Ahmedabad University

School of Engineering and Applied Science

Ahmedabad University

School of Engineering and Applied Science

Associate Dean's Message

The driving force behind our identity as School of Engineering and Applied Science (SEAS) is Ahmedabad University's commitment to building a highly competent engineering school. Ahmedabad University offers unique opportunities to learn basic and fundamental concepts, perform innovative experiments in laboratories, interact with the surrounding world, take an interest in various walks of human life, develop a multi-dimensional personality and understand the importance of living together as a society. We provide our students with an intensive experience of Project Based Learning (PBL), so that they are able to learn by doing and tinkering. This helps them enjoy classroom instruction from a new perspective.

SEAS has also continued to grow in terms of infrastructure and setting up of state-of-the-art research labs. We expect this will take our research activities to new heights, particularly in our thrust areas that range from theoretical computer science, nanomaterials, applied chemistry, surface science, robotics, data analytics, embedded systems, VLSI systems, internet-of-things, image processing and communications engineering. We will continue striving to create engineers and scientists committed to a serious sense of purpose and scholarship.
The purpose of this brochure is to provide an insight into the research and development initiatives of SEAS' faculty members. We are keen and committed for further interactions with leading institutes, research labs, and industry.

A Handbook of Research
School of Engineering and Applied Science, Ahmedabad University

Ahmedabad, Gujarat

About the Ahmedabad University

Ahmedabad University is a private, non-profit university dedicated to rigorous academic pursuit through interdisciplinary learning. We provide a liberal education, preparing students to reflect deeply and creatively across fields to become independent thinkers and compassionate leaders. This unique learning process is mediated by projects, fieldwork and a belief that a strong theoretical grounding leads to robust practice. As a student-centric, research university, we are committed to the discovery of ideas that can enhance our understanding of issues facing our world at the intersection of various axes of influence, defined by: disciplines (data, materials, biology, and behavior), nature (air, water, forests, and land), sectors of impact (health, transport, energy, and education) and society (individual, community, civilisation and constitution). Across four schools and three Centres, Ahmedabad University is striving to redefine higher education in India.

School of Engineering and Applied Science

The School of Engineering and Applied Science (SEAS), Ahmedabad University was established in 2012 and is a constituent institution of Ahmedabad University.

SEAS delivers undergraduate and postgraduate engineering programmes with extensive student-centric pedagogies to produce excellent learning outcomes. Our project-based educational approach creates dynamic and pro-active graduates with capacities for lifelong learning, complex problem solving, design & innovation and relating technology to society.

Programmes

- Bachelor of Technology (BTech)
  - Chemical Engineering
  - Information and Communication Technology
  - Mechanical Engineering
- Master of Technology (MTech)
  - Computer Science and Engineering (Data Science and Analytics)
- Doctor of Philosophy (PhD)
  - Chemical Engineering
  - Information and Communications Technology

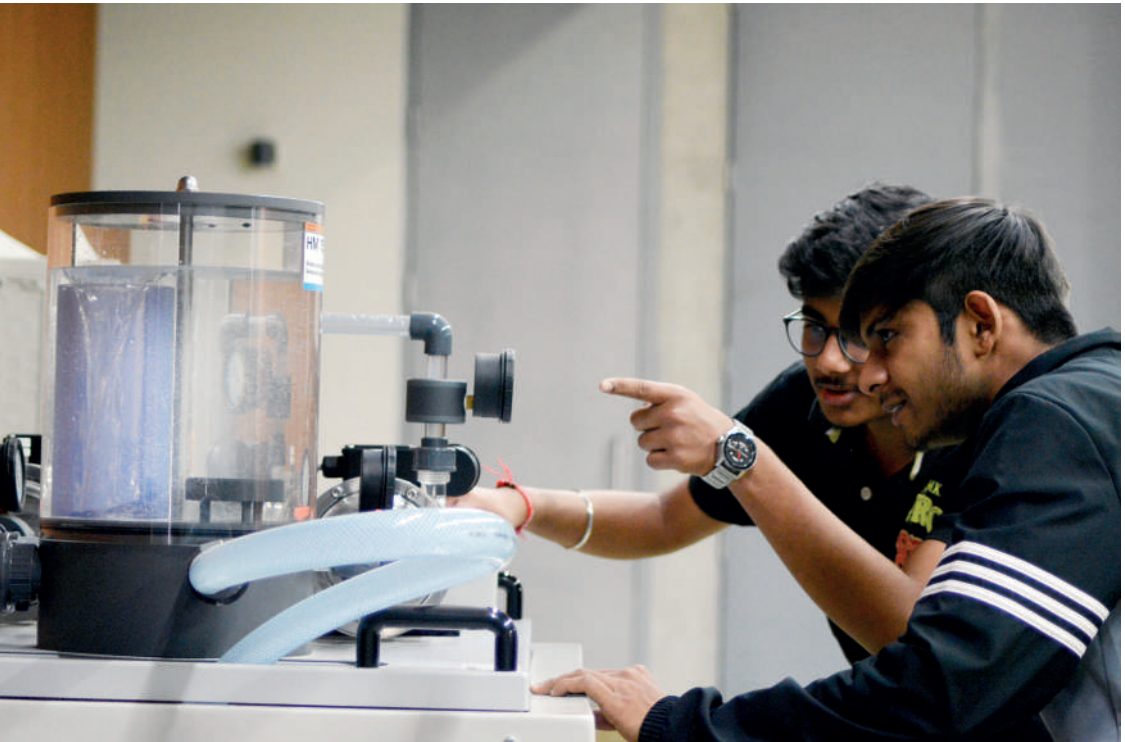
Aditi Singhal

Aditi Singhal is an Assistant Professor at SEAS. She holds a Master's and PhD degree in Chemistry from Indian Institute of Technology (IIT) Roorkee after which, she pursued her Post doctorate from University of California Santa Barbara (UCSB) and Arizona State University (ASU), in the US. She also has extensive teaching experience at colleges in the US and India. Her research interests include synthesis and properties of nanoparticles and core shell systems via different routes; inorganic synthesis and electro-chemistry of materials; studying the interaction of the inorganic/ organic composites with biomolecules and environmental implication of these nanoparticles for water purification process.

- **Hierarchically structured nanoporous geopolymers for waste and ground water purification**

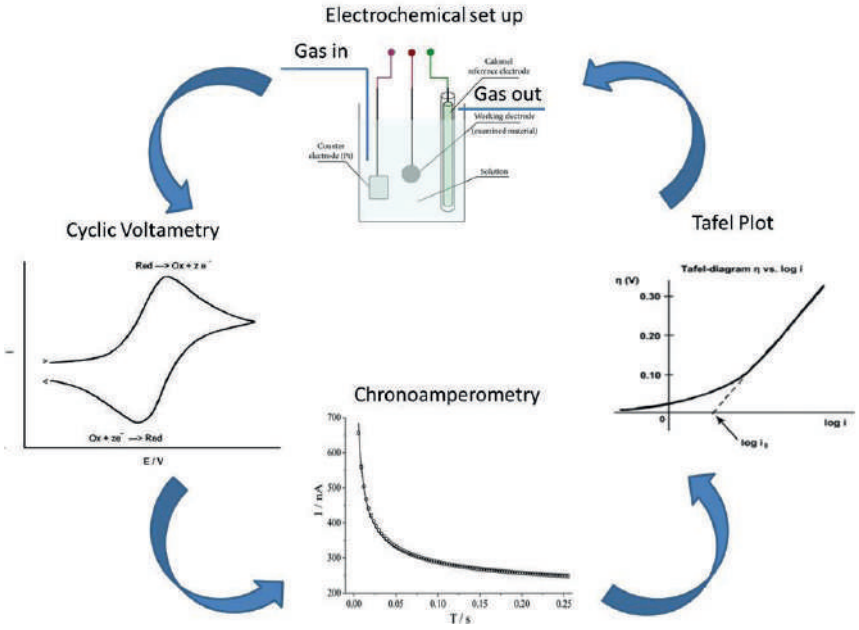
Abstract: The project focuses on converting nonporous geopolymer into hierarchically structured nanoporous geopolymers with high surface area using structure directing agents/ templates with enhanced adsorption/ion exchange capacity for the removal of toxic heavy metals ions.

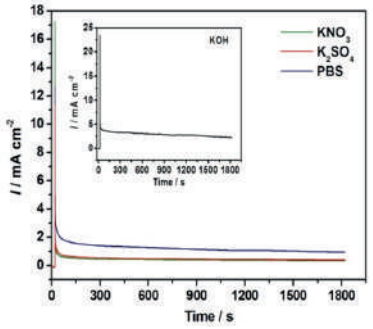
Members: Gayathry J M



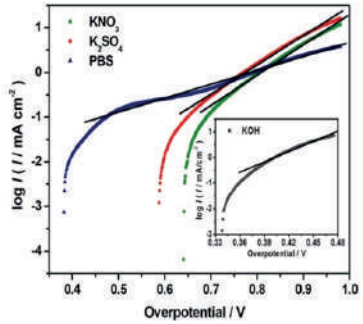
- **Nanocrystalline substituted cobalt based metal oxides for oxygen evolution reaction: A prerequisite for photochemical water splitting**

Abstract: The project focuses on designing more advanced cobalt based metal oxides and substituting them with transition metals. Cobalt oxide based materials have been chosen because they are economical and have shown promising activity towards OER recently. Prepared materials will be used as oxygen evolution reaction (OER) electrocatalysts with the aim to get higher catalytic activity in terms of low overpotential and high current density. The catalytic OER on one hand will give oxygen and on other hand it will also provide cost-effective route for clean, renewable hydrogen fuel which will be able to reduce our dependency on fossil fuels and also result in minimizing the environmental pollution.





The chronoamperometric responses of Co_3O_4 electrode in different electrolytes



Tafel plots for oxygen evolution reaction over Co_3O_4 catalyst in different electrolytes

Ajay Karakoti

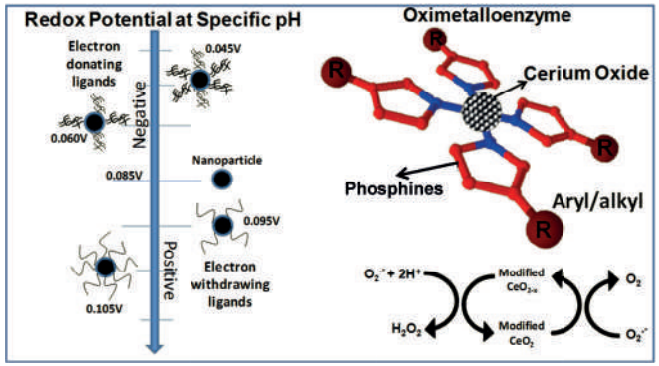
Ajay Karakoti has a joint appointment with SEAS and the School of Arts and Sciences. He has co-authored 60 publications with 4800 citations and an H-index of 32, two book chapters, has three international patents to his credit and has applied for two patents. He has an interdisciplinary educational background with BSc and MSc in Chemistry from Delhi University, an MTech from IIT Bombay. He received his PhD in Materials Science in 2010 from UCF, Orlando in the US for his research on nanoscale science and technology. He also received UCF Presidential Fellowship to pursue his doctoral research and was later awarded the "AVS Top Level Student Award" (Dorothy M and Earl S Hoffman Scholarship, 2008) for his doctoral work. Following his PhD, Ajay worked for Environmental and Molecular Sciences Laboratory at Pacific Northwest National Laboratory as a Research Associate. He was part of various projects in the areas of hybrid solar cells; nanomaterials for drug delivery, assessing the toxicity of nanomaterials and development of nanoparticles based chemical sensors for detection of peroxides. He was also awarded the 2011 MT Thomas Award for outstanding postdoctoral achievements at EMSL, PNNL. He has worked on a variety of industrial and academic projects such as sustained inorganic nanomaterials based anti-cancerous compounds, drug release, targeted drug delivery, thermal conversion of methanol to hydrogen, electrochemical conversion of alcohols to energy, gas and chemical sensors, inorganic antioxidants, hydrophobic coatings, photocatalytic decomposition of organic contaminants, antireflective sol-gel coatings and hybrid solar cells. His research is focused on understanding the fundamental level of interaction between nanomaterials surface and its immediate environment thereby spinning of multiple applications.

Before joining Ahmedabad University, he worked as a Principal Scientist at Battelle Science and Technology PVT LTD from September 2012 to October 2014 where he worked on developing platform nanomaterials based technologies for wide range of applications in automotive, energy, environment and healthcare applications.

Redox Tunable Nanomaterials as Nano-enzymes

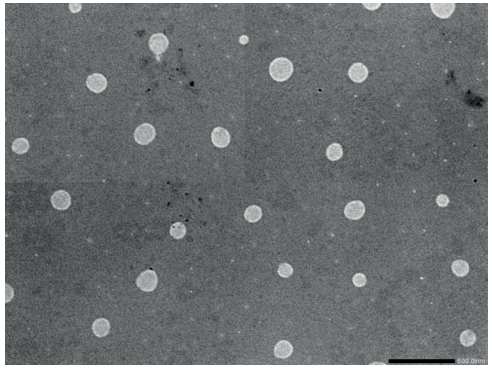
Abstract: Enzymes are required by the body to catalyse many metabolic reactions within the human system. Enzymes work with unique specific and catalytic efficiency that is hard to mimic in materials systems and thus many biological enzymes are used in industrial applications as well such as Biofuel, food processing, brewery, dairy and paper industry. Synthetic analogues of nzymes have been tried by scientists for many years now though mostly these analogues were organometallic in nature. Recently nanomaterials have been shown to possess enzyme like activity and has been a hot topic of research for past one decade. In this research we have taken a jump from the discovery mode of finding the enzymatic activity of nanoparticles to systematically creating a library of nanomaterials based enzymes by selectively altering the chemical and physical property of a selected nanomaterial. In this research we are decorating the surface of nanomaterials with active molecules called as ligands that can engage in transfer of electrons at the nanomaterials surface and thereby accelerate or decelerate a chemical or biochemical reaction by affecting its redox potential (ability to oxidize or reduce a substrate).

Members: Sanjay Singh



Development of efficient drug delivery vehicles

Abstract: Efficient capture and release of drugs at the targeted site of delivery will help in reducing the overall drug load administered to a patient and help to reduce side effects of the drugs. This is especially beneficial in cancer care and treatment as the drugs usually show several side effects to the patients and are usually insoluble in water. In this project we are attacking this problem in two different ways. In the first aspect we are working at the fundamental leave by addressing the surface related aspects of the most commonly used drug delivery vehicle such as silica and lipid nanoparticles. We are studying how the changes in the surface properties of these nanomaterials can result in significantly higher uptake of drugs and whether it translates into the release of the same in the region of interest. In the second part we are addressing the engineering challenges in synthesis of tunable sized lipid nanoparticles. We have been successful in devising a strategy to synthesize lipid nanoparticles using a one-step continuous process and are now working on tuning the size based on several parameters. A provisional patent is currently being filed for this process. Another goal is to incorporate target drug molecules within these lipid nanoparticles in a single step process.



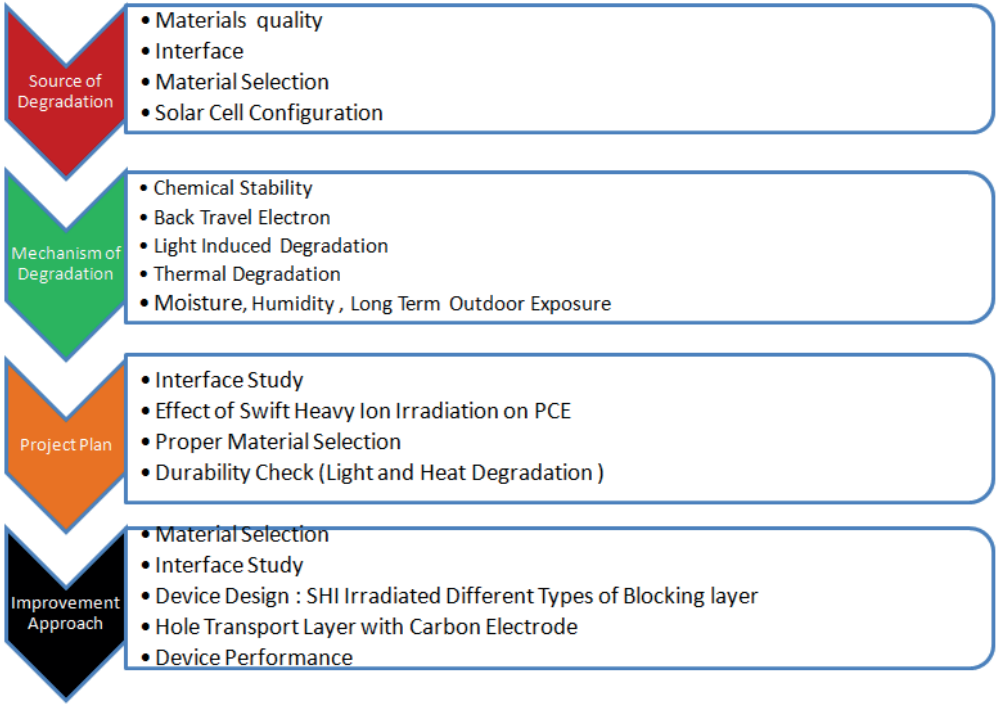
Deepak Verma

Deepak Verma is an Assistant Professor at SEAS. He received his MSc in Physics from IIT Roorkee (University of Roorkee) in 2000, MTech in Energy Management from Devi Ahilya Vishwa Vidyalaya, Indore in 2002, and PhD from IIT Delhi in 2009. He has more than four years of postdoctoral research experience on photovoltaic materials, Kelvin probe force microscopy and photovoltaic systems. Before joining Ahmedabad University, he was working as a postdoctoral research fellow with the Department of Engineering & Science, University of Agder, Norway from 2010 to 2013 and Institute of Physics, Praha, Czech Republic from 2013 to 2014.

Deposition and Characterization of Perovskite Solar Cells

Abstract: This project will result into better understanding of Thin Films Technology and Perovskite solar cells. The project's outcomes will highlight the issues and solutions regarding the stability, degradation mechanism, and improvement in the efficiency of the perovskite solar cells. Most importantly degradation study will provide a path to rectify the shortcomings of the perovskite solar cells and helps the researchers to prepare a better device.

Members: Gayathry J M



Role of Swift Heavy Ion on the Performance of Perovskite Solar cell

Abstract: Swift heavy ions (SHI) have found substantial use in the research and technology of materials analysis and modification. TiO2 thin films are of great interest and there is need to optimize its property for given application such as solar cells, sensor, and electrochromic materials. Engineering of a perfect TiO2 compact layer, known as blocking layer, is very important part of the perovskite solar cell or dye sensitised solar cell fabrication since the interface between TiO2 and FTO plays a significant role in power conversion efficiency. Blocking layer helps in the electron transportation and reduces the electron recombination losses. Different materials have been investigated for this purpose e.g., ZnO, sandwich layer, TiO2 embedded in an insulating polymer derived ceramic, Graphene oxide mixed TiO2 and hybrid blocking layer. Properties of these oxide materials and their nano-composite can be tailored using Swift heavy ions. SHI irradiated transparent conducting oxide films have reported significant improvement in the adhesion as well as changes in optical, electrical, & structural properties and contact to the substrate . Therefore, in the present project it is expected that SHI will improve the TiO2 adhesion to the substrate and also helps in blocking the back travel of the electrons which will eventually enhance the solar cell efficiency.

Members : Pawan K. Kulriya (IUAC)

Dharamshi Rabari

Dharamashi Rabari is an Assistant Professor at SEAS. He completed his PhD in Chemical Engineering at IIT Guwahati. Before his doctoral studies, he worked as an Assistant Professor at Institute of Diploma Studies, Nirma University and GH Patel College of Engineering and Technology, Vallabh Vidynagar for five years. He obtained his MTech in Chemical Engineering from Nirma University in 2008 and his BE in Chemical Engineering from Gujarat University in 2005.

His research interests are in the fields of Ionic Liquids applications, extraction based separation, equation of state modelling, process simulation and optimisation. He is also interested in molecular simulation.

- **The mutual solubility of Ionic Liquid and Water: Experiments and Correlations**

Abstract: Ionic Liquids (ILs) are known as green solvents. ILs can separate aromatic-aliphatic mixture as well as aqueous solution. The mutual solubility is the pre-requirement for the solvent selection in extraction based separation. The mutual solubility of IL and water with temperature variation is the prime objective. The experimental data can be correlated with Gibbs free energy models for the generation of binary interaction parameter.

Members: Saurabh Patel, Ashray Koradiya

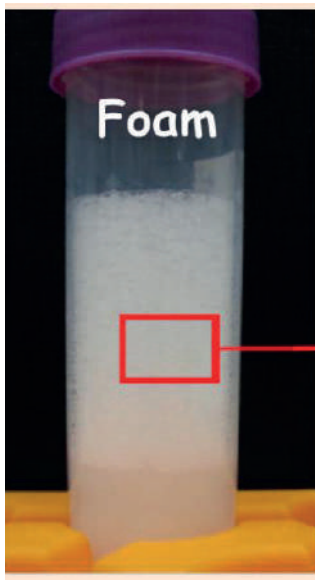
Dharmesh Varade

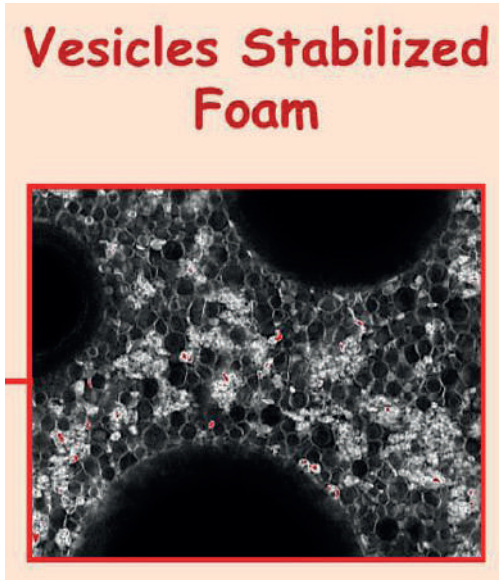
Dharmesh Varade has been an Associate Professor at SEAS since September 2014. Earlier, he worked as a Postdoctoral Researcher at several reputed institutes like Kawamura Institute of Chemical Research, Japan from March 2011 to March 2014; University of Paris XI, France from September 2009 to August 2010; University College Dublin, Ireland from June 2008 to December 2008; and Yokohama National University, Japan from July 2005 to March 2008. He has also worked with the CSIR project from April 2003 to June 2005 at VNSGU, Surat as a Research Associate. His research areas are synthesis and characterization of Nanomaterials, Nanocomposites, Wormlike Micelles, Foams, and Microemulsions. He has published more than fifty research papers in international peer-reviewed journals with a total citation till 2016 exceeding 1250, and an h index of 20. He is an active member of review committees of leading journals of ACS and Elsevier. He has presented his research papers in more than 10 different countries and was also awarded the prestigious JSPS Postdoctoral fellowship from the government of Japan.

Superstable Responsive Aqueous Foam for Synthesis of Novel Biomimetic Materials

Abstract: Vesicles blocked in the Plateau borders slows down the drainage imparting higher foam stability. Furthermore, the tightly packed vesicles strongly reduce bubble coalescence and gas transfer between bubbles.

Members: Ajay Karakoti

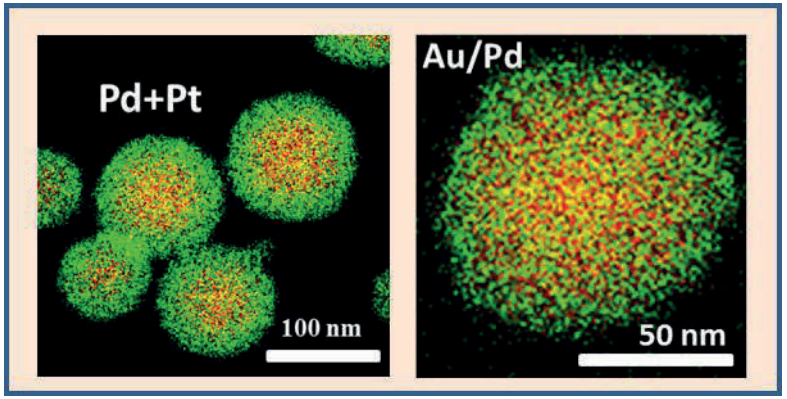




- **Inorganic Layered Materials: New Opportunities for Nanomaterial Synthesis and Novel Multifunctional Catalyst Design**

Abstract: Clay (synthetic hectorite; Laponite XLG) plays a very crucial role in the formation and stabilization of core–shell nanocrystals (NCs) and affords high stability, large BET surface area and stimulates the exceptional catalytic activity of the core–shell NCs.

Members: Aniket Powar



Dhaval Patel

Dhaval Patel is an Assistant Professor at SEAS. He was visiting faculty at Olin School of Engineering, a faculty at Nirma University and Charotar University of Science and Technology - Changa. He was also a Research Engineer at Pentium Electronic in Ahmedabad.

He has published research papers in peer-reviewed journals and at conferences. He is a TPC member of many international conferences in USA and India. He also contributes as a reviewer to International and National Journals like IEEE Transaction on Wireless Communications, NASA Journal of Physical Science and IEEE Communication letters, among others. Further, he is an executive committee member of professional bodies like IEEE Signal Processing Society, ISTE and IETE. His areas of interest include Non-parametric statistics, Cognitive Radio-Physical Layer, MIMO Communications and Statistical Signal Processing.

- **Design and Performance Analysis of Non-parametric Detection algorithm for Cognitive Radio - MIMO Communications**

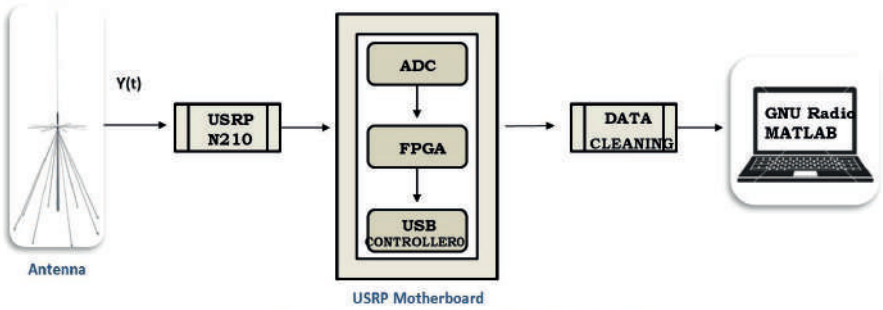
  Abstract: The aim of the project is to develop non-parametric detection algorithm and analyze the performance in a real-time wireless environment. In this project, we focus on the study and Monte-Carlo simulations of a new non-parametric scheme to detect the presence of the primary user without knowing its structure and channel information. The work includes the detailed performance evaluation of non-parametric detection scheme in the actual wireless environment. To achieve this, GNURADIO software and the Universal Software Radio Peripheral (USRP) hardware based wireless test bed will be created to prepare the experimental setup of CR-MIMO (Cognitive Radio – Multiple Input Multiple Output) systems. Thus, the project will provide simulations and an experimental performance evaluation of non-parametric detection schemes to provide opportunistic spectrum access in a cognitive radio environment.

  Members : Sanjay Chaudhary, Mitul Panchal, Maunil Joshi

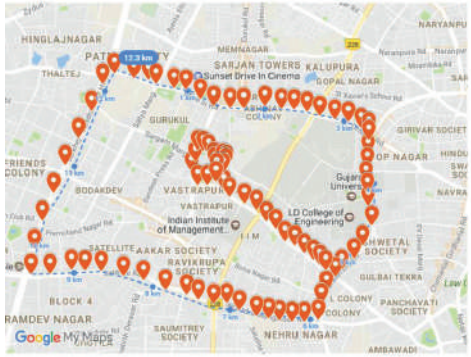
- **Non-parametric Smart Sensing Analytics based on Large Spectrum Data and Estimation of Channel Activity Statistics**

  Abstract: Future wireless networks will demand huge amounts of radio frequency spectrum resources. It is unlikely that such demand will be met without employing smart dynamic spectrum sharing approaches based on cognitive radio (CR) techniques. In this context, one important requirement of future wireless networks will be the ability to detect the presence of other wireless systems within a particular region of the spectrum occupancy data. Spectrum sensing is a popular approach to address this problem and constitutes a fundamental building block of CR systems. Existing sensing schemes are parametric and imperfect in nature, and unrealistic to implement on large scale networks due to various practical performance limitations. The main objective of this project is to develop feasible non-parametric smart sensing mechanisms with an improved performance obtained by exploiting statistical knowledge of the spectrum activity patterns, and validate their suitability by means of a proof-of-concept wireless prototype / test bed.

  Members: Brijesh Soni



DATA CAPTURING AND PROCEESING MODEL



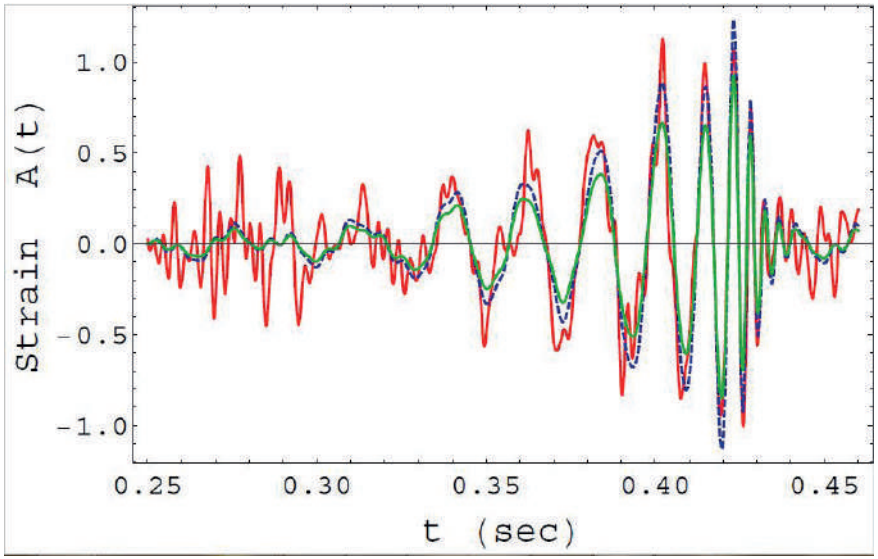
Gaurav Goswami

Gaurav Goswami is an Assistant Professor at SEAS. Before joining AU he was a postdoctoral fellow at Physical Research Laboratory (PRL), Ahmedabad. He completed his PhD in Physics in the field of theoretical cosmology from Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune, and holds an MSc in Physics from University of Pune (in 2007).

His primary research interest is in the interface of fundamental physics and cosmology.

- **Constraints on cosmological viscosity and self interacting dark matter from gravitational wave observations**

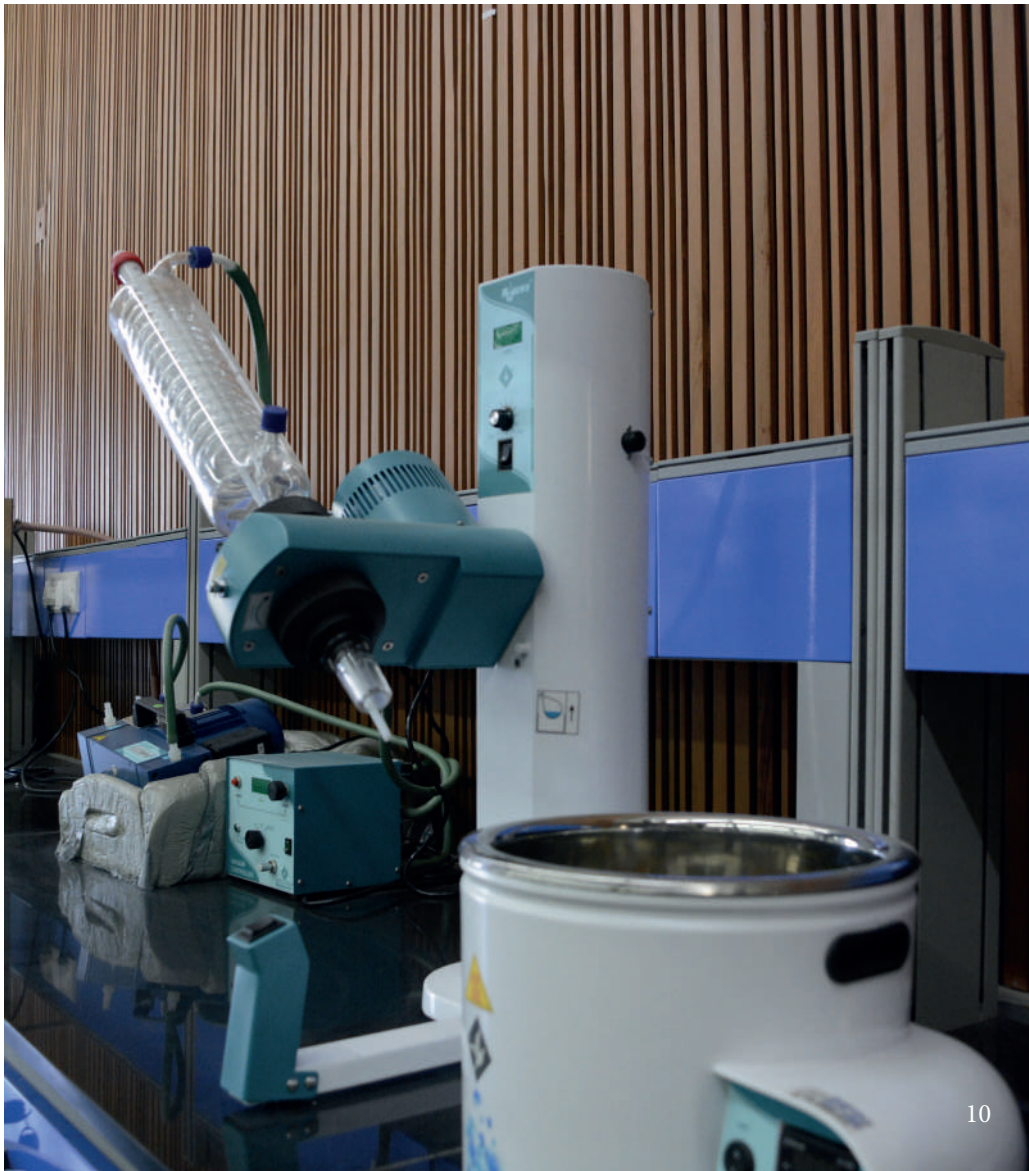
Abstract: It has been shown that gravitational waves propagate through ideal fluids without experiencing any dispersion or dissipation. However, if the medium has a non-zero shear viscosity, gravitational waves will be dissipated at a rate proportional to the value of shear viscosity. We constrain dark matter and dark energy models with non-zero shear viscosity by calculating the dissipation of gravitational waves from GW150914 which propagate over a distance of 410 Mpc through the dissipative fluid and comparing the data with the theoretical predictions. This provides a proof-of-principle demonstration of the fact that future observations gravitational waves at LIGO have the potential of better constraining the viscosity of dark matter and dark energy.
Members: Gaurav Goswami, Girish Kumar Chakravarty, Subhendra Mohanty, A. R. Prasanna



- **Revisiting CMB constraints on Warm inflation**

Abstract: In this project, we explore the possiblity that cosmic inflation takes place in the presence of a thermal bath of elementary particles. In particular, we carefully clarify all the necessary assumptions required to be made to ensure that warm inflation works and attempt to constrain the parameters of the model using the Cosmic Microwave Background observational data by performing a detailed Markov Chain Monte Carlo analysis.

Members: Richa Arya, Arnab Dasgupta, Gaurav Goswami, Jayanti Prasad, Raghavan Rangarajan



Harshal Oza

Harshal Oza graduated in Mechatronics from Sardar Patel University. His PhD studies were focused on non-linear control of uncertain systems with applications to robotics. He has control engineering experience in industry sectors such as industrial automation and oil and petrochemical refining. Before joining Ahmedabad University, he was with working as a postdoctoral researcher at the University of Kent.

■ **Quaternion based control of industrial robots**

Abstract: A finite time control of articulated robots using quaternions is studied in this project. Remote dexterous control of articulated robots is shown as a natural application which finds utility in hazardous area and space robotics applications where dexterity of the robot end-effector is not be compromised while maintaining safety of the human operator. This project proposes a leader-follower framework for trajectory planning and control where quaternions are utilized to describe the position and orientation of the follower end effector. A simple one-to-one map connecting the work volumes of the leader and follower is used.

Members : Harshil Prajapati, Jaina Mehta

Mazad Zaveri

Mazad Zaveri joined the SEAS in 2014, Ahmedabad University, as an assistant professor. During 2010-2014, he worked as an assistant professor, Dhirubhai Ambani Institute of Information and Communication Technology, Gandhinagar. From January to May 2014, he was also a visiting faculty at the Indian Institute of Information Technology, Vadodara. During 2003-2009, he worked at the erstwhile OGI School of Science & Engineering, and Portland State University, as a graduate research assistant, on projects funded by the US-NSF and DARPA (HRL subcontract No. 801884-BS).

Mazad got his PhD in Electrical and Computer Engineering from Portland State University in 2009, his MSE in Electrical Engineering from Arizona State University in 2003, and his BE in Instrumentation and Control Engineering from Gujarat University in 2000.

- **Low Power High Speed Hybrid Full Adder (FA) Circuits**

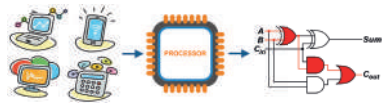
Abstract: Full Adder (FA) is a basic building block of the Arithmetic Logic Unit (ALU), present in most digital VLSI systems/processors. The FA is needed for implementing addition/subtraction/multiplication operations. The perforamce of FAs will directly impact the combinational path delay of the pipelined ALU, and hence, the FA should be well designed, optimized and characterized.

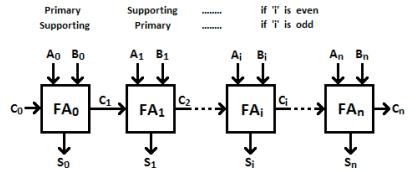
We are working on new hybrid FA designs (mix of CMOS and pass transistor logic styles), which aims at achieving higher speed but keeping power dissipation low, and hence, targeting low PDP. One of our proposed FA and seven other existing FA designs were simulated in spice, using 45 nm low power MOSFET models, using standard test bed and test pattern (56 input transitions), and the simulation results of these eight designs were compared in terms of power dissipation, propagation delay and PDP. Simulation results show that our proposed FA design has the lowest propagation delay and lowest PDP across the simulated supply voltage range and the frequency range.

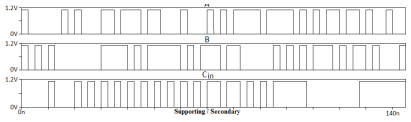
We are also working on reducing the set of input transitions (input test pattern), and yet be able to satisfactorily characterize the maximum propagation delay, and estimate power dissipation of individual FA within ripple carry adder.

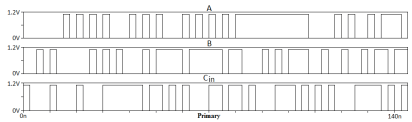
We are now exploring twin-born FA circuits, and investigating their performance and power, within ripple carry structure and within carry-save tree structure.

Members: Manan Mewada, Mazad Zaveri, Anurag Lakhlani, Ratnik Gandhi









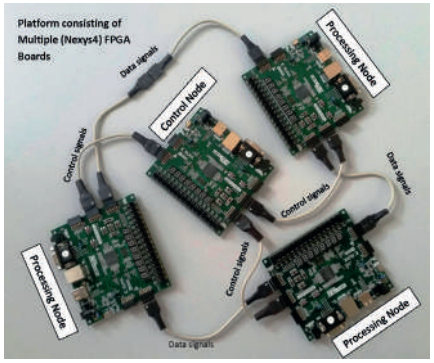
- **Building a (programmable) hardware simulation platform based on multiple boards (FPGA or Arduino boards), for implementing/emulating neural networks/algorithms**

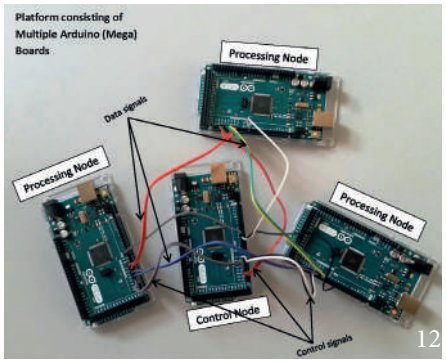
Abstract: This project is an attempt to create an expandable multi-board (FPGA or Arduino boards) platform for implementing/emulating neural network/algorithm. As an initial case study, we are working on the implementation of Palm Associative Memory onto multiple FPGA boards.

The project involves the development of the algorithm-specific computational architecture (coded in Verilog HDL) within each board (also referred to as the Processing Node), and algorithm-specific inter-board communication scheme (coded in Verilog HDL). The computational architecture (and the communication scheme) would be programmable, in terms of: the number of neurons, and number of processing nodes.

We are investigating the
changes in performance (and possible acceleration), due to distribution of the sub-operations of the algorithm over the FPGA boards, and parallelization within each FPGA board. Within each FPGA, we would be looking at improving the implementations of these sub-operations: K-WTA (sorting, and generation of binary vector from integer vector), matrix-vector multiplication, etc. We would also implement the Palm Associative Memory onto multiple Arduino boards, and compare the performance of these two platforms.

Members: Dev Mehta, Pal Nikola, Mazad Zaveri, Anurag Lakhlani





Mehul Raval

Mehul Raval an Associate Professor at SEAS, worked as in the same capacity at Dhirubhai Ambani Institute of Information and Communication Technology (DA-IICT), Gandhinagar from 2008 to 2013. For almost a decade before that, he worked at Electronics and Communication Engineering Department, Sarvajanik College of Engineering and Technology (SCET), Surat as a Lecturer, as an Assistant Professor and eventually, as the Department in-charge. He was a visiting faculty to Master's program in Electronics department at Sardar Vallabhbhai National Institute of Technology SVNIT from 2005 to 2007 and at Veer Narmad South Gujarat University from 2004 to 2008. He is an alumnus of Electronics & Telecommunication Engineering department, College of Engineering Pune. His current research interest are Image and Signal Processing, Reversible watermarking techniques, Soft biometrics, Soft computing, Machine learning, Remote sensing, Inverse ill posed problems in image processing.

Dr. Raval visited Graduate School of Natural Science and Technology, Okayama University, Japan during July- August 2016 under Sakura science exchange program sponsored by Japan Science and Technology (JST), Govt. of Japan. He coauthored a book on Image and Video Compression: Fundamentals, Techniques and Applications, CRC press, Nov. 2014. He also reviews articles for leading journals of IEEE, ACM, Springer, Elsevier, SEAS . He has received research funds from Board of Research in Nuclear Science (BRNS), Department of Atomic Energy, Government of India. He is currently supervising two doctoral candidates and many students have completed MTech thesis and BTech projects under his supervision. He is member of Board of Studies for various universities. He is a senior member of IEEE and he has served IEEE Gujarat section execom in various capacities (2008 - 2015). He also served IEEE Gujarat section signal processing society chapter as vice chair and execom member in 2014.

■ **Description based person identification in unconstrained surveillance video**

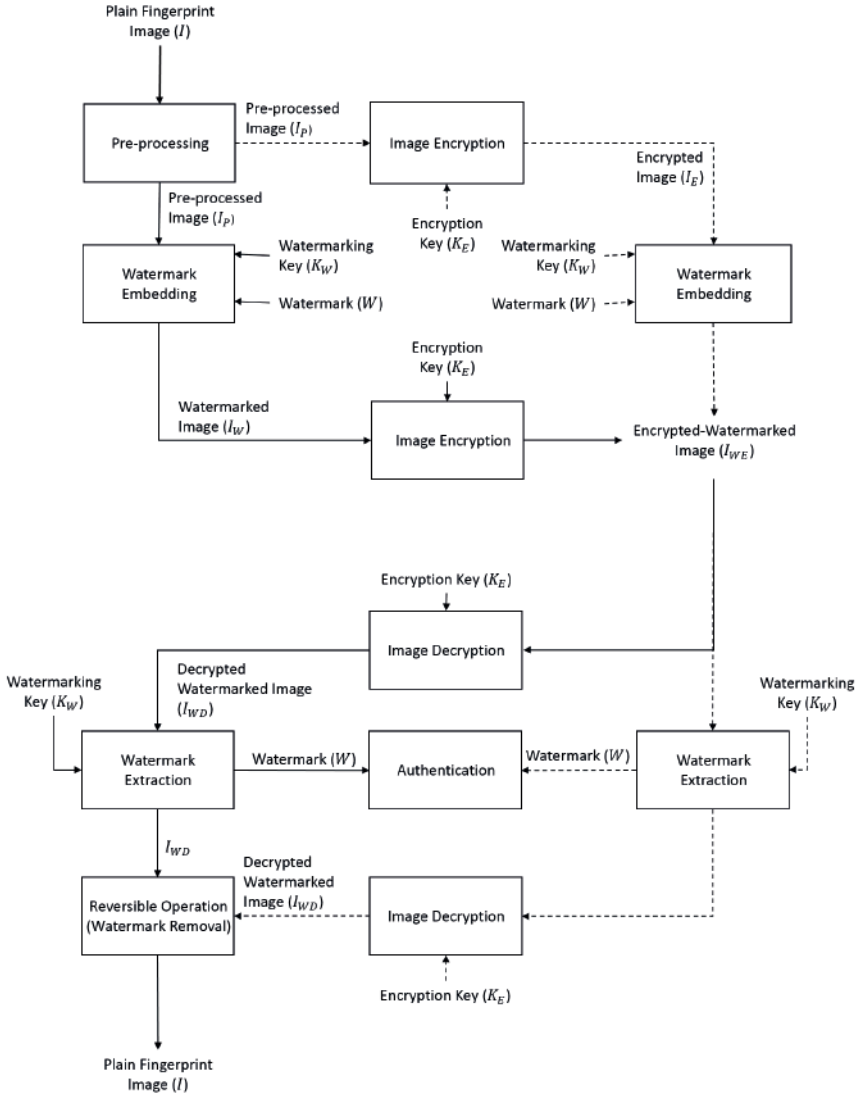
Abstract: The goal of the project is to locate a person-of-interest based on specific set of soft biometric attributes from a surveillance video without prior registration. The project will integrate and minimize semantic gap between human descriptions and soft biometric traits. Moreover it aims at extracting soft biometric features from an input image or a video frame and then uses these features to locate a matching individual in the video stream. This project will add another dimension to surveillance as human cognitive perceptions are used while searching the video streams.

Members: Sanjay Chaudhary, Anand Laddha, Shvetal Pandya

■ **Securing biometric data using data hiding techniques**

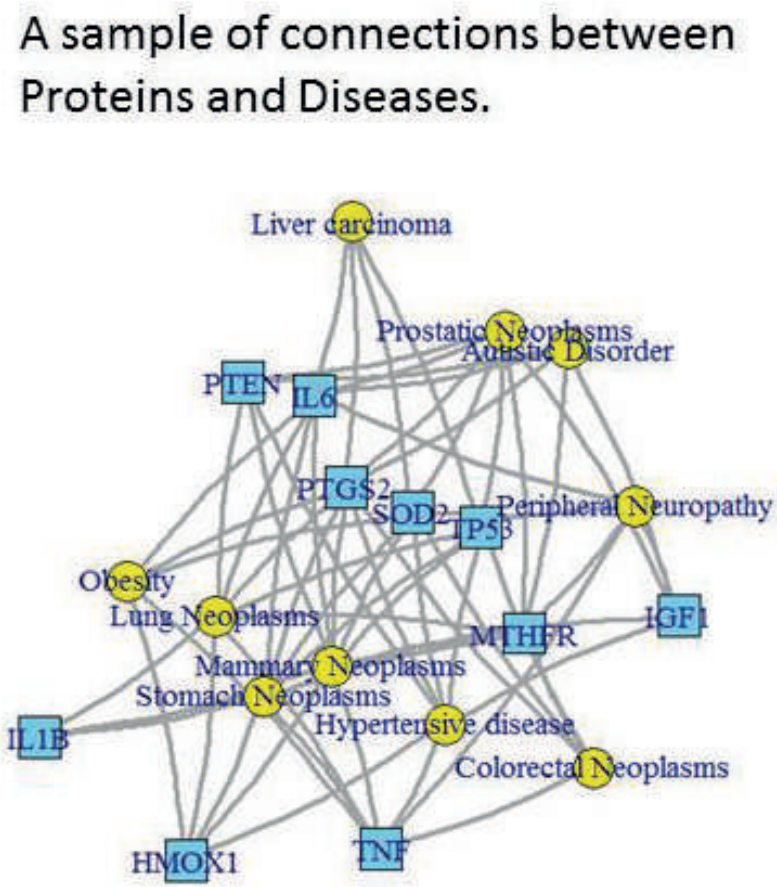
Abstract: Biometrics based authentication systems have been gaining widespread acceptance in the information security domain. However there are several loopholes in biometric systems. This project aims at improving the security and authentication mechanisms of biometric systems by using complementary data hiding techniques. Fragile watermarking will be used to check the integrity and authenticity of biometric templates before identification. This will improve the overall security.

Members: Priti P Rege, S K Parulekar, Vaibhav B Joshi



Mitaxi Mehta

Mitaxi Mehta has PhD in Physics from Physical Research Laboratory in Ahmedabad and has previously worked as a postdoctoral fellow at PRL, IMSc (Chennai), University of Regensburg (Germany) and IPR (Gandhinagar). She has been a visiting researcher at ICTP, Trieste in Italy, HRI Allahabad and Central University Hyderabad. Before joining Ahmedabad University, she was an Assistant Professor at BITS-Pilani, Goa. Her research interests span the fields of classical nonlinear dynamics, chaos and fractals and scale free networks. Recently, she has also been working on problems in protein networks; speaker verification based on fixed short speech, Visualisation of health databases and Periodic orbit search algorithms. She is also interested in recreational mathematics and machine learning.



■ **Protein-Protein interaction networks.**

Abstract: Multiple databases provide free access to protein-protein interaction data. Graph theory provides powerful tools to analyse such data. The analysis has multiple possible applications like, prediction of interaction of a new protein with the proteins in the database (how would a new disease protein effect human biochemistry ?), identification of roles of special proteins in processes (which proteins to target to inhibit or enhance certain processes) and identification of functional groups of proteins (which proteins play a role metabolic processes ?). We have studies network representation of protein data to identify proteins with special roles and their relation to the structure of the network.

Members: Manish Datt, Seema Aswani, Priyanka Nimawat

■ **Speaker verification**

Abstract: Speech biometrics has a big potential in security, service, medical and human-computer interaction sectors. While speech data is typically smaller compared to imaging data, due to its high variability, classification and processing challenges have given rise to interesting algorithms and a quest for improvements. We study speech features from short fixed one word speech to exctract features and study the effectiveness of the features for the purpose of speaker verification.

Members: Pooja Patel

■ **Analysis and visualization of health data**

Abstract: Visualisation of data may give a consolidated view of a large dataset to highlight multiple key features of the data and aid in a decision process. Often the analysis required is meaningful in terms of partition of the data according to one or more parameters to answer questions like; What are gender based differences in occurrence of anemia, high blood pressure, diabetes ?, What arethe demography based (rural/urban) differences of the same parameters ? The data may be further analysed to reflect sample sizes and variance to convey reliability. The analysis may be extended also to other databases like education and business too.

Members: Yesha Bhavsar

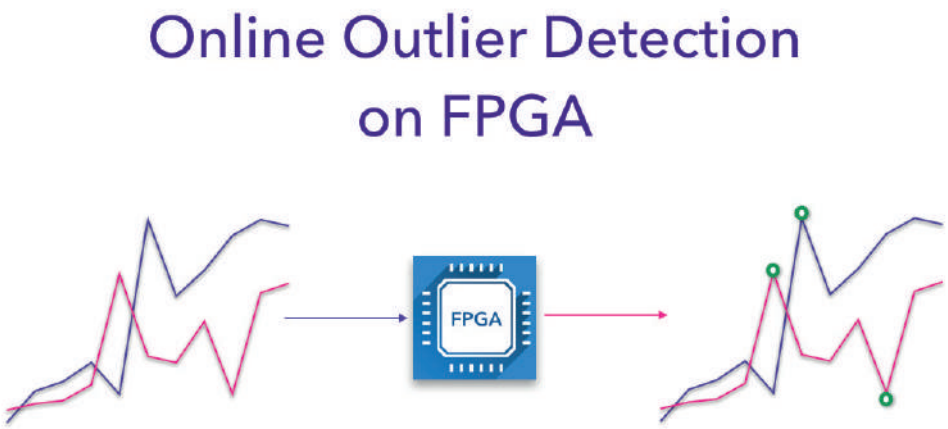
Ratnik Gandhi

Ratnik Gandhi is an Assistant Professor with SEAS. Before SEAS, he was a postdoctoral fellow with Tel Aviv University in Israel and Tata Institute of Fundamental Research (TIFR) in Mumbai. He obtained his PhD and MTech in Information and Communication Technology from Dhirubhai Ambani Institute (DA-IICT), Gandhinagar in 2011 and 2005 respectively, and his BE in Computer Engineering from Dharamsinh Desai University, Nadiad, in 2002. Ratnik also mentors start-ups at VentureStudio. His research areas include design and analysis of Online and Streaming Algorithms, Algorithmic Game Theory and Computational Polynomial Algebra.

■ **Online Outlier Detection Algorithm on FPGA**

Abstract: The project involves comparative study, implementation and analyse of various anomaly detection algorithms. The desired goal is to build a hardware (FPGA module) that runs an algorithm designed to detect anomalies on data streams. A typical use case of this project is to generate real time alerts. We have already designed a constant space and linear time online algorithm. Next we will implement it on FPGA.

Members: Ativ Joshi, Pratik Padalia



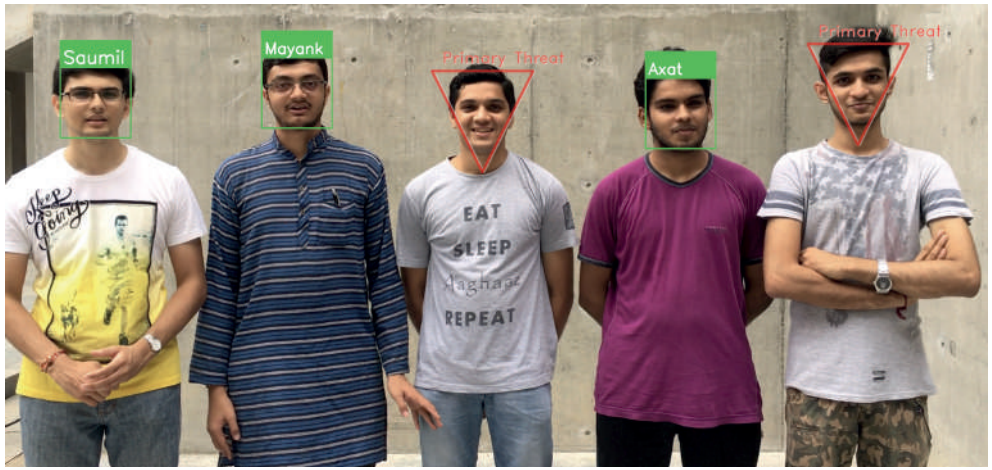
■ **Fast Implementation of Face Recognition on GPU**

Abstract: In this information era, we have most of our data secured by computers by incurring different security mechanisms such as passwords, encryption keys, fingerprints, faces as well iris data. Over Last three decades, face recognition have been a pervasive research problem in computer vision due to its wide applicability. Computation of high dimensional data in real-time can increase time complexity. To overcome time complexity, we can use hardware with more processing powers. Though high-end CPUs can reduce the computation time, GPUs can reduce computation time significantly, because they have been designed for specialized optimization for faster arithmetic operations than traditional processors exploiting the power of streaming multiprocessors.

Besides, these high-end hardware (CPUs & GPUs) can cost a fortune. We are designing faster algorithms for Face Recognition that runs on commodity hardware.

We use Principal Component Analysis, and Linear Discriminant Analysis as a training model. Training time on GPU linearly increases whereas on CPU it remains quadratic. We also use Incremental algorithms for PCA and LDA to learn from videos in online fashion. By sacrifice of some frames, we had been able to preserve frame rates and retain recognition accuracy of around 90%.

Members: Axat Chaudhary, Mayank Jobanputra, Saumil Shah



Sanjay Chaudhary

Sanjay Chaudhary is a Professor and the Associate Dean at SEAS. His research areas include Distributed Computing, Cloud Computing, Data Analytics, and ICT Applications in Agriculture and Rural Development. He has authored five books and six book chapters and published more than hundred research papers in international conferences, workshops, and journals. He is an active member of program committees of leading International conferences and workshops as well as review committees of leading journals. He has received research grants from leading organisations including IBM, Microsoft and Department of Science and Technology, government of India. Earlier, he worked as a Professor and Dean of Academic Programs at Dhirubhai Ambani Institute of Information and Communication Technology (DA-IICT) in Gandhinagar. Four PhD candidates have completed their research under his supervision and four are currently working under his guidance. He has worked on various large-scale software development projects for corporate sector, co-operative sector, and government organisations. He is actively involved in various consultancy and enterprise application development projects. He is also a senior member of IEEE and Computer Society of India and a patron of the Computer Society of India, Ahmedabad Chapter. The Sahitya Academy awarded his book "Girnar" the second prize under the 'Essays and Travelogue' category in 2009. He loves literature, music, travel and wildlife.

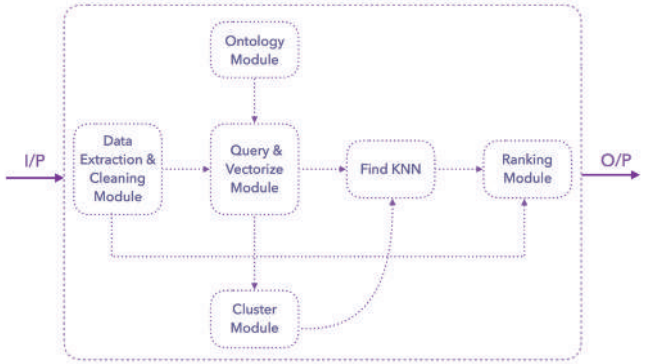
Human Capital Management System

Abstract: Human Resource (HR) Management is one of the most essential part of a myriad of institutions across the globe. From an institution's viewpoint, Recruiting talent has been one of the crucial problem faced by HR Department and which fits the job description. From a professional's perspective, job hunting is also a challenging problem where one has to spend hours to find the right match of job with skills they have meeting their expectations.

Most of this job hiring & hunting process is manual, where human intervention is needed to make decisions and we have attempted to automate that process. This project aims to provide a solution for both users - Institutions & Professionals - that recommends prospective employees and jobs respectively.

Members: Axat Chaudhary, Mayank Jobanputra, Saumil Shah, Ratnik Gandhi

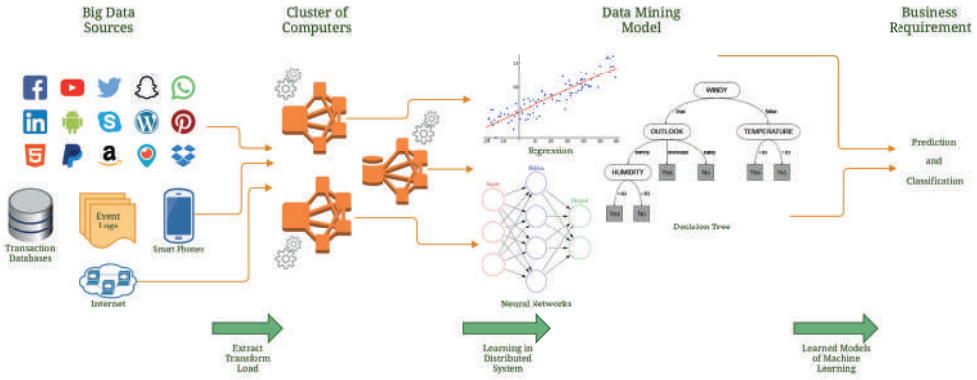
Architecture



Cost-Sensitive Big Data Analytics

Abstract: Data mining classification algorithms can be classified in two categories. i.e. error-based model (EBM) and cost-based model (CBM). EBM does not incorporate the cost of misclassification in model building phase while CBM does. EBM treats all errors equally likely, which is not the case with all real world applications like credit card fraud detection, medical diagnosis etc. Shopping carts, credit card fraud detection system, loan approval system, medical diagnosis etc. are some example systems, which largely works in spread across environment. Therefore, to perform classification for such data requires distributed system. Moreover, in such applications the volume of the data is very high. CBM in distributed environment helps in reducing the overall misclassification cost. As part of our research we are developing an algorithm which works in distributed environment with a goal to reduce the overall misclassification cost. Moreover, this will solve the problem of learning from highly imbalanced dataset as Cost-Sensitive classification is majorly applied in solving class imbalance problem.

Members: Ankit Desai



Shashi Prakash

Shashi Prakash is currently working as an Assistant Professor in SEAS. He holds a PhD degree in Mechanical Engineering from Indian Institute of Technology Patna. He obtained Masters in Production Engineering from Jadavpur University, Kolkata where he received university Gold Medal for securing first rank. He did his bachelors in Mechanical Engineering from Veer Bahadur Singh Purvanchal University, Uttar Pradesh. Shashi also has a brief teaching experience of about seven months at Amity University, Lucknow. He is the recipient of DST INSPIRE fellowship award from Government of India.

Shashi's primary research area is Laser based machining and micromachining processes. He also has a keen interest in laser related processes for bio-microfluidics.

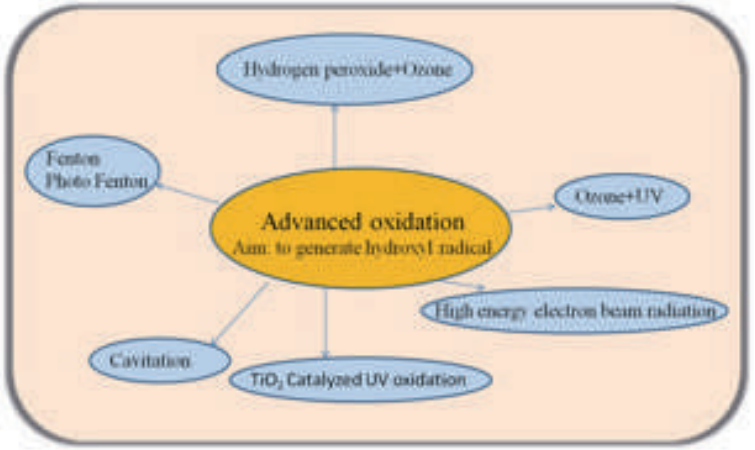
■ **Comparison of different laser micromachining processes for different microfluidic devices (proposed)**

Abstract:

- Lasers are commonly used for various micromachining requirements.
- Polymer based microfluidic devices can be fabricated efficiently and effectively using laser machines.
- Understanding different laser micromachining processes based on requirements.
- Identifying critical parameters for laser micromachining processes.
- Study of different types of surface parameters and dimensional precision.
- Development of theoretical and analytical equations for identifying the output dimensions based on input parameters.

Snighda Khuntia

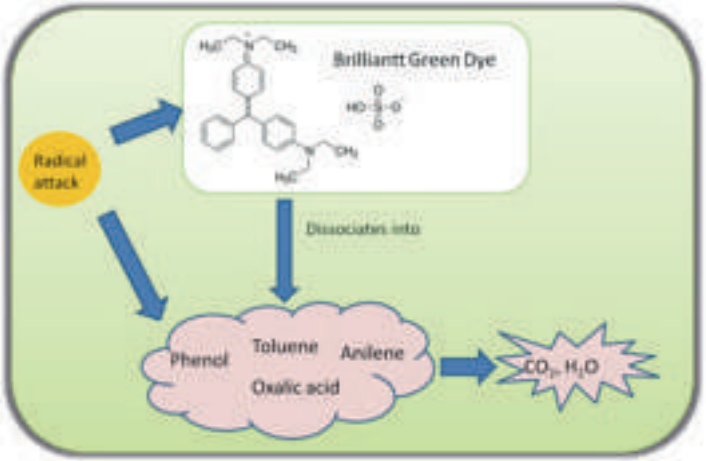
Snigdha Khuntia is an Assistant Professor at SEAS. She holds a BTech in Chemical Engineering from IGIT Sarang. She has an MTech and PhD in Chemical Engineering from Indian Institute of Technology, Guwahati. Her research areas are advanced oxidation processes, ozone based water/wastewater treatment, biosorption, adsorption, heavy metal removal from wastewater. Her additional research includes mass transfer study of ozone, oxygen using millibubbles and microbubbles, kinetics and decomposition of ozone in water, synthesis of adsorbents for metal removal.



■ **Peroxone Mineralization of Dyes and Intermediates from Secondary Effluents**

Abstract:

1. Evaluation of the performance of peroxone process on dye oxidation
2. Optimization of various operating parameters
3. Interference study of ions on the process
4. Use of modified ozone spargers



Sridhar Dalai

Sridhar Dalai is an Assistant Professor at SEAS and holds a BTech in Chemical Engineering from Andhra University in Visakhapatnam. He finished his MTech in Chemical Engineering from IIT Roorkee. Before commencing his doctoral study, he worked as an Assiatant Professor at GVP College of Engineering, Visakhapatnam for three years. He has a PhD from the Centre for Research in Nano-Technology (CRNTS), Indian Institute of Technology Bombay (IITB) in nanomaterial's for hydrogen storage.

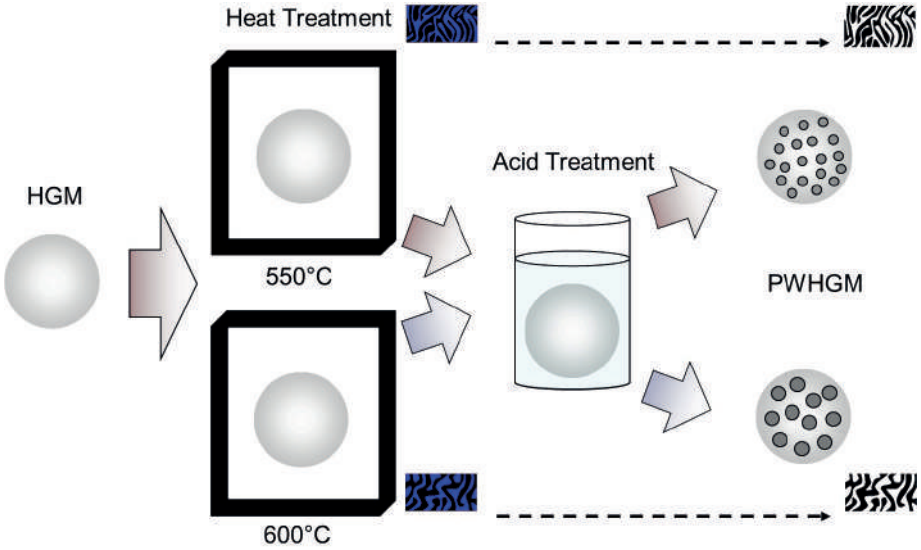
During his PhD, he was actively involved in the teaching assistant program at IITB, where he got hands on experience on many sophisticated analytical instruments. He is proficient at handling the Laser Raman Spectrometer (LRS), Electron spin spectrometer (ESR), Gas chromatograph with mass spectrometer (GCMS), BET surface area analyser, Flame Spraying, Sievert's type apparatus and also Temperature programmed desorption system (TPDRO) for the routine sample analysis, preventive maintenance and data analysis for research applications.

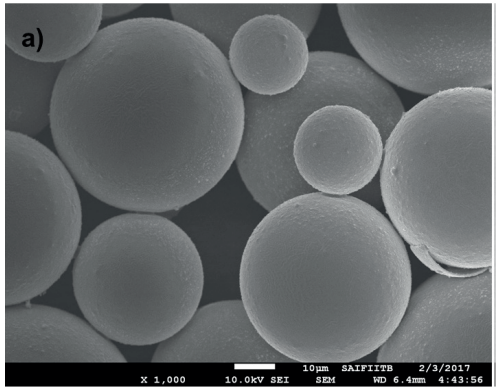
Recently, he was coffered with the Young Scientist Award (in the Engineering/Chemical category) from VIFRA2015 at Chennai.

- **Impact of heat treatment and acid leaching time on preparation of porous walled hollow glass microspheres (PWHGMs)**

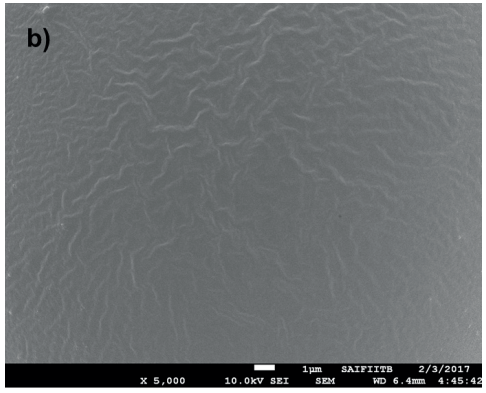
  Abstract:
  1. Successful design and synthesis of PWHGMs from hollow glass microspheres
  2. Pore size variation with heat treatment temperature and acid leach time.
  3. PWHGMs as additives in lead acid batteries and Li-ion batteries.

  Members: Disha Ravipati, Shewta Snigh, Gaurav Prakash Nikam, Harmitkumar Narendrabhai Pandya





SEM images of heat treated K15 HGMs at 500^{0}C



Srikrishnan Divakaran

Srikrishnan Divakaran completed his PhD in Computer Science in 2002 from Rutgers University in the US. From 2002 to 2008 he worked as an Assistant Professor in the Computer Science department at Hofstra University in New York, and as an Associate Professor at DAIICT from 2009 to 2016 before joining SEAS in 2017. He has nearly 20 years of research, over 15 years of teaching experience and over five years of industry experience at leading multi-national companies in computing and finance.

He has taught a wide range of courses in Computer Science as well as related disciplines like Bioinformatics and Operations Research, and has a strong research background in designing algorithms for problems with applications in bioinformatics/computational biology, distributed systems and operations research.

In terms of research, over the past seven years, his interests have broadly been in the area of design and analysis of online and approximation algorithms for problems in Bioinformatics/ Computational Biology, Distributed Systems and Operations Research. In Bioinformatics, his current research focus is the design and analysis of approximation algorithms and heuristics for the following problems: (1) Constrained Generalized Tree Alignment, (2) Template Based Methods for Sequence Alignment and (3) Fast Heuristics for Exact String Matching. In Distributed Systems, his research focus is in the design and analysis of online and offline approximation algorithms for problems in resource allocation, load balancing and list update. In Operations Research, his research interests have been the design and analysis of online and approximation algorithms for bin packing and scheduling with set-ups.

■ **Fast Heuristics for Exact and Approximate String Matching**

Abstract: The online exact string matching problem consists of finding all occurrences of a given pattern P of length n in a text T of length m. It is a problem in computer science that has been studied widely since 1970's and has applications in bio-informatics, computational biology, image processing, data compression and many other areas. This problem is a very well-studied special case of approximate string matching, where we attempt to find all occurrences of pattern P of length n with at most k mismatches in a text T of length m. This problem has applications in image processing, information retrieval and computational biology in contexts where there is scope for some errors/noise in the data and despite that we are interested in finding occurrences of a given pattern P of length n with at most k mismatches in a text of length m.

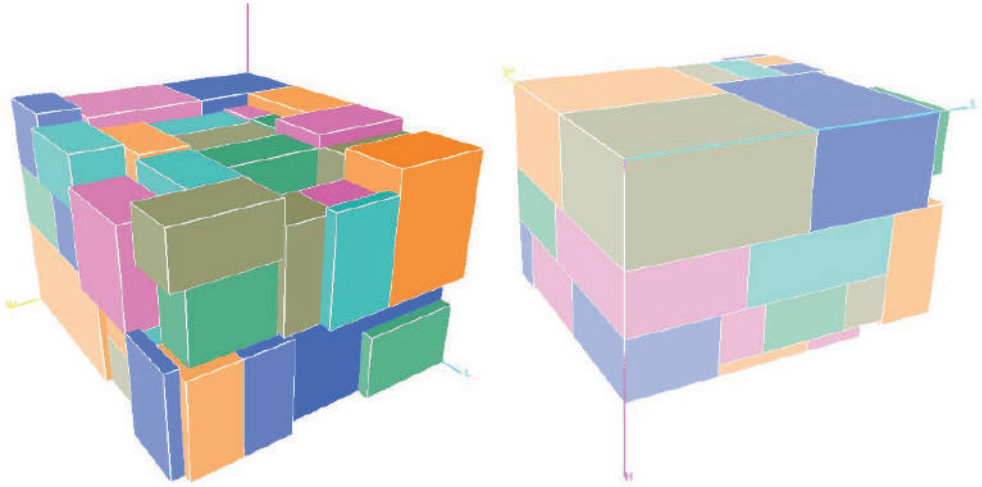
Since the late 90's until recently there have been many classes of algorithms proposed for the problem. Though most of these algorithms have linear worst case time and empirically sub-linear running times, they do not provide any probabilistic sub-linear run-time guarantees. In addition, there are many contexts where the power of randomization has not been fully exploited. So, there is a need for designing randomized algorithms that can provide

■ **Approximation Algorithms for Processor Allocation in Grids**

Abstract:
The Bin Packing problem can be defined as follows: Given an infinite supply of bins with capacity C and a list L = (a1, a2, …, an) of items. where for i in [1..n] 0 <= si <= C denotes the size of item ai, we need to pack the items into a minimum number of bins under the constraint that the sum of the sizes of the items in each bin is no greater than C.
This problem is a classic combinatorial optimization problem that has several variants and has a wide range of applications in Computer Science (Resource Allocation) and Operations Research (Packing, supply chain management). In this project, we are looking at a processor allocation problem that is an online variant of a generalization of the classical bin packing problem, and can be described as follows:

We are given a computing grid consisting of a set of processors connected in the form of a grid topology. When a job arrives, a set of available processors from the grid is assigned to that job. One of the objectives in allocating processors is to minimize communication overheads caused by overlapping jobs. That is, assign processors to minimize communication overheads caused by non-contiguous allocation of processors.
Notice that the processor allocation problem is a variant of the two-dimensional bin packing problem, where objects have placement constraints and are allowed to be split into smaller objects. This problem also has applications in the design of algorithms for bandwidth allocation in computer networks and memory management in computer systems.
Our objective in this project is to design constant approximation algorithms for minimizing communication costs for various cost measures. This problem is known to be SNP-Hard for almost all standard cost measures.

Members: Shananya Mehta, Ashutosh Kakadiya, Anushree Rankawat and Rushita Thakker



(a) Top view (b) Bottom view

Sweta Jatav

Sweta Jatav joined School of Engineering and Applied Science as an Assistant Professor in 2017. She graduated in Chemical Engineering from Institute of Engineering and Technology, Lucknow in 2009. Afterwards she pursued MTech from IIT Roorkee followed by PhD from IIT Kanpur in Chemical Engineering. Her PhD work was focused on phase behavior of anisotropic shape colloidal clay nanoparticles in aqueous media. During her stay at IIT Kanpur she was also working as Research Associate for industrial projects of Hindustan Uniliver Ltd.

- **Rheology and stability study of soft materials**

Abstract: Most of the materials we use in our day to day life come into soft materials like shampoo, lotions, butter and many more. The long term stability and processing of such materials is a crucial problem. The detail knowledge of such systems allows better application in processing, fabricating and other applications. Rheology studies provide insight of the material properties and also facilitate the understanding of long term stability in various conditions. The aim of the project is to explore the problem area in soft matter applications and to eliminate those using additive components.

Area Wise List of Projects

Mechatronics, Control Systems - Automation and Robotics

Project 1: Quaternion based control of industrial robots
Members: Harshal Oza, Harshil Prajapati, Jaina Mehta
Project 2: Assistance System for the Visually Impaired
Members: Harshal Oza, Rishabh Shah

Chemical and Materials Engineering: Energy Engineering, Nanotechnology

Project 1: Peroxone Mineralization of Dyes and Intermediates from Secondary Effluents
Members: Snigdha Khuntia
Project 2: Impact of heat treatment and acid leaching time on preparation of porous walled hollow glass microspheres (PWHGMs)
Members: Disha Ravipati, Shewta Snigh, Gaurav Prakash Nikam, Harmitkumar Pandya
Project 3: Deposition and Characterization of Perovskite Solar Cells
Members: Deepak Verma
Project 4: Hierarchically structured nanoporous geopolymers for waste and ground water purification
Members: Aditi Singhal, Gayathry J M
Project 5: Nanocrystalline substituted cobalt based metal oxides for oxygen evolution reaction: A prerequisite for photochemical water splitting
Members: Aditi Singhal
Project 6: Redox Tunable Nanomaterials as Nano-enzymes
Members: Ajay Karakoti, Sanjay Singh
Project 7: Two stage controlled release of pesticides
Members: Ajay Karakoti
Project 8: Development of efficient drug delivery vehicles
Members: Ajay Karakoti
Project 9: Role of Swift Heavy Ion on the Performance of Perovskite Solar cell
Members: Deepak Verma, Pawan Kulriya
Project 10: The mutual solubility of Ionic Liquid and Water: Experiments and Correlations
Members: DharamshI Rabari, Saurabh Patel, Ashray Koradiya

Data Science: Cloud Computing, Data Analytics and Machine Learning

Project 1: Online Outlier Detection Algorithm on FPGA
Members: Ratnik Gandhi, Ativ Joshi, Pratik Padalia
Project 2: Fast Implementation of Face Recognition on GPU
Members: Ratnik Gandhi, Axay Chaudhary, Mayank Jobanputra, Saumil Shah
Project 3: Human Capital Management System
Members: Ratnik Gandhi, Sanjay Chaudhary, Axat Chaudhary, Mayank Jobanputra, Saumil Shah
Project 4: Cost-Sensitive Big Data Analytics
Members: Ankit Desai, Sanjay Chaudhary
Project 5: Analytics And Integrated Platform For Agriculture (Indian Context) Using Spark
Members: Sanjay Chaudhary, Purnima Shah, Deepak Hiremath, Ratnik Gandhi
Project 6: Protein-Protein interaction networks
Members: Mitaxi Mehta, Manish Datt, Seema Aswani, Priyanka Nimawat

Theoretical Computer Science: Algorithms, Combinatorics, Game Theory and Unification Theory

Project 1: Online Outlier Detection Algorithm on FPGA
Members: Ratnik Gandhi, Ativ Joshi, Pratik Padalia
Project 2: Fast Implementation of Face Recognition on GPU
Members: Axat Chaudhary, Mayank Jobanputra, Saumil Shah
Project 3: Human Capital Management System
Members: Ratnik Gandhi, Sanjay Chaudhary, Axat Chaudhary, Mayank Jobanputra, Saumil Shah
Project 4: Cost-Sensitive Big Data Analytics
Members: Ankit Desai, Sanjay Chaudhary
Project 5: Analytics And Integrated Platform For Agriculture (Indian Context) Using Spark
Members: Sanjay Chaudhary, Purnima Shah, Deepak Hiremath, Ratnik Gandhi
Project 6: Approximation Algorithms for Processor Allocation in Grids
Members: Srikrishnan Divakaran, Shananya Mehta, Ashutosh Kakadiya, Anushree Rankawat, Rushita Thakker
Project 7: Fast Heuristics for Exact and Approximate String Matching
Members: Srikrishnan Divakaran, Jay Mohta, Suraj Patel, Shreyas Patel, Chintan Gandhi, Himol Shah, Charmi Chokshi, Meet Patel

VLSI Systems: Digital CMOS VLSI Circuits and Sub-systems

Project 1: Online Outlier Detection Algorithm on FPGA
Members: Ratnik Gandhi, Ativ Joshi, Pratik Padalia
Project 2: Low Power High Speed Hybrid Full Adder (FA) Circuits
Members: Manan Mewada, Mazad Zaveri, Anurag Lakhlani, Ratnik Gandhi
Project 3: Building a (programmable) hardware simulation platform based on multiple boards (FPGA or Arduino boards), for implementing/emulating neural networks/algorithms
Members: Dev Mehta, Pal Nikola, Mazad Zaveri, Anurag Lakhlani
Project 4: Design of of high-speed CORDIC based on asynchronous CMOS circuits/architecturess
Members: Ankur Changela, Mazad Zaveri, Anurag Lakhlani

Communication and Signal Processing: Computer Vision, Image Processing, Wireless Communications

Project 1: Protein-Protein interaction networks
Members: Mitaxi Mehta, Manish Datt, Seema Aswani, Priyanka Nimawat
Project 2: Non-parametric Smart Sensing Analytics based on Large Spectrum Data and Estimation of Channel Activity Statistics
Members: Dhaval Patel, Brijesh Soni
Project 3: Description based person identification in unconstrained surveillance video
Members: Mehul Raval, Sanjay Chaudhary, Anand Laddha, Shvetal Pandya

Area Wise List of Projects

Project 4: Design and Performance Analysis of Non-parametric Detection algorithm for Cognitive Radio -MIMO Communications
Members: Dhaval Patel, Sanjay Chaudhary, Mitul Panchal, Maunil Joshi
Project 5: Securing biometric data using data hiding techniques
Members: Mehul Raval, Priti P Rege, S K Parulekar, Vaibhav B Joshi
Project 6: Disease Detection and Severity Estimation in Cotton Plant from Unconstrained Images
Members: Mehul Raval, Sanjay Chaudhary, Aditya Parikh

- Applied Chemistry: Colloids, Surface Science

Project 1: Hierarchically structured nanoporous geopolymers for waste and groundwater purification
Members: Aditi Singhal, Gayathry J M

- Physical and Mathematical Sciences

Project 1: Deposition and Characterization of Perovskite Solar Cells
Members: Deepak Verma
Project 2: Protein-Protein interaction networks
Members: Mitaxi Mehta, Manish Datt, Seema Aswani, Priyanka Nimawat
Project 3: Redox Tunable Nanomaterials as Nano-enzymes
Members: Ajay Karakoti, Sanjay Singh
Project 4: Role of Swift Heavy Ion on the Performance of Perovskite Solar cell
Members: Deepak Verma, Pawan Kulriya

List of externally funded projects

- **Title:** Developing Data Analytics Architecture Applications in Agriculture
  Principal Investigator: Dr. Sanjay Chaudhary
  Co-Investigator: Dr. Mehul Raval
  Funding Organization: Department of Science and Technology, New Delhi, (NRDMS - NSDI)
  Duration: Two years (2017-2019)

- **Title:** Nanocrystalline substituted cobalt based metal oxides for oxygen evolution reaction: A prerequisite for photochemical water splitting
  PI: Dr. Aditi Singhal
  Co-PI: Dr. Arnab Dutta (IITGn)
  Duration: Three years (2017-2020)
  Funding Organization: DST-SERB Extra Mural Research Award (EMR)

- **Title:** Non-parametric Smart Sensing Analytics based on Large Spectrum Data and Estimation of Channel Activity Statistics
  Funding Agency: DST-UK-India Education and Research Initiative (UKIERI), British Council
  DST Theme: Data Science
  India Partner: Ahmedabad University
  UK Partner: University of Liverpool, Department of Electrical Engineering and Electronics, Brownlow Hill, Liverpool L69 3GJ, United Kingdom
  PI: (1) Dr. Dhaval Patel (Ahmedabad University - India) (2) Dr. Miguel López-Benítez (University of Liverpool, UK)
  Duration: Three Years (2017-2020)

- **Title:** Superstable Responsive Aqueous Foam for Synthesis of Novel Biomimetic Materials
  PI: Dr. Dharmesh Varade
  Co-PI: Dr. Ajay Karakoti
  Duration: Three years (2017-2020)
  Funding Organization: DST - SERB Early Career Research Award
  Broad Area: Nanocomposites and nanotechnology.
  Subject Area: Chemistry and Materials Science

- **Title:** Quaternion based leader-follower robust tracking control of an industrial robot using an anthropomorphic arm
  PI: Dr. Harshal B. Oza
  Duration: Three years (2016-2019)
  Funding Organization: Science and Engineering Research Board (SERB), Department of Science and Technology (DST), Government of India.

- **Title:** Description based person identification in unconstrained surveillance video
  PI: Dr. Mehul S Raval
  Co-PI: Dr Sanjay Chaudhary
  Project Collaborator (PC): Anand Laddha, Scientific Officer, BARC, Trombay
  Duration: Three years (2016-2019)
  Funding Organization: Board of Research in Nuclear Science (BNRS), Bhabha Atomic Research Centre, Department of Atomic Energy, Government of India

- **Title:** Systematic Design of Redox Potential Tunable Nanoparticles to Mimic the Function of Biological Enzymes for Mitigating the Diseases caused by Reactive Oxygen Species
  PI: Dr. Ajay Karakoti
  Co-PI: Dr. Sanjay Singh
  Duration: Three years (2016-2019)
  Funding Organization: DST - SERB Early Career Research Award
  Broad Area: Synthetic enzymes and nanotechnology
  Subject Area: Chemistry and Materials Science

- **Title:** Design and Performance Analysis of Non-parametric Detection algorithm for Cognitive Radio - MIMO Communications
  PI: Dr. Dhaval Patel
  Co-PI: Dr. Sanjay Chaudhary
  Funding Organization: Gujarat Council on Science and Technology (GUJCOST), Department of Science and Technology (DST), Government of Gujarat
  Duration: Two Years (2016-2018)

- **Title:** ASVI – Assistance System for the Visually Impaired
  PI: Dr. Harshal Oza
  Co-PIs: Jaina Mehta, Rishabh Shah
  Duration: One year (2015-2017)
  Funding Organization: Ahmedabad University

- **Title:** Inorganic Layered Materials: New Opportunities for Nanomaterial Synthesis and Novel Multifunctional Catalyst Design
  PI: Dr. Dharmesh Varade
  Duration: Three years (2015-2018)
  Funding Organization: Ahmedabad University
  Funding for research infrastructure
  Type of Funding: Infrastructure - Gujarat Institute of Chemical Technology (GICT)

- **Title:** Establishment of Basic Lab for Research in Novel Engineered Materials
  PI: Dr. Ajay Karakoti, SEAS
  Broad Area: Energy and Environment
  Subject Area: Chemistry and Materials Science

www.ahduni.edu.in/seas/list-of-funded-projects

Recent Faculty Publications (2016-2017)

Book Chapters

1. Ratnik Gandhi, "Big Data Analytics in Cloud – A streaming approach", In Book: Research Advances in Cloud Computing, Editors: Sanjay Chaudhary, Gaurav Somani and Rajkumar Buyya, Publisher: Springer
2. Minal Patel, Sanjay Chaudhary and Sanjay Garg, "Performance Modeling and Optimization of Live Migration of Virtual Machines in Cloud Infrastructure", In Book: Research Advances in Cloud Computing, Editors: Sanjay Chaudhary, Gaurav Somani and Rajkumar Buyya, Publisher: Springer

International Journal Papers

1. S. Garg , K. Modi and S Chaudhary, "A QoS-aware Approach for Runtime Discovery, Selection and Composition of Semantic Web Services", International Journal of Web Information Systems, Emerald, Vol. 12, Issue 2, ISSN: 1744-0084, 2016
2. Mansi Dhuria, Gaurav Goswami, "Perturbativity, vacuum stability and inflation in the light of 750 GeV diphoton excess," Phys.Rev. D94 (2016), 055009 (2016-09-09), pre-print available at https://arxiv.org/abs/1512.06782
3. Rupal Agravat, MS Raval, "Brain Tumor Segmentation: Towards a better life," CSI Communications, Vol. 40, No. 9, pp. 31 - 35, Dec. 2016
4. Aditi Singhal, Anuj Bisht, Amit Kumar, Sudhanshu Sharma, "One pot, rapid synthesis of Co3O4 by solution combustion method and its electrochemical properties in different electrolytes," 2016, J of Electroanalytical Chemistry, Vol. 776, pp. 152-161
5. N.V. Srikanth Vallabani, Ajay S. Karakoti, Sanjay Singh, "ATP-mediated intrinsic peroxidase-like activity of Fe3O4-based nanozyme: One step detection of blood glucose at physiological pH", Colloids and Surfaces B: Biointerfaces, Volume 2017, 153, 52–60
6. Ragini Singh, A. S. Karakoti, William Self, Sudipta Seal, and Sanjay Singh, "Redox-Sensitive Cerium Oxide Nanoparticles Protect Human Keratinocytes from Oxidative Stress Induced by Glutathione Depletion" Langmuir, Langmuir, 2016, 32 (46), 12202–12211
7. S. Sanghavi, W. Wang, M.I Nandasiri, A.S. Karakoti, W. Wang, P. Yang, S. Thevuthasan, Investigation of trimethylacetic acid adsorption on stoichiometric and oxygen-deficient CeO2 (111) surfaces, Physical Chemistry Chemical Physics, 2016, 18, 15625 – 15631

Patents

1. Ajay Karakoti, Structural materials with nearly zero carbon emissions, US Patent Number - 9388074
2. Ajay Karakoti, Redox active cerium oxide nanoparticles and associated methods, US patent Number - 9585840

International Conference and Workshop Papers

1. Aditya Parikh, Mehul S Raval, Chandrasinh Parmar, Sanjay Chaudhary, "Disease Detection and Severity Estimation in Cotton Plant from Unconstrained Images", Special Session on Data Science for Agricultural Decision Support Systems 3rd IEEE International Conference on Data Science and Advanced Analytics (DSAA 2016) , 17 - 19th Oct. 2016, Montreal, Canada
2. P. Shah, D. Hiremath and S. Chaudhary, 'Big Data Analytics Architecture for Agro Advisory System', 2nd annual IEEE International Workshop on Foundations in Big Data Computing (HiPC BigDF'16), in conjunction with the 23rd IEEE International Conference on High Performance Computing (HiPC 2016), in Hyderabad, India, December 19-22, 2016
3. A. Parikh, M. Raval, C. Parmar, and S. Chaudhary, 'Disease Detection and Severity Estimation in Cotton Plant from Unconstrained Images', 3rd IEEE International Conference on Data Science and Advanced Analytics (DSAA 2016), Montreal, Canada, October 17-19, 2016
4. A. Desai and S. Chaudhary, 'Distributed Decision Tree ', In Proceedings of the 9th Annual ACM India Conference (COMPUTE '16). ACM, New York, NY, USA, 43-50
DOI: http://dx.doi.org/10.1145/2998476.2998478
5. M. Patel, S. Chaudhary and S. Garg, 'Performance Modeling of Skip Models for VM Migration using Xen', ICCCA- 2016, Delhi, India, April 29-30, 2016
6. S. Chauhan, P. Patel, F. Delicato and S. Chaudhary, 'A Development Framework for Programming Cyber-Physical Systems', 2nd International Workshop on Software Engineering for Smart Cyber-Physical Systems (SEsCPS'16) , In conjunction with ICSE 2016, Austin, Texas, USA on May 16, 2016
7. D. Hiremath, P. Shah and S. Chaudhary, 'ICT Interventions to Improve the Performance of Canal Irrigation Sector in India ', Proceedings of the Eighth International Conference on Information and Communication Technologies and Development , Article No. 51, ACM New York, USA, 2016, ISBN: 978-1-4503-4306-0, http://dx.doi.org/10.1145/2909609.2909635
8. Jaina M. Mehta, Pratik Trivedi, "An enhanced mixed-scaling-rotation CORDIC algorithm with weighted amplifying factor"â€‹, 2016 IEEE International Conference on Digital Signal Processing (DSP), Beijing, China, 16-18 Oct 2016, DOI: 10.1109/ICDSP.2016.7868613
9. Vaibhav B Joshi, Mehul S Raval, Dhruv Gupta, Priti P Rege, "An Invertible Fuzzy Scheme for Securing a Fragile Watermark", IEEE International Conference on Computing, Analytics and Security Trends (CAST-2016), Pune, India, 19th - 21st Dec. 2016

www.ahduni.edu.in/seas/publications

Visitors at SEAS

- **Dr. Manish Gupta**, VideoKen, Bengaluru, April 2017
- **Dr. Ashish Sureka**, ABB Corporate Research, Bengaluru, April 2017
- **Dr. Shailesh Nayak**, Ministry of Earth Sciences, New Delhi, March 2017
- **Prof. P. Selvam**, IIT-Madras, February 2017
- **Mr. Arup Das Gupta**, January 2017
- **Dr. Shamik Bhattacharya**, St. Mary Univeristy, USA, January 2017
- **Prof. Dganit Danino**, Technion, Israel, December 2016
- **Prof. Siddhartan Govindswamy**, Oline College of Engineering, USA, December 2016
- **Prof. Ravi Rao**, TIFR, Mumbai, November 2016
- **Dr. Pankesh Patel**, ABB Corporate Research-India, November 2016
- **Prof. Radhakant Padhi**, IISc, Bengaluru, October 2016.
- **Dr. Srikrishnan Divakaran**, DAIICT, Gandhinagar, October 2016
- **Shri Sushant Panda**, Syum Labs, October 2016
- **Dr. Parth Gupta**, IIIT-Vadodara, September 2016
- **Prof K.S. Gandhi**, Indian Institute of Science, Bengaluru, September, 2016
- **Prof. Umesh Bellur**, Indian Institute of Technology, Mumbai, September, 2016
- **Dr. B L V Prasad**, NCL, Pune, September 2016.
- **Prof. R. K. Shevgaonkar**, IIT Bombay, August 2016.
- **Dr Vijay Modi**, Columbia University, USA, July 2016.
- **Mr Harshad Patel**, Adani Ports & SEZ, March 2016.
- **Prof. Dr. Ramki Thurimella**, University of Denver(DU), USA, March 2016
- **Dr. Amit Nanavati**, IBM Research, India, March 2016.
- **Prof. Gaurav Sharma**, University of Rochester, USA, March 2016.
- **Prof. Amit Sheth**,Wright State University, Dayton, Ohio, USA, February and March 2016.
- **Dr. Arnav Jhala**, University of California, Santa Cruz, December 2015
- **Prof. Lynn Stein**, Oline College of Engineering, USA, October 2015
- **Shri Kalpesh Padia**, North Carolina State University, June 2015
- **Prof. Anil Gupta**, IIMA, Ahmedabad May 2015.
- **Shri Rahul Nawab**, IQR Consulting, Ahmedabad, April 2015
- **Prof. Benjamin Linder**, Oline College of Engineering, USA, March 2015
- **Dr. Sithu D Sudarshan**, ABB Corporate Research Centre, Bangalore March 2015
- **Dr. Kamlesh Lulla**, NASA, USA, January 2015
- **Dr. Nirmit Desai**, IBM Research, USA, December 2014
- **Prof. Priti Rege**, University of Pune, July 2014
- **Prof. Joseph Davis**, University of Sydney, June 2014
- **Prof. Pratik Shah**, IIIT Vadodara, March 2014
- **Prof. Aditya Tatu**, DA-IICT, Gandhinagar February 2014
- **Dr. Pathik Pathak**, University of Southampton, UK, January 2014
- **Dr. Chintan Vaishnav**, MIT, USA, January 2014

Ahmedabad University

School of Engineering and Applied Science

School of Engineering and Applied Science,
GICT Building, Central Campus, Navrangpura,
Ahmedabad 380009, Gujarat, India | +91·79·61911000

www.ahduni.edu.in/seas | admissions_seas@ahduni.edu.in

Compilation: Ratnik Gandhi, Tanvi Maher, Kinjal Arya, Surabhi Vaya, Sanjay Chaudhary