of Engg. and Applied Maths in Computer Science, Cornell University. He delivered a lecture on “Computer science theory to support research in the information age”.

Dr. Srini Ramaswamy, ABB Global Industries and Services Ltd. He delivered a lecture on “Large Scale Industrial Software Systems Development”.

**Conferences/Symposia/Workshops/Seminars**

**(Participated/Papers Presented)**

**National**

**Chakraborty Supratik**
Participated in the National Conference on *Foundations of Software Technology and Theoretical Computer Science, 2010 (FSTTCS).*

**Chakraborty Supratik**
Participated in National Workshop on *Automata, Concurrency and Timed Systems (ACTS-III), Formal Methods Update Meeting 2010*

**International**

**Diwan A.A.**
Participated in International Conference on Recent Trends in Graph Theory and Combinatorics, Cochin, August 12-15, 2010.

**Bhattacharyya Pushpak**
International Conference on Natural Language Processing (ICON2010), IIT Kharagpur, December, 2010.

**Bhattacharyya Pushpak**
Computational Linguistics Conference (COLING 2010), Beijing, China, August 2010.

**Bhattacharyya Pushpak**

**Krithi Ramamritham**
Krithi Ramamritham
Kasina Rao, Krithi Ramamritham, R. Sonar.
Examining the viability of mixed framework for mobile services impact study in India.

Krithi Ramamritham
Rajeev Gupta, Krithi Ramamritham, Mukesh Mohania.
Ratio Threshold Queries over Distributed Data Sources.
Proc. of IEEE International Conference on Data Engineering (ICDE), March, 2010.

Krithi Ramamritham.
Maintaining Coherent Views over Dynamic Distributed Data.

Invited Lectures

National

Chandran Sharat
"Digital Heritage Project". NIAS Workshop, Bangalore March 25, 2011.

Chandran Sharat

Diwan A.A.
Research Promotion Workshop on "Introduction to Graph and Geometric Algorithms", PSG College of Engineering, Coimbatore, January 6-8, 2011.

Diwan A.A.

Bhattacharyya Pushpak
Invited Presentation, Strategies in English Hindi Machine Translation, Yahoo, Bangalore, 9 Feb, 2011.

Bhattacharyya Pushpak

Bhattacharyya Pushpak
Invited Presentation, IndoWordNet, Jawaharlal Nehru University (JNU), New Delhi, May 18, 2010.

International

Chandran Sharat
"Rendering Primitives with Vision and Graphics". Plenary Talk. ICVGIP December 2010

Chakraborty Supratik
Invited talks at Intel, Israel Development Centre, Haifa

**Bhattacharyya Pushpak**

**Bhattacharyya Pushpak**
Keynote Speech, *WSD and IR*, 4th Workshop on Cross Lingual Information Access, Beijing, 28 August, 2010 (Satelite event of COLING 2010).

**Significant Awards/Distinctions**

**Honorary Work**

**Chandran Sharat**
Top Tier Program committee reviewer: ACCV, CVPR, ICCV, Eurographics
Program Committee ICVGIP
Reviewer of proposals: DST
GeoICT PAMC member (DST)

**Chakraborty Supratik**
PC member of ASYNC 2011, VLSI Design 2011 (Verification Track Co-Chair), SPIN 2011.

**Diwan A.A.**

**J.Saketha Nath**
Served as program-committee member for AAAI-2011 and reviewer for NIPS 2011.

**Bhujade M.R.**
Member, International advisory Board for Journal of Information Technology and Multimedia.

**S. Sudharshan**
General Chair, Int'l Conference on Management of Data (COMAD), Nagpur, Dec 2010.
Member, Board of Trustees, Very Large Data Base Foundation (2010 onwards).
Track Chair, International Conference on World Wide Web, Hyderabad, 2011.
Program Committee Member, Very Large Database Conference (VLDB) 2011.

**Bhattacharyya Pushpak**
Associate Editor, ACM Transaction on Asian Language Information Processing (TALIP).
Editorial Board Member, Volume on *Advanced Language Technologies for Digital Libraries* to be published in the Springer's Lecture Notes on Computer Science (LNCS) Hot Topic Series.
Board Member, Global Wordnet Association (GWA).
Organizing Chair, 5th International Conference on Global Wordnet, 2010.
Faculty Members and Their Specializations

Sharat Chandran

Bharat Adsul
Formal methods in Concurrency, Logics and Games.

Srinivas Aluru
Parallel algorithms and applications, bioinformatics and systems biology, combinatorics scientific computing, applied algorithms

Varsha Apte
Performance Evaluation of Computer Systems and Networks

Kavi Arya
Functional Programming Applications (Domain Specific Languages), Embedded Systems/Parallel Programming Languages, Distance Learning

Ashwin Gumaste
Optical Networks, Telecommunication Networks, Data Centers, Carrier Ethernet

Umesh Bellur

Pushpak Bhattacharyya
Natural Language Processing, Machine Learning, Machine Translation, Cross Lingual Information Retrieval

Moreshwar R. Bhujade
Hardware verification, Neural networks

Supratim Biswas
Parallel and Distributed Processing, Neural Nets, Architecture

Soumen Chakrabarti
Hypertext databases, Data mining

Supratik Chakraborty
Formal Methods and Applications, Logic and Automata Theory

Parag Chaudhuri
Computer Graphics

Kameswari Chebrolu
Wireless Networks

Om P.Damani
Natural Language Processing
Dhananjay Madhav Dhamdhere
Distributed Algorithms, Programming Languages, Operating Systems, Optimizing Compilers

Ajith Diwan
Graph Theory, Algorithms.

Sridhar Iyer
Mobile Computing, Distributed Systems, Educational Software.

Saketha Nath J
Machine Learning, Data Mining, Convex Optimization

Rushikesh K Joshi
Object Oriented Systems, Distributed Systems, Software Architectures

Shashikant Kelkar
Software Engineering, Management Information Systems

Uday Khedkar
Programming Languages, Compilers, Data Flow Analysis.

Purushottam Kulkarni
Sensor and Wireless Networks, Distributed Systems and Data Dissemination. Developing solutions to problems in above areas for non-urban/rural settings.

Bernard Menezes
Information Appliances, Electronic Commerce, Java Security, Parallel Computing, Time Series Forecasting

Gopalakrishnaswami Nagaraja
Machine Intelligence, Pattern Recognition,

Deepak B Phatak

Krithi Ramamritham
Databases, real-time systems, and distributed applications, Dynamic Data in sensor networks, embedded systems, mobile environments and the web.

Bhaskar Raman
Computer networks, Wireless systems, Communication system design for developing regions

Ganesh Ramakrishnan
Statistical Relational Learning, Graphical Models, Some other topics in Machine Learning such as Support Vector Machines, Information Extraction

Abhiram G Ranade
Algorithms and Combinatorial Optimization

Krishna Shankaran Narayanan
Formal Methods, Bio-inspired Computing
Anirudha Sahoo  
Computer networks, Voice routing, QoS in networks, wireless networks, wireless sensor networks, WiMax

Amitabha Sanyal (Head of the Department)  
Functional Programming, Compilers, and Programming Languages

Sunita Sarawagi  
Databases, data mining, and machine learning. Her current research interests are web information extraction, data integration, graphical models and structured learning.

Nandlal L Sarda  
Databases, Information Systems, Software Engineering

Sivakumar G  
Automated Reasoning, Logic Programming, Rewrite Systems, Networks, Distributed Systems

Milind Sohoni  
Combinatorial Optimization, Mathematical Programming, Algorithms

Sudarshan S  
Database Systems

Sundar Vishwanathan  
Algorithms, Combinatorics, Complexity Theory.

Publications

Books (Authored)

Kelkar S.A.  
*Information Technology project management*, Prentice Hall of India.  
Hospital Information systems, Prentice Hall of India.  
Strategic IT Management, Prentice Hall of India.

Books (Edited)

Pushpak Bhattacharyya  

Krithi Ramamritham  
Sadagopan Srinivasan, Krithi Ramamritham, Arun Kumar, M. P. Ravindra, Elisa Bertino, Ravi Kumar:
Chapter (Book)

S. Chakraborty,

Krithi Ramamritham
S. Ghaisas, G. Karmakar, D. Shenai, S. Tirodkar, Krithi Ramamritham.
SPaR: Safety Partition Kernel for Integrated Real-Time Systems. in From Active Data Management to Event-Based Systems and More.

Alan David Fekete, Krithi Ramamritham.

Articles in Journals

National

Ashwin Gumaste, et al,

Ashwin Gumaste, et al,

Ashwin Gumaste and N. Krishnaswamy,

S. Zheng and Ashwin Gumaste,

Y. Li, J. Wang, Ashwin Gumaste, Y. Xu and Y. Xu,

M. Esmaeili, F. Xu, M. Peng, N. Ghani, Ashwin Gumaste, J. Finocchietto,

Jing Chen, Jianping Wang, Ashwin Gumaste, and S.Q. Zheng,
Ashwin Gumaste, A Lodha, S. Mehta, J. Wang and N. Ghani,

P. Rost, R. Boutaba, K. Doppler and Ashwin Gumaste,

S. Zheng, Ashwin Gumaste and E. Lu,

Bernard L Menezes
"Min-max fair power flow tracing for transmission system usage cost allocation: A large system perspective” IEEE Transactions on Power Systems

Krishna Shankara Narayanan
“Model Checking Weighted Integer Reset Timed” Automata Theory of Computing Systems

Krishna Shankara Narayanan

Krithi Ramamritham
Subhasri Duttagupta, Krithi Ramamritham, Purushottam Kulkarni,

Krithi Ramamritham

Krithi Ramamritham
Rajeev Gupta and Krithi Ramamritham.
“Optimized Query Planning of Continuous Aggregation Queries over a Network of Data Aggregators”. IEEE Transactions on Knowledge and Data Engineering, accepted Nov. 2010. Digital Object Identifier: 10.1109/TKDE.2011.12 Date of Publication: 2011-01-06

Krithi Ramamritham
Saikat Mukherjee, Srinath Srinivasa, Krithi Ramamritham:

Om P Damani
“Transliteration for resource-scarce languages” ACM Transactions on Asian Language Information Processing

A.Kumaran, Mitesh Khapra and Pushpak Bhattacharyya
Soumen Chakrabarti
“Index design and query processing for graph conductance search” VLDB Journal

Soumen Chakrabarti, Sunita Sarawagi and S.Sudarshan

Sunita Sarawagi, Ajit A Diwan and Rahul Gupta
“Collective inference for extraction MRFs coupled with symmetric clique potentials” Journal of Machine Learning Research

Sashank J. Reddi, Sunita Sarawagi, and Sundar Vishwanathan
“Map estimation in binary MRFs via bipartite multi-cuts.” In NIPS (Oral presentation, Honorary mention for Outstanding student paper award), 2010.

Rahul Gupta and Sunita Sarawagi
“Joint training for open-domain extraction on the web: Exploiting overlap when supervision is limited” In WSDM, 2011.

Sharat Chandran

S. Chakraborty

Ajit Arvind Diwan
“ Cycles of even lengths modulo k”, J. Graph Theory, Vol. 65(3), Novemeber 2010, 246-252.

Ajit Arvind Diwan
“Collective inference for extraction MRFs coupled with symmetric clique potentials” Journal of Machine Learning Research Vol.11

Ashwin Srinivasan, Ganesh Ramakrishnan
“ Parameter Screening and Optimisation for ILP using Designed Experiments” Accepted for publication in the Journal of Machine Learning Research 11 (2010) 3481-3516

Sachindra Joshi, Jayadeva, Ganesh Ramakrishnan, Suresh Chandra
“ Using Sequential Unconstrained Minimization Techniques to Simplify SVM Solvers” Accepted for publication in Neurocomputing 2011

Saketha Nath J
A. Ben-Tal, S. Bhadra, C. Bhattacharyya and J. Saketha Nath.

Saketha Nath J
Papers Published in Proceedings of Conferences/Symposia

National

**Sharat Chandran**

"Adaptive Kernel Sampling for Projector Defocus Blur Correction with Indirect Illumination Compensation in Multiplanar Environments"  (with Shamsuddin Ladha and Kate Smith-Miles), Techvista January 2011

International

**Anirudha Sahoo**

“A scheduling and call admission control algorithm for WiMax mesh network with strict QoS guarantee” 2010 2nd International Conference on COMmunication Systems and NETworks, COMSNETS 2010

**Anirudha Sahoo**

“Residual white space distribution-based opportunistic channel access for cognitive radio enabled devices” SIGCOMM'10 - Proceedings of the SIGCOMM 2010 Conference

**Anirudha Sahoo**

“Opportunistic channel access scheme for cognitive radio system based on residual white space distribution “ IEEE International Symposium on Personal, Indoor and Mobile Radio Communications, PIMRC

**Anirudha Sahoo**

“DGRAM: A Delay Guaranteed Routing and MAC Protocol for Wireless Sensor Networks” IEEE TRANSACTIONS ON MOBILE COMPUTING

**P. Gokhale, R. Kumar, T. Das and Ashwin Gumaste**


**A. Verma, S. Mehta, Ashwin Gumaste**


**Ashwin Gumaste, S. Bidkar, C. Taunk and D. Bhamare**

"Using MPLS-TP for Data-Center Interconnection" Invited paper, Broadnets 2010, Athens Greece Oct 2010

**J. Wey, C. Babstieber, Ashwin Gumaste, A. Noorozifar, A. Tiexiera, K. Pulverer and H. Rohde**


**Ashwin Gumaste, S. Mehta, S. Rana and T. Das**


**P. Gokhale, T. Das and Ashwin Gumaste**


**U. Manyam, J. Parab, Ashwin Gumaste**

"Experimental Demonstration for the Need for Carrier Ethernet in Mission Critical Networks", 26th
Ashwin Gumaste
"Maximizing Network Capacity using the Reach Optimized Architecture for Multi-rate Transport System (ROAMTS)," Photonics in Switching, Monterey CA, USA, July 2010

Ashwin Gumaste

Ashwin Gumaste
"Achieving Nanosecond Switching Time for Intra-Data-Center Connectivity - The Omnipresent Ethernet Approach", in the 6th International Conference on IP + Optical Networks IPOP 2010, NTT center Japan.

Vijay Gabale, Bhaskaran Raman, Kameswari Chebrolu, Purushottam Kulkarni,
“LiT MAC: Addressing the challenges of effective voice communication in a low cost, low power wireless mesh network” Proceedings of the 1st ACM Symposium on Computing for Development, DEV 2010

Kameswari Chebrolu, Sagar Bijwe, Vijay Gabale, Bhaskaran Raman
“PIP: A connection-oriented, multi-hop, multi-channel TDMA-based MAC for high throughput bulk transfer” Proceedings of the 8th ACM Conference on Embedded Networked Sensor Systems

Kameswari Chebrolu and Advait Mishra
“Loss behavior analysis and its application in design of link quality metrics” The third international conference on Communication Systems and Networks (COMSNETS), 2011

Lakshmanan Kuppusamy, Anand Mahendran, Krishna Shankara Narayanan

Gabriel Ciobanu, Krishna Shankara Narayanan

Rijurekha Sen, Bhaskaran Raman, Prashima Sharma

Bhaskaran Raman and Rahul Jain
"SIR-Based Interference-Maps for TDMA-Based Outdoor Mesh Networks", The 17th IEEE Workshop on Local and Metropolitan Area Networks (LANMAN'10), May 5-7, 2010, Long Branch, New Jersey, USA.

Swaroop Roy, Rijurekha Sen, Swanand Kulkarni, Purushottam Kulkarni, Bhaskaran Raman, Lokendra Singh,

Vijay Gabale, Ashish Chiplunkar, Bhaskaran Raman, Partha Dutta
"DelayCheck: Scheduling Voice Over Multi-hop Multi-channel Wireless Mesh Networks",
The Third International Conference on COMmunication Systems and NETworkS (COMSNETS), Bangalore, India, January 2011.

**G Sivakumar**  
“EGSI: TGKA based security architecture for group communication in grid”  CCGrid 2010 - 10th IEEE/ACM International Conference on Cluster, Cloud, and Grid Computing

**G Sivakumar**  
“Dynamic policy adaptation for collaborative groups Communications” in Computer and Information Science

**Pratik Jawanpuria, Saketha Nath and Ganesh Ramakrishnan**  
“Efficient Rule Ensemble Learning using Hierarchical Kernels”  Accepted paper in the 28th International Conference on Machine Learning, 2011

**Devshree Sane, Soumen Chakrabarti, Ganesh Ramakrishnan**  

**Naveen Nair, Ganesh Ramakrishnan and Shonali Krishnaswamy**  
“Enhancing Activity Recognition in Smart Homes Using Feature Induction”  Accepted for publication in DaWaK 2011

**Srihari Kalgi, Chirag Gosar, Prasad Gawde, Ganesh Ramakrishnan, Chander Iyer, Kiran T V S, Kekin Gada and Ashwin Srinivasan**  
“BET: An ILP workbench” ILP 2010, Florence, Italy

**Naveen Nair, Chander Jayaraman, Kiran TVS and Ganesh Ramakrishnan**  
“Pruning Search Space for Weighted First Order Horn Clause Satisfiability”  ILP 2010, Florence, Italy

**Ganesh Ramakrishnan**  
“Incorporating linguistic expertise using ILP for named entity recognition in data Hungry Indian languages” Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)

**Ganesh Ramakrishnan**  
“Parameter screening and optimisation for ILP using designed experiments” Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)

**Kameswari Chebrolu**  
“PIP: A connection-oriented, multi-hop, multi-channel TDMA-based MAC for high throughput bulk transfer” SenSys 2010 - Proceedings of the 8th ACM Conference on Embedded Networked Sensor Systems

**Kameswari Chebrolu, Purushottam Kulkarni**  
“LiT MAC: Addressing the challenges of effective voice communication in a low cost, low power wireless mesh network” Proceedings of the 1st ACM Symposium on Computing for Development, DEV 2010

**Krithivasan Ramamritham**  
“SParK: Safety Partition Kernel for integrated real-time systems” Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)

**Nandlal Laxminarayan Sarda**  
“Developing IITB Smart CampusGIS Grid” Proceedings of the 1st Amrita ACM-W Celebration of Women
Nandlal Laxminarayan Sarda
“Keyword search in geospatial database” GIS: Proceedings of the ACM International Symposium on Advances in Geographic Information Systems

Purushottam Kulkarni
“Vehicular WiFi access and rate adaptation” SIGCOMM’10 - Proceedings of the SIGCOMM 2010 Conference

Purushottam Kulkarni
“Road Traffic Estimation using In-situ Acoustic Sensing” COMPUTER COMMUNICATION REVIEW

Shashank and Pushpak Bhattacharyya,

Mitesh Khapra, Saurabh Sohoney, Anup Kulkarni and Pushpak Bhattacharyya

Harshada Gune, Mugdha Bapat, Mitesh Khptra and Pushpak Bhattacharyya
“Verbs are where all the Action Lies: Experiences of Shallow Parsing of a Morphologically Rich Language”, Computational Linguistics Conference (COLING 2010), Beijing, China, August 2010.

Abbas Malik, Christian Boitet and Pushpak Bhattacharyya

Mitesh Khptra, Anup Kulkarni, Saurabh Sohoney and Pushpak Bhattacharyya

Manoj Chinnakotla, Karthik Raman and Pushpak Bhattacharyya

Shalini Gupta and Pushpak Bhattacharyya

Raghavendra Udupa, Mitesh Khptra, A Kumaran and Pushpak Bhattacharyya

Manoj Chinnakotla, Karthik Raman and Pushpak Bhattacharyya

Mitesh Khptra, Kumaran A and Pushpak Bhattacharyya

Pushpak Bhattacharyya
Karthik Raman, Raghavendra Udupa, Abhijit Bhole and Pushpak Bhattacharyya

Mitesh Khapra, Sapan Shah, Piyush Kedia and Pushpak Bhattacharyya
“Domain-Specific Word Sense Disambiguation Combining Corpus Based and Wordnet Based Parameters”, 5th International Conference on Global Wordnet (GWC2010), Mumbai, Jan, 2010.

Sangharsh Boudh and Pushpak Bhattacharyya

Jaya Saraswati, Rajita Shukla, Sonal Pathade, Tina Solanki and Pushpak Bhattacharyya
“Challenges in Multilingual Domain-Specific Sense-marking”, 5th International Conference on Global Wordnet (GWC2010), Mumbai, Jan, 2010.

Malhar Kulkarni, Chaitali Dangarikar, Irawati Kulkarni, Abhishek Nanda and Pushpak Bhattacharyya

Rushikesh K Joshi

Rushikesh K Joshi
“Identifying architectural connectors through formal concept analysis of communication primitives “ Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)

Rushikesh K Joshi
“Ontological analysis for generating baseline architectural descriptions” Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)

Rushikesh K Joshi
“Quality analysis of object oriented cohesion metrics” Proceedings - 7th International Conference on the Quality of Information and Communications Technology, QUATIC 2010

Rushikesh K Joshi
“Inheritance metrics: What do they measure”? ECOOP 2010 Workshop Proceedings - Workshop 8: 4th Workshop on Mechanisms for Specialization, Generalization and Inheritance, MASPEGHI’10

Sharat Chandran, Biswarup Choudhury and Ambareesha R
"Image-Based Animation”

Sharat Chandran, Sriram Kashyap, Rhushabh Goraida, Parag Chaudhuri
"Implicit Surface Octrees for Ray Tracing Point Models"
ICVGIP 2010, Seventh Indian Conference on Computer Vision, Graphics and Image Processing, pages 227-234

Sharat Chandran, Rhushabh Goradia, Sriram Kashyap, Parag Chaudhuri
“GPU-Based Ray Tracing of Splats”
Sharat Chandran, Andrew Janowczyk, Michael Feldman and Anant Madabhushi
"Local Morphologic Scale: Application to Segmenting Tumor Infiltrating Lymphocytes in Ovarian Cancer TMAs"
SPIE Medical Imaging. Feb 2011

M. Joglekar, N. Shah, A. A. Diwan,
“Balanced group-labeled graphs,”

Varma, A.; Ranade, A.; Aluru, S.;
“An improved maximum likelihood formulation for accurate genome assembly”
IEEE 1st International Conference on Computational Advances in Bio and Medical Sciences (ICCABS), 2011

Mahendra Chavan, Ravindra Guravannavar, Karthik Ramachandra, S. Sudarshan,
“Program Transformations for Asynchronous Query Submission”
International Conference on Data Engineering (ICDE), Hannover, Germany 2011

Shetal Shah, S. Sudarshan, Suhas Kajbaje, Sandeep Patidar, Bhanu Gupta, Devang Vira,
“Generating Test Data for Killing SQL Mutants: A Constraint-based Approach”,
International Conference on Data Engineering (ICDE), Hannover, Germany 2011

Mahendra Chavan, Ravindra Guravannavar, Karthik Ramachandra, S. Sudarshan,
“DBridge: A Program Rewrite Tool for Set-Oriented Query Execution (demo)”,
Demo paper, International Conference on Data Engineering (ICDE), Hannover, Germany 2011.

Pratik J., and J. Saketha Nath
“Multi-task Multiple Kernel Learning”
In Proceedings of the SIAM International Conference on Data Mining (SDM), 2011.

Umesh Bellur
“On using network tomography for overlay availability” Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)

Umesh Bellur
“Automating QoS based service selection ICWS 2010” - 2010 IEEE 8th International Conference on Web Services