Department of Instrumentation and Control

MAPAN

THE MEASURE OF PROGRESS

Issue 17, December 2021

Inside this issue:

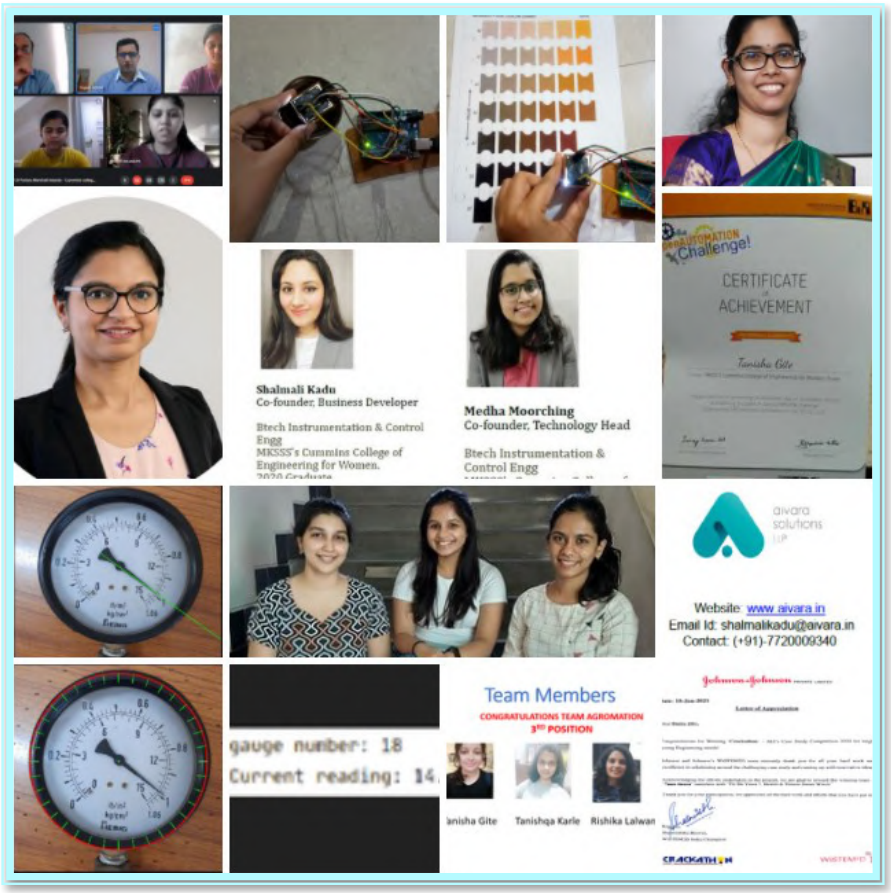
Imagine with all your mind.

Believe with all your heart.

Achieve with all your might!!

From HOD's Desk — Dr. Anagha Panditrao

Hope All are doing well! I am happy to express my views for the seventeenth issue of our department newsletter – MAPAN. The department of Instrumentation and Control has been consistently active in organizing and participating co-curricular events along with the regular academic schedule. Considering the latest trend and need of online training, the department collaborated with Virtual Lab Nodal Centre at COEP, Pune and established our own Nodal Centre. This VLNC will cater to the requirements of all departments of the college. Online expert sessions, webinars and technical talks on various recent and upcoming topics like MEMS, Industrial Automation, Biomedical, IoT were organized for the students. The faculty members completed around 70 FDP in these areas. In the pandemic situation, to face the online Teaching –Learning challenge, all the faculty members are using Moodle Learning Platform effectively. Under the ISA student chapter, many state and national level technical events were organized. This was the 25th year for the Forbes Marshall Project competition and the award was bagged by the project titled 'Automated Soil Analyzer'. I am proud to share that two of our alumnae have taken ahead their project idea as a start-up immediate after graduation. Overall, AY 2020 - 2021 was effective on all fronts and I am confident that this trend will continue in future as well.



YEAR 2020 - 2021 AT A GLANCE ...

Workshops and Faculty Development Programs

'*PO2 and PO3 Attainment in Linear Integrated Circuits'* by Dr. Atul Joshi, at KBTCOE, Pune.

Dr. Anagha Panditrao is selected as a Advisory Board Member of *'Center of Electrical Engineering Excellence'.*

'Advanced Microcontrollers' by Dr. Atul Joshi, a expect session at SKN Sinhgad Institute of Technology and Science.

'*Online Workshop on Moodle'* for Instrumentation Students was conducted by Prof. Amruta Bahulikar.

'Webinar—MEMS and Applications' by Prof. Pratima Kulkarni was arranged for T.Y.B.Tech Students.

'Hands-on PLC Workshop' by Prof. Manisha Narawane was conducted for T.Y.B.Tech students.

Dr. Dipali Ramdasi served as a *Session Chair during the IEEE Conference ESCI 2021*, Pune.

All the dept faculty members participated in '*Hands on FDP on Use of Moodle as LMS'* & *'Examination Reforms'*.

Dr. Anagha Panditrao participated in the STTPs & Cousera/NPTEL Certifications in '*Automotive Technology for Sustainable Future', 'Role of Teachers in Implementation of National Education Policy NEP 2020',* '*'Writing and Publishing High Impact Research Publications and Scientific Documents', 'Embedded System Design', 'Programming Fundamentals' , 'Excel Skills for Business: Essentials'.*

Dr. Vaishali Upadhey & Dr. Swati Madhe attended FDP on *'Robotics and Automation', 'Strategies in Teaching Learning'* organised by VIT.

Dr. Nivedita Daimiwal & Dr. Revati Shriram participated in NITTR Organised FDPs on *'Leadership & Teamwork for Performance Excellence', 'NAAC Accreditation Process', 'Capacity Building for Effective Teaching'.*

Dr. Dipali Ramdasi & Prof. Pratima Kulkarni participated in FDP on *'Internet of Things for Futuristics Smart Systems'* organized by Bharati Vidyapeeth, Pune.

Prof. H. T. Patil participated in FDP on '*Applications of Computers in Biology'* organized by AICTE ATAL.

Prof. Pratima Kulkarni participated in FDP on *'Python'* and *'National Innovation and Startup Policy & Activation of Institutional IIC'* .

Dr. Swati Madhe participated in FDP on '*Photography & Media Communications',* and *'Genome Engineering and Technology',*

Prof. Yashwant Adhav participated in FDP on *'Modern Tools and Techniques for Effective Research and Publications',* by MTTERP.

Dr. Nivedita Daimiwal participated in FDP/STTP on '*IoT', 'Artificial Intelligence', 'Systems Engineering',* organized by AICTE ATAL.

Dr. Vaishali Upadhey participated in the FDPs on, *'NBA Accreditation Process', 'Artificial Intelligence & Machine Learning using Python' , 'Internet of Things using Amazon AWS'.*

Dr. Dipali Ramdasi participated in the workshop on, *'Transformation Through NAAC Accreditation Process, A National Level Workshop for Higher Educational Institutions'.*

Dr. Revati Shriram participated in the FDPs on *'Image Processing and Data Science with MATLAB', 'Teaching Learning Pedagogies' , ' Sensors Technology', 'Research Avenues in Machine Learning Approaches for Pattern Recognition', 'Industry Academia: Bridging the Gap', 'Developing Research & Development Culture in Industry Institute Interaction Oriented Modern Teaching Learning and Project Based Learning', Organizational Behaviour', 'Writing and Publishing High Impact Research Publications and Scientific Documents', Biomedical Instrumentation'*

Department Toppers of Year 2020 - 2021

Ms. Anjali Sharma
(8.84/10)

Ms. Sai Kate
(8.83/10)

Ms. Manali Sawant
(8.71/10)

Ms. Urwashi Taki
(8.7/10)

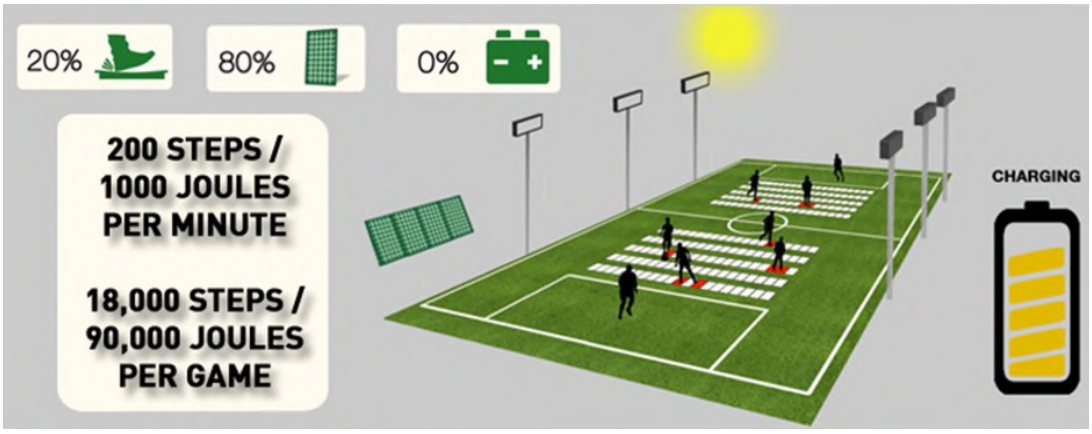
Ms. Disha Bhagwat
(8.62/10)

You are moving on to a new and exciting chapter in your life.
We wish you all the best for the future that lies ahead.

CONGRATULATIONS ON YOUR GRADUATION!!

Kinetic Football: Energy Generation

Shell worked with Pavegen to implement its game changing technology in Brazil at scale, changing perceptions on energy usage and encouraging the next generation of innovators. Pavegen installed 200 tiles into a local football pitch redeveloped by Shell in the favela. Morro da Mineira.



The kinetic-harvesting Pavegen tiles convert the energy from footsteps into electricity. It works day and night alongside solar panels to light the pitch and surrounding area for 10 hours a night on a fully-charged battery. To date this pitch is the largest global installation of Pavegen technology, providing a local community with sustainable energy. Using Pavegen's wireless Application Programming Interface (API), the tiles can transmit energy to designated web addresses, allowing for real-time data analytics, live football representation and potential incorporation within smart cities of the future. The technology in Rio can collate the daily amount of footsteps and energy produced by each tile, allowing for community interaction and unity through the power of sport. Pavegen's pioneering flooring tile converts the kinetic energy from people's footsteps into renewable electricity. Each installation has the ability to power off-grid applications such as street-lighting, advertising displays and ticket machines. Pavegen is able to collect, monitor and communicate live data with any software or hardware application using its unique API wireless interface.

Source: https://www.offgridenergyindependence.com/articles/6900/turning-on-the-football-pitch-with-kinetic-energy

Nidhi Entrepreneur - in - Residence (EIR) Grant

aivara solutions LLP

Shalmali Kadu
Co-founder, Business Developer

Medha Moorching
Co-founder, Technology Head

aivara solutions LLP

Website: www.aivara.in
Email Id: shalmalikadu@aivara.in
Contact: (+91)-7720009340

Aivara Solutions is an AI-based start-up from Pune, Maharashtra offering innovative and economical solution for Environmental Monitoring. With our current focus on water-technology, we are building AI based water quality analyzer for water testing labs, municipality and waste-water industries.

Water Pollution is one of the most prominent challenges that India faces today. Government spends $107M just for testing water quality. Studies show that approximately 40 million litres of untreated wastewater and up to 2 million tons of human waste is disposed directly into the water courses. The effects of which goes unchecked due to lack of quality checking. The traditional method of water quality monitoring is slow, tedious, expensive and prone to human error- it allows testing of limited water samples due to lack of testing facilities and resources. Hence the data quality and consistency are low.

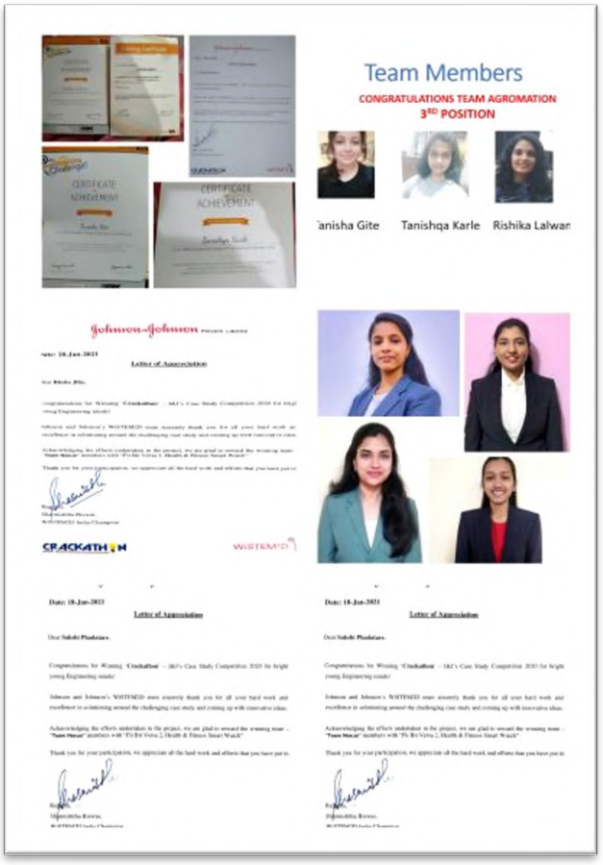
Water quality monitoring is, at the end of the day, an important aspect in maintaining the planet's health and sustainability. Land-based activities have a significant impact on water systems, and it's vital that we understand how these activities affect water bodies above and below ground. Thus with our technology, we want to bring reliable, accurate and real-time reports of the water quality parameters to the user at an economical price. Our device consists of a hardware and software module. We can display 20 parameters of water quality in real-time with our equipment, including Ph, Dissolved Oxygen, Temperature, Electrical Conductivity, BOD, COD, TDS, Heavy Metals, Ammonia, Sulphate, Blue Green Algae, ORP, and biological analysis in real-time.

Our journey started in final year of engineering itself. After winning the first prize at NES-Innovation Awards 2020, we began conducting market research and developing our product. Our application got selected for the Together 2021 program which is an Indo-Canada Bootcamp for early-stage start-ups. We modified our product after consulting with industry experts and customers. In April 2021, we received the NIDHI-Entrepreneur in Residence grant of 3.6Lakh from Dept of Science & Technology. Currently we are at a prototype stage and are incubated at Science and Technology Park, Pune University.

We are also supported by Start-up Nexus, American Centre at New Delhi.

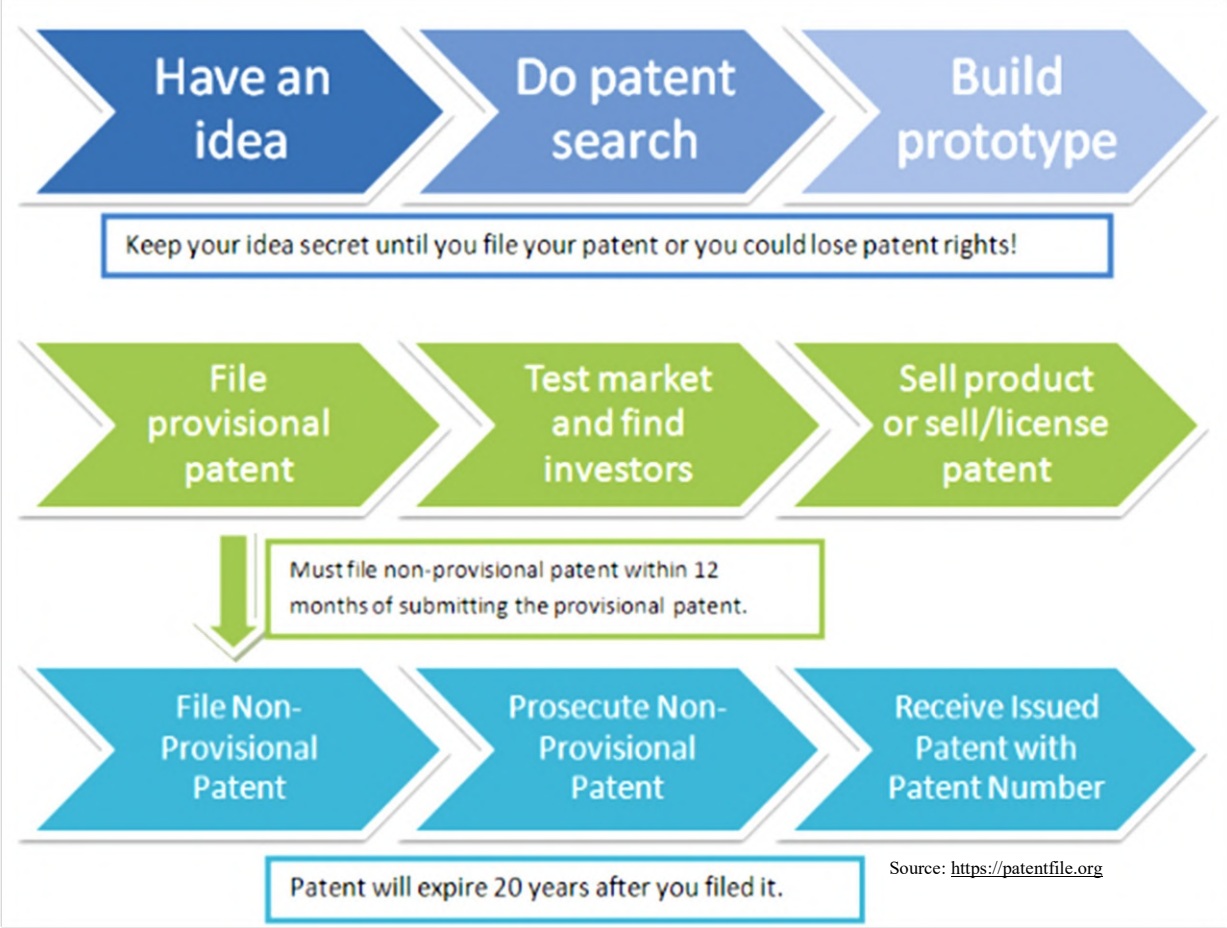
By — Shalmali & Medha

Congratulations & Great Luck for the Future Endeavors!!



Winner of Co-curricular Activities

Patents and Steps in Filing the Patents



Inventions cannot be judged on Patent Parameters, but Patent have the ability to take Inventions very far!!

- Kalyan C Kankanala

Patent Filed & Published

PATENTS PUBLISHED

Ms. Neenu George, Ms, Jinu James, Ms. Shrinidhi Kulkarni, Ms. Sneha Parsewar & Dr. Revati Shriram , 'System and Method for Detection of Neurogenerative Disease using Speech and Body Odour Signature'.

Ms. Akshada Jadhav, Ms. Sanchali Jadhav, Ms. Ankita Chaudhari, Ms. Priyanka Inde, Ms. Akanksha Deshpande, Ms. Appurwa Zingade, Prof. Pratima Kulkarni & Dr. Dhananjay Bodas, 'Astute Footwear Device with Integrated Sensors'.

Ms. Vaidehi Deoskar, 'System for Indicating Colour Fading of Clothes and Method'.

Dr. Nivedita Daimiwal & Dr. Revati Shriram, 'System and Method for Arthritis Detection'.

PATENTS FILED

Ms. Arya Dethe, Ms. Shruti Dharmadhikari, Ms. Harshada Paralkar & Dr. Atul Joshi, 'System of Detecting Flatness on Wheels of Railway Vehicle and Method Thereof'.

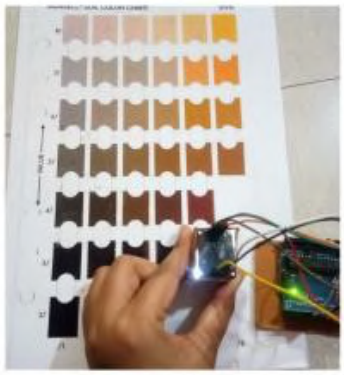
Ms. Vaidehi Deoskar, Ms. Pooja Kulkarni, Ms. Tejaswini Dengade & Dr. Revati Shriram, 'System for Mental Workload Assessment and Method Thereof'.

CONGRATULATIONS !!

Forbes Marshall Project Award 2021

Forbes Marshall Project Award is Annually declared to a Best Final Year B. Tech Project. This year FM Award is bagged by a Project **'Automated Soil Analyzer'**, by **Ms. Rutuja Bhosale, Ms. Apurwa Patil & Ms. Srushti Rajapure**, guidance for the project was extended by **Prof. Manisha Naravane**.

Hearty Congratulations to the Winning Team & Project Guide!



In the environmental cycle, soil plays a vital part. According to human needs, the contribution of soil in agriculture is essential for the sustainability of humans in the world by keeping food production up to a satisfactory level. And for this purpose, the quality of soil is very crucial. Soil contains inorganic material, organic material, minerals, microorganisms, etc. But in this changing world, the soil gets polluted due to the legion activities made by humans. For enhancing the quality of soil, testing of soil is very important. The traditional soil testing methods are time-consuming, expensive, etc. To overcome such methods, this study proposes an automated soil analyzer to test the quality of soil for agricultural purposes. This soil analyzer technique incorporates an Optical sensor through which the color of the soil is to be detected based on the RGB values of soil. Which is then followed by the interfacing of the optical module and Arduino and also a database creation for different soils using the Munsell chart. Through which the comparison of soil color is done with the Munsell's soil color .The comparison is done by streaming the data in python programming. Depending upon the upcoming results how much fertilizers to be added will be depicted.

Instrumentation to track Jupiter's Great Red Spot

The atmosphere of Jupiter consists of bands of winds rotating at different rates, punctuated by giant storms. The largest storm is the Great Red Spot (GRS), which has persisted for more than a century. It has been unclear whether the storms are confined to a thin layer near the top of the atmosphere or if they extend deep into the planet.

The Microwave Radiometer (MWR) instrument on Juno is a set of radiometers designed to measure Jupiter's emitted flux. The instrument observes at six frequencies between 0.6 and 22 GHz (with wavelengths 50 to 1.3 cm), each sampling a different depth determined by how atmospheric transparency varies with frequency. This kind of a technology was adapted to ensure that radio maps were received as a function of frequency. Getting data from the different maps it was seen that the atmospheric opacity of Jupiter is mainly determined by water and ammonia. To measure an estimated brightness temp, the data for limb darkening was corrected by using information from models of previous Juno satellite orbits. The resulting radio maps allow us to compare the vertical structures of Jupiter's cyclones and anticyclones, including the GRS.

Source: www.leptonsoftware.com , MA Janssen, California Institute of Technology

Kedar Tumne Award 2021

Third Year B.Tech (Instrumentation & Control) students **Ms. Saniya Godbole**, **Ms. Sayali Kulkarni** and **Ms. Shreya Adsul** were the winner of a Kedar Tumney College Level competition for the Project. Work was carried out on **'Reading Analog Gauges Using Open CV for Hazardous Area Applications'** and **Prof. Manisha Naravane** extended her guidance for the same.

Analog meters are widely used in the process industry due to their ruggedness, simple construction, high reliability, and easy operation. Most of the applications use analog meters as they provide accurate results for the purposes. They are easy to use and still the first choice for the industries to do the measurement. A Human Operator manually takes the measurement that might cause errors. In hazardous areas like Oil and Gas industries, mining industry, the operator's safety is at stake while taking measurements. This project suggests a simple application that makes use of image processing to read the analog gauges.

Background of the Project: This project was a part of the Vision System of the Fieper. The Fieper (Field Operator Robot) is a project initiated by ISA-ACARD to replicate and gradually replace human operators in a hazardous industrial environment. We aimed to read analog gauges just with the help of an image. This project takes an image of the gauge and reads the value. Before giving any result, it first calibrates the image in small angular values and then uses these calibrated values in the measurement stage to convert the angles into meaningful values to display. We have used Python and OpenCV for this application. OpenCV, as the name suggests, is an open-source platform having a huge collection of libraries using which we can develop real-time computer vision applications like machine learning, and image processing. We have used the Hough Circle Transform and Hough Line Transform to detect the circular gauge's boundaries and the pointer respectively. The image is first preprocessed before the transforms are applied to it. The preprocessing includes cropping, resizing, grayscale conversion, jpeg conversion to get better results and remove noise. A QR code has been generated for every gauge which stores relevant information like minimum angle, maximum angle, minimum value, maximum value, etc which will help in the calculation of the angle of the pointer and calibration of the gauge.

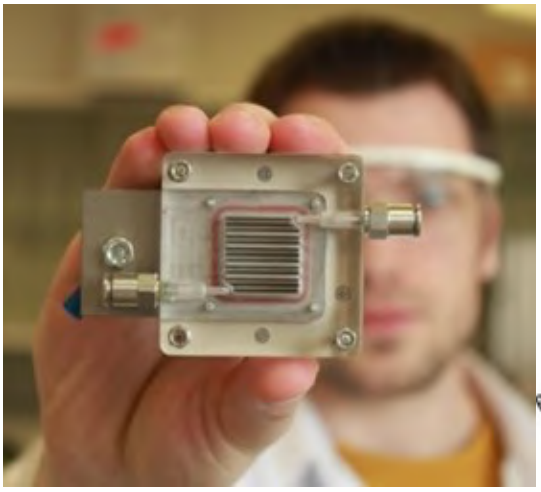
This measurement technique will help the human operator to work in hazardous areas without any health risks. This application will also reduce human error involved while taking the readings. We have also presented this project at the 10th National Conference On "Recent Advancements in Power System Engineering (RAPSE –X)" and they were kind enough to publish our paper in the online journal "International Journal of New Technology and Research" (IJNTR).

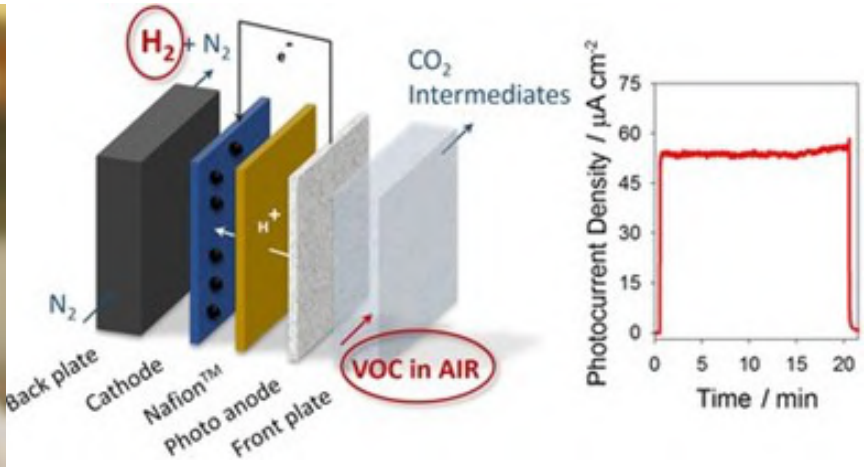
Link- https://www.ijntr.org/download_data/IJNTRSIJUN21009.pdf

Hearty Congratulations to all the Winners!!

Fuel from Pollutants: Creating Hydrogen Fuel from Air

Researchers from the University of Antwerp and KU Leuven has developed a process that purifies air from organic pollutants while generating power in the form of hydrogen gas. It is small device with two rooms separated by a membrane. Air is purified on one side, while on the other side hydrogen gas is produced from a part of the degradation products. This hydrogen gas can be stored and used later as fuel. The concept is called an all-gas-phase photoelectrochemical (PEC) cell. When exposed to light, the cell is capable of converting volatile organic pollutants to CO2 at a TiO2 photoanode. Using PEC technology to remediate air pollution would be great on its own, but the added fuel-generation feature really motivates the scientists' cause. Hydrogen gas is created at a dark Pt cathode where it can then be saved for later use. The system is most efficient working with organic pollutants in inert carrier gas, it still does create photocurrents in the presence of oxygen, which is imperative if the cell is to be used with organic contaminated air.





Source: https://www.labroots.com/trending/earth-and-the-environment/5938/hydrogen-gas-air-pollution

Walmart's Robotic Bees: A step forward for Agriculture

Walmart has recently filed a patent for its pollination drones. Though many might feel apprehensive about the prospect of robotic bees thanks to a certain *Black Mirror* episode, the potential benefits of this technology are too good to pass up. These tiny robots could act just like bees, pollinating crops autonomously. Flying around autonomously, these drones could potentially pollinate as effectively as the real thing. These small creatures are the backbone of agriculture and the food that we eat. The robot bees would operate using sensors and cameras to help them navigate to crops. The proposed design would allow the bees to identify crops, and would then allow them to pollinate the same way real bees do. With declining bee populations proving to be a worrying issue worldwide, robotic bees like these could be a huge advantage to the agricultural industry.

Source: https://interestingengineering.com/15-of-the-most-interesting-recent-patents

Placement & Internships for year 2020 - 2021

PLACEMENTS

LAM Research—Ms. Anuja Saran

ZS Associates—Ms. Himani Bokil

Addverb— Ms. Sumedha Mujoo

Colgate Palmolive—Ms. Shamika Ghodke

Alstrom—Ms. Anjali Sharma

Cognizant—Ms. Akanksha Gadekar

Capgemini—Ms. Snehal Babladkar

Sell Do—Ms. Snehal Amrutwar

Emerson—Ms. Sai kate, Ms. Manali Sawant, Ms. Soha Kshirsagar, Ms. Ankita Bhate, Ms. Anushka Mandke

Johnson Control India—Ms. Urwashi Taki, Ms. Pradnya Shelar, Ms. Kamini Gaikwad

Rockwell Automation—Ms. Apurva Patil, Ms. Srushti Rajapure, Ms. Akshata Kulkarni, Ms. Ruchita Wani, Ms. Dhanashri Dandi, Ms. Meghana Zalte

SUMMER INTERNSHIP

In the AY 2020—2021 sixty students (S.Y., T.Y. and Final Year B.Tech) from the department have completed the Industrial/Hospital Internship for more than four weeks. Following are some of the Paid Internships completed by the department students.

Suez Water Technologies—Ms. Anushka George, Ms. Maithili Deshpande, Ms. Dipika Deogadkar

KP Instruments—Radhika Bhise, Ms. Tanmayi Chavan, Ms. Vishnavi Thakare

Becton Dickinson TCI—Ms. Saniya Godbole

Lab Systems and Biotech India PVT LTD—Ms. Riddhi Kulkarni

Perfect Products India—Ms. Sayali Kulkarni

Volfram Systems India PVT LTD—Ms. Isha Paithankar

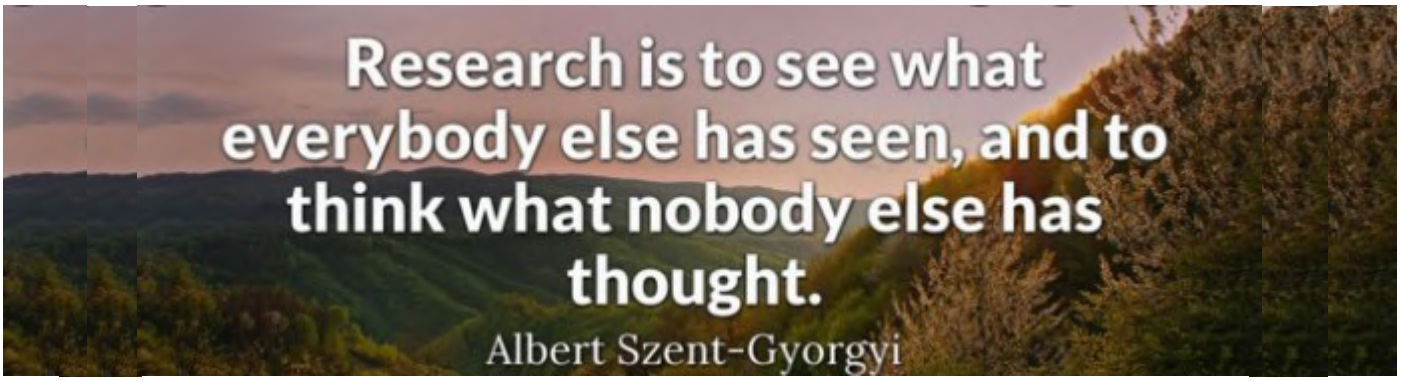
Tetra Pak India PVT LTD—Ms. Sakshi Phadatare

Cloud Hedge—Ms. Janhavi Shilawat

Alcore Funds—Ms. Deeksha Sharma

Expert Recruitments—Ms. Deeksha Sharma

Publications by Students & Faculty in 2020 - 2021



Nivedita Daimiwal & Revati Shriram, "*CPPG Based Emotion Classification Based on Statistical and Eigen Space Features and Performance Analysis of Classifiers",* Lecture Notes in Electrical Engineering Book Series (LNEE, Vol 750, pp 315-323, May 2021, ISBN: 978-981-16-0336-5)
https://doi.org/10.1007/978-981-16-0336-5_26.

Swati Madhe, Vaishali Upadhey & Atul Joshi, "*Design of Low Cost IoT Enabled Universal Wiring Harness Tester",* Journal of Critical Reviews (Vol 7, Issue 18, pp 1476-1481, July 2020, ISSN: 2394-5125

Sai Kate, Vaishnavi Malkapure, Bhagyashree Narkdede & Revati Shriram, *"Analysis of Electroencephalogram During Coloured Word Reading Interference",* Lecture Notes in Electrical Engineering Book Series (LNEE, Vol 750, pp 253-262, May 2021, ISBN: 978-981-16-0336-5)
https://doi.org/10.1007/978-981-16-0336-5_21

Ankita Deokate, Kshitija Karale, Suvidha Sawant & Yashwant Adhav, *"IoT Based Accident Detection & Tracking System—A Contribution Towards Smart City, Smart Healthcare Domains & Industry 4.0",* International Journal of All Research Education & Scientific Methods (Vol 9, Issue 5, pp 1411-1416, May 2021, ISSN: 2455-6211)

Neenu George, Shrinidhi Kulkarni, Jinu James, Sneha Parsewar & Revati Shriram, *"Detection of Parkinson's Disease Through Speech and Smell Signatures",* Lecture Notes in Electrical Engineering Book Series (LNEE, Vol 711, pp 659-670, March 2021, ISBN: 978-981-15-9019-1)
https://doi.org/10.1007/978-981-15-9019-1_57

Shreya Adsul, Sayali Kulkarni, Saniya Godbole & Manisha Naravane, *"Reading Analog Gauges Using Open CV for Hazardous Area Applications",* International Journal of New Technology and Research (PP 39-42, June 2021, ISSN: 2454-4116)

Revati Shriram & Nivedita Daimiwal, *"Statistical Analysis of Coherence Between Electrical and Hemodynamic Brain Signal",* Lecture Notes in Electrical Engineering Book Series (LNEE, Vol 750, pp 211-219, May 2021, ISBN: 978-981-16-0336-5)
https://doi.org/10.1007/978-981-16-0336-5_18

Soha Kshirsagar, Shamika Ghodke & Revati Shriram, *"Ocean Pollution Detection using Image Processing",* International Conference on Emerging Smart Computing & Informatics ESCI 2020 (March 2021)
https://doi.org/10.1109/ESCI50559.2021.9397025

Atul Joshi, Vaishali Upadhey & Swati Madhe, *"Design of Portable Air Purge Level Transmitter with Built-in Calibration Feature",* IOP Conference Series: Materials Science & Engineering (Vol 1012 (2021) 012043, January 2021)
https://doi.org/10.1088/1757-899X/1012/1/012043

Revati Shriram, Akshada Shinde, Radhika Nibandhe, Achal Guleria & Rashmi Are, *"Acquisition and Analysis of Skin Impedance in Parkinson's Disease",* Lecture Notes in Electrical Engineering Book Series (LNEE, Vol 728, pp 109-115, ISNB: 978-981-33-4866-0)
https://doi.org/10.1007/978-981-33-4866-0_14

Revati Shriram & Nivedita Daimiwal, *"Study of Electrical Brain Signal During Verbal Cognitive Assignment",* Biomedical and Pharmacology Journal (Vol 13, No 3, pp 1195-1205, September 2020, ISSN: ISSN: 0974-6242)
https://dx.doi.org/10.13005/bpj/1987

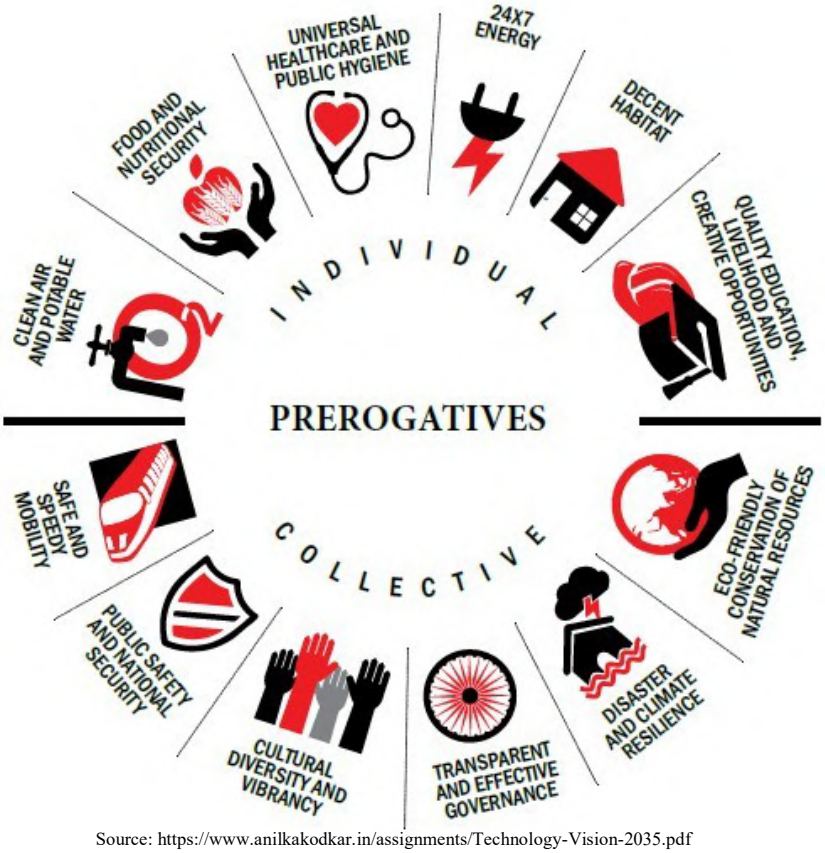
Technology Vision 2035 - TIFAC

TECHNOLOGY INFORMATION, FORCASTING AND ASSESSMENT COUNCIL (TIFAC)

INDIANS IN 2035 - OUR NEEDS: TO FULFIL OUR VISION TO BE CITIZENS

of a modern country, we would have certain prerogatives with regard to ourselves, our nation and our planet. We have to define specific targets with regard to these necessities as also technologies needed to achieve them. We need to set these targets at multiple levels taking into account widely varying necessities of our very diverse population and their time lines may vary. There would be minimum expectations that every Indian must be assured of and a gross picture that should be in place latest by the year 2035 is depicted here. Simultaneously, commensurate with the rise in India's stature and expected technological advances there would be aspirations that a vision like this must capture.

Twelve prerogatives should be available to each and every Indian, and ensuring the attainment of these prerogatives is the core of our technology vision for India. Nevertheless, the inherent and enduring diversity of our people would also have to be factored into our policies to meet these prerogatives. Firstly, different targets would need to be set for different population segments: while the clean air challenge is more severe in our cities, the potable water challenge is more severe in our rural areas. Secondly, the technology delivery mechanisms for different population segments would also be different: for example, ensuring water availability in our arid zones would raise a series of challenges pertaining both to technology creation and delivery. Lastly, success in attaining our technology targets would have differential social impacts, depending upon the characteristic of the population segment: connectivity, for instance, would be far more enabling in our countryside compared to our metropolitan areas.



Source: https://www.anilkakodkar.in/assignments/Technology-Vision-2035.pdf

Technology in the service of India: ensuring the security, enhancing the prosperity and strengthening the identity of every Indian

MKSSS's Cummins College of
Engineering for Women, Karvenagar,
Pune–411052, Maharashtra, INDIA

Phone: 020-2531100
Fax: 020-25311499
Email: administrator@cumminscollege.in

MKSSS's
CUMMINS COLLEGE OF ENGINEERING FOR WOMEN

An autonomous Institute affiliated to
Savitribai Phule Pune University

www. cumminscollege.org

Faculty Editor: *Dr. Revati Shriram*
revati.shriram@cumminscollege.in

Student Volunteers: *Ms. Anushka George, Ms. Dipika Deogadkar, Ms. Anwesha Sen & Ms. Harshada Bhawar*

Alumnae Corner

Dept of Instrumentation and Control is thankful to our alumnae for their support through out the last year. In the last year our department alumnae have helped us in many ways viz by conducting guest lectures and sharing their experiences about management, self discipline and for generous support towards the Bhaubij Nidhi.

We are always grateful towards the generous support extended by our department alumni in various way. We kindly request you to all to share your achievements and we will be glad to showcase them always! ……. THANK YOU!!

We are proud of your accomplishments. We are confident that you will continue with even more successes…
Good luck for the future!!
&
Thank you for your support!

Deep Brain Stimulation Safer for Patients with New MRI Compatible Electrode

Dr. Surabhi Nimbalkar
Batch of 2013

Source: https://newscenter.sdsu.edu/sdsu_newsletter/news_story.aspx?sid=77828

Imagine having an electrode embedded in your brain in a surgical procedure that involves drilling holes in your skull to implant it. Now imagine going through an MRI scan for medical evaluation, when the metal electrode may react to the magnetic fields and vibrate, generate heat or even possibly damage the brain.

Deep Brain Stimulation—where electrodes implanted in the brain produce electrical impulses that control abnormal movement – is increasingly being used for those with movement disorders that don't respond to medication, such as patients with Parkinson's disease, tremors, and uncontrolled muscle contractions known as dystonia. It's also being considered for traumatic brain injury, addiction, dementia, depression and other conditions, so the potential applications are vast. Until now, the electrodes have been made out of thin-film platinum or iridium oxide. But such metal-based electrodes can produce heat, interfere with the MRI images by creating bright spots that block views of the actual area in the brain being studied, and can become magnetized and move or vibrate when patients undergo scans, causing discomfort.

Carbon proves safer—"Lab testing shows that unlike the metal electrode, the glassy carbon electrode does not get magnetized by the MRI, so it won't irritate the patient's brain," said Surabhi Nimbalkar, first author and doctoral candidate. In addition, it can read both chemical and electrical signals from the brain, while the metal-based electrodes can only read electrical signals, so the carbon material is multi-modal as well as MRI compatible. It's supposed to be embedded for a lifetime. Inherently, the carbon thin-film material is homogenous – or one continuous material – so it has very few defective surfaces. Platinum has grains of metal which become the weak spots vulnerable to corrosion. Able to test the novel carbon electrodes directly in the MRI scanner, and confirm it was a safer, better alternative. Nimbalkar, a doctoral student in Kassegne's lab who has two pending patents. Surabhi has completed her Doctorate jointly from UCSD and SDSU. Currently she is working with Intel Corporation in USA.

Congratulations Dr. Surabhi!!

Links to some of the Publications by Ms. Surabhi Nimbalkar:

https://iopscience.iop.org/article/10.1088/1741-2552/ac245a
https://www.sciencedirect.com/science/article/pii/S0008622321008629?via%3Dihub
https://iopscience.iop.org/article/10.1088/1741-2552/ac1e45
https://www.researchgate.net/publication/351612912_Supplementary_Voltage_Peak_Separated_Simultaneous_Detection_of_Dopa_5HTpdf
https://www.researchgate.net/publication/354254209_GC_Supplementary_MD_Simulation_Kassegne_Labpdf
https://pubs.rsc.org/en/content/articlelanding/2021/AN/D1AN00425E
https://iopscience.iop.org/article/10.1088/1741-2552/ab9b5c
https://www.researchgate.net/publication/337669938_Supplementary_Information_-_Nimbalkar_Fuhrer_et_alpdf