

ENGINEERS WITH SOCIAL RESPONSIBILITY

Dhirubhai Ambani Institute of Information and Communication Technology

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NAAC Accredited

Recipient of Centre of Excellence Award by the Government of Gujarat Recipient of '5 Star' in GSIRF Ranking by Government of Gujarat

OUR FOCUS AREAS OF RESEARCH:

DAIICT is committed towards developing and maintaining the highest standards in both teaching and research. Engineering with Humanities and Social Sciences at DAIICT provides a best environment that fosters inter-disciplinary research in cutting edge areas. The faculty at DAIICT contributes to sponsored research, basic research and industrial collaboration in the areas of Information and Communication Tech and Humanities and social science. Our Institute website provides a great deal of information on its people, activities, and resources. Our focused areas of research are described below.

Communication and Signal Processing

Research is underway on the design and development of software that generates implementations and solves estimation problems using Kalman filters and its variants. From a high-level mathematical description of a state estimation problem, the software aims to generate code that computes statistically optimal estimate using the appropriate estimation filters. Also being developed are motion analysis algorithms to find relevant motion parameters based on available information, in the presence of relatively high error rates in low SNR conditions.

Distributed Databases

Works carried out by the group members is in the area of data partitioning and allocation for distributed systems. In 2015, Agro Advisory System for cotton crop of north Gujarat region was developed. The current research interests include dynamic data partitioning and distribution, query processing architecture for streaming data, storage and configuration of tiered storage systems, and data blocking. The group members are also exploring application domains like IoT, sensor network, and agriculture. This group is also interested in developing applications for biodiversity domain.

ICT in Agriculture & Rural Development

The group is primarily engaged in research areas related to Impact of Globalization and Indian Agriculture, ICT Enabled Rural Services: Issues and Solutions, Agricultural Information Systems, Analysis and Data Mining, ICT Interventions in Agrarian Crisis in collaboration with other leading research and development Institutions and Organizations.

Natural Information Processing

Research currently focuses on two aspects of information processing viz. deciphering the information processing principles in life, and making a computer out of bio-molecules. The key expertise of the research group is in error-correcting codes. Work is also carried out in classical and quantum information processing principles, in coding theory, and its applications in Information and Communication Technology (ICT).

Networks & Security

Active research is underway on the design, modeling and simulation of protocols for mobile, ad-hoc delay-tolerant and intermittent networks. Problems such as routing, congestion control, pricing in the Internet, power control in case of ad hoc networks are some of the specific areas of research. Security-oriented research includes covert channels in TCP/IP protocols, efficient implementation of encryption algorithms, and copy protection for XML documents.

Next Generation Wireless Systems

Emerging wireless systems (super-3G, 4G, xG) will place greater demands on the baseband level, cross-layer design, and radio access technology. This research group focuses on designing and modeling state-of-the-art architecture for next generation wireless systems. Radio resource management, multi-hop communication, OFDM-based systems, dynamic spectrum access based on cognitive radio, and wireless multimedia streaming are the areas being investigated. Longer term vision of the group is to create an industry-backed center which contributes to the development of next generation wireless systems and standards.

Pattern Recognition & Image Processing

Multi-media systems, biometric authentication and automated medical diagnoses are just a few of the potential applications of ongoing work in image processing and pattern recognition. Specific research topics include super-resolution using motion cue, face recognition, and digital image watermarking.

Sensor Networks

Research is being carried out to apply this technology in various domains including, in particular, wildlife research, agriculture and animal health monitoring, and nuclear fusion reactor monitoring. Complete system design and development is being undertaken, including the design of energy-efficient protocols, localization algorithms, and routing algorithms for wireless sensor networks. The aim is to build a GPS-less wireless sensor network which can be used, for example, to track and monitor animals in a wildlife sanctuary. Work is also being carried out to develop a modular sensor network test-bed 'CENSE', consisting of a hundred nodes.

Speech Processing

Research is being conducted on various aspects, including in particular speaker recognition, focusing mainly on speech features based on linear prediction and Mel frequency cepstrum coefficients. The work is being carried out for several Indian languages. Speaker recognition research is further being explored in the area of spectral resolution problem associated with female speech, speaker classification, language identification, mimic resistance, and the effects of different coding standards on system performance.

VLSI

Research activities at DA-IICT include the following broad areas: low-power circuit design techniques, analog and mixed-signal circuit design; low-power processor design, rapid prototyping of digital systems, design of embedded systems using Programmemable logic devices; applications of graph theory to VLSI physical layout; and VLSI implementations of speech, digital, and image processing algorithms.

Wireless communication

Research is being carried out for the development of new circuit topologies for wireless communication and radar systems. Specific research topics include: the design and development of miniaturized active integrated antennas, front-ends of wireless communication and radar systems including smart antenna systems; multi-band transceiver design, digital base-band signal processing for wireless communication, multi-band fractal antenna for satellite applications, analysis of radiation from multi-device high-gain amplifier, and interaction of active MMIC with package.

Computational Science and HPC

The Group in Computational Science and HPC combines theory, modeling and computer simulations to study a range of complex problems in the areas of Computational Science. The particular interests of the group members include – Computational Physics, Scientific Computing, advanced Parallel Programming techniques, Data Analysis, Computational

modeling of Plasmas – the fourth state of matter, simulation of Granular Materials and Transport in Quantum Systems, Computational Electromagnetics and Computational Coding theory.

Humanities and Social Sciences:

Our HSS faculty are engaged in a wide range of research projects anchored in their own disciplinary specializations as well as in new inter-disciplinary domains. There is ongoing research and publications in the areas of Phenomenology and Hermeneutics; Indian Literature, Sexuality Studies and the English Novel; Cultural Studies, Film Studies and New Media; Hunter-Gatherer Studies and Symbolic Anthropology; Science and Technology Studies; Development Economics; Political Anthropology, Feminist Theory and New Social Movements; Design History and Anthropology; colonial and post-colonial histories of the Andaman and Nicobar Islands.