किरIITH

the crowning glory

A quarterly e-newsletter of IITH

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Sensors & Devices @IITH

भारतीय प्रौद्योगिकी संस्थान हैदराबाद
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Indian Institute of Technology Hyderabad

Celebrating 74th Republic Day as we elegantly entering our Crystal Year

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Dear Readers,

Hope you are doing well!

We have been overwhelmed by the support we have received so far, and would like to offer sincere thanks to everyone who has been involved in these **thirteen issues of किराIITH**, as we bring this time our **Third-Anniversary Issue**.

This 3 years journey could not be possible without the encouraging support of contributors & energizing feedback from our readers.

Alike every time, this issue of किराIITH is also being dedicated to one of the thrust research areas of IITH. We are glad to release twelve theme-based issues of किराIITH, namely, COVID-19, AI, Healthcare, IITH-in-Japan, 5G & Next-Gen Tech, Nano-Tech, Energy, Integrated Computational Engineer-ing, Additive Manufacturing, Smart Mobility, and Climate Change.

Following this precedence, किराIITH is back with yet another critical area of research at IITH **"Sensors and Devices Research @IITH" - Issue - 13**. Our Cell phone has 10 Sensors, a Car has 400 Sensors. But we have none (Human-made), as said by Mr Vinod Khosla, this going to change.

We trust this issue of किराIITH will be an enlightening source of exceptional research work being carried out by the IITH fraternity in the theme area.

This issue of किराIITH observes – the 74th Republic Day of India - January 26, saluting the efforts of all those selfless humans who gave us the pride to call our India, a Republic Nation.

> **Our Real Reality is beyond five senses.**
>
> **- Deepak Chopra**

किराIITH will be back next quarter with another trending research area.

So, stay connected.

We wish everyone a safe and healthy stay.

Have a great year ahead...

Happy Reading...

Prof C Krishna Mohan
(Dean – Public & Corporate Relations)
{Editor-in-Chief}

Prof Deepak John Mathew
(Head of the Department - Design)

Dr Mudrika Khandelwal
(Dean – Alumni Relations)

Ms Ankita Roy
(Assistant Professor, Department - Design)

Ms Mitalee Agrawal
(Public Relations Officer)

Mr Ekshan
(Media & PR Head, Student Gymkhana)

Director Desk

All our knowledge begins with Senses!

– Immanuel Kant

Dear Friends,

Hope you embraced this New Year with a Novel set of admiring resolutions and vision for yourself. I am delighted to inform you that किराIITH (our quarterly Newsletter) has completed 3 years of its glorious journey bringing to you every quarter our institute's expedition into various cutting edge research areas. I am happy to inform you that we have brought out 12 issues of किराIITH in these 3 years and the areas focused in each issue are listed below:

1. *2019 Snippet*
2. *COVID-19,*
3. *AI,*
4. *Healthcare,*
5. *IITH-in-Japan,*
6. *5G & Next-Gen Tech,*
7. *Nano-Tech,*
8. *Energy*
9. *Integrated Computational Engg.,*
10. *Additive Manufacturing,*
11. *Smart Mobility, and*
12. *Climate Change*

I am gratified to share with you that the Indian Institute of Technology Hyderabad witnessed 508 offers (which includes 54 international offers) made from 144 companies during Phase-1 of Campus Placements this year. It is a moment of pride to announce that 17 Faculty and 1 PhD Scholar (2021) from IITH, a total of 18 Scientists have made it to the Top 2% of Scientists by Stanford University, published by Elsevier Connect.

IITH has exhibited 6 Industry-ready technologies, ranging from Healthcare to Defense at the IInvenTiv-2022, a mega Research & Development Fair held at IIT Delhi by the 23 IITs. The Researchers at IITH have developed an affordable Ultra-High Performance Fibre Reinforced Concrete (UHPFRC) for infrastructural applications. Hon'ble Defense Minister Shri Rajnath Singh launched Acclimatization Boot Camp (ABC) for Defense Startups, a program by iTIC Incubator at IITH during DefExpo 2022.

IITH exhibited the co-developed indigenous 5G testbed "Sameer" at the India Mobile Congress 2022 inaugurated by the Hon'ble PM of India Shri Narendra Modi. IITH is conducting various path-breaking research in the field of 5G & 6G. One such unique innovation is 5G Tech: NB-IoT System-on-Chip (SoC). The Institute has celebrated its first Innovation-Day on January 7, 2023 showcasing the technologies developed at IITH.

As it is said "The sum of the whole is bigger than the sum of each part", with a wider vision ahead that working together collaboratively can result in greater accomplishments, IITH inked MoU with DRDO for DRDO-Industry-Academia (DIA) Center of Excellence; with Suzuki Motor Corporation for India-specific Autonomous Car - ADAS Technology Development; with Sri Visweswara Yoga Research Institute (SVYRI) announce MRD-Heritage Research Fellowships for PhD in Heritage Science & Technology; with Tata Consultancy Services for mutual benefit in the areas of interest related to Academics & Research; with Hexagon for Industrial Metrology and Inspection Systems; with National Centre for Additive Manufacturing (NCAM) for mutual assistance and complementary advantages for both organizations; and with Auckland University of Technology, New Zealand, for collaborative growth.

IITH rejoiced the decade-long journey on the Alumni Day (Dec 17, 2022) with the first graduated batch celebrating the Decennial get-together and a Release of the 15th Year Logo with the message #Tends2Xcellence. Seven Alumni awards have been given for Excellence in the field of Academics, Research, Innovation, Entrepreneurship, National Building, Institute Building, and Annual Relations. IITH Alumni Association (IITHAA) organised the inaugural 10/10 Alumni Summit-2022, inspired by recognitions like MIT Innovators under 35 and Forbes 30 under 30.

With immense pride, IITH is glad to share that it has won the General Championship Women's in the Inter IIT Staff Sports Meet 2022. A total of 7 of our team members have won the medal and Team IITH made it to the 'Top-5' Inter IIT Aquatics Meet 2022 held at IIT Delhi. With an Overwhelmed Enthusiasm Students at IITH have vibrantly celebrated the Hostel Utsav, "Entrants Fiesta", New Year Evening, etc.

As you are aware, each Issue of किराIITH emphasizes a specific research area at IITH. Going beyond the reality of the five senses/sensors our human body encompasses, it is the time of "Sensors and Devices @IITH", that bridges the gap between the physical world and the logical world, acting as the eyes and ears for a computing infrastructure that analyzes and acts upon the data collected from the sensors.

I am confident that you will exhort our efforts of enkindling innovation in every initiative of us including किराIITH wherein we diligently curate each issue and only bring forward a read that expediently exhibits the true reflection of our motto - Inventing & Innovating in Technology for Humanity (IITH).

Wish you an incredible year ahead!

-Prof B S Murty

SRC Office: Enabling and Facilitating the Scientific Research at IIT Hyderabad

KID: 20220401

As the Indian Institute of Technology, Hyderabad (IITH) celebrates its crystal jubilee this year, the sponsored research & consultancy (SRC) office takes pride in crossing the milestone of facilitating 2000+ research projects of our faculty members with a total funding of ~700 crores.

Scientific & industrial research has always been at the forefront of the Indian Institute of Technology, Hyderabad since its inception. As IITH stands for Inventing & Innovating in Technology for Humanity, it may be ascertained without a doubt that while inventions come from research, it is research that leads to innovations.

As a Dean (SRC), in little more than four months' time, we have taken several measures to facilitate the research and researchers at IIT Hyderabad. From day one, our focus has not only been on streamlining the processes to enable the whole R&D ecosystem but also on new initiatives to create a vibrant research environment.

First and foremost, a new Research Advisory Committee comprising the representatives of all departments was constituted with the aim to contribute with suggestions for adopting good practices, coming up with new ideas and actionable recommendations for the development and smooth function of the SRC Office and taking the R&D at IITH to next higher level. We have set up an SRC help desk for the speedy redressal of all queries in a time-bound manner.

To understand the issues, improve the services and educate on the project management guidelines in view of the GoI mandates, we organized a few faculty connect sessions in the month of November and December. As an ad-hoc measure to enable and expedite the equipment purchase, Institute provided up to 50% support for paying the differential amount due to the withdrawal of GST exemption by the Government.

For the very first time, the SRC office has organized a Research Grant writing workshop for 30 young faculty of the Institute who joined in the last year or so. We hope to continue this at least once a year for all newly joined faculty to help them in writing strong research proposals with a success rate. In December 2022, we not only approved 21 new seed grant projects but also conducted a review of the ongoing/recently completed seed grant projects. This review process was introduced first time, more to provide specific inputs to improve the outcomes and also to understand any difficulties, young colleagues are facing.

Further, as an extraordinary step, we have made a provision to allow a negative balance in the Research & Development Fund of an individual faculty and settle the same in that financial year as per the receipt of funds. This will be a great enabler for the cases where the project's progress is compromised due to long delays in the receipt of funds from the various funding agencies.

We are also excited to learn that our Director has inked an MoU with the DRDO in the august presence of Hon'ble Raksha Mantri, Shri Rajnath Singh Ji in October 2022 to set up Defense Industry-Academia (DIA) Centre of Excellence. This DIA-COE will be an important milestone not only to strengthen our R&D ecosystem but also to develop cutting-edge technologies jointly with DRDO for our defense sector to achieve the vision of our Hon'ble Prime Minister towards Aatma Nirbhar Bharat. We also envisage a few more CoEs in near future in the research area of strategic and national importance.

Statistical Summary of Sponsored Research & Consultancy projects at IIT Hyderabad
* Since Inception

Some of the immediate future plans for the SRC office include a new scheme for the summer internships named Summer Undergraduate Research Exposure (SURE) in which 150 UG internships will be offered to promote undergraduate research and to timely nurture potential PhD candidates. As a Dean (SRC), one of my major focuses is also on the maintenance and accessibility of R&D infrastructure for all. A committee has been constituted in this regard which is also coordinating with the I-STEM team at the National level.

Having said so, there are several challenges ahead for the SRC office due to recent changes in the funds' flow procedures from the Government. As this year was a transition from the old practice to new Zero balance subsidiary accounts and fund flow through Central nodal agencies, there have been unprecedented delays in the release of funds and return of the unspent balance in the mid of the financial year. To minimize the delay in preparing the final UCs with more accuracy, we are also preparing interim UCs till December 31, 2022, for all the projects. We also believe that a little cooperation from all the stakeholders in terms of following GFR and other Institute guidelines while managing their projects will ease the pressure on the system to benefit one and all.

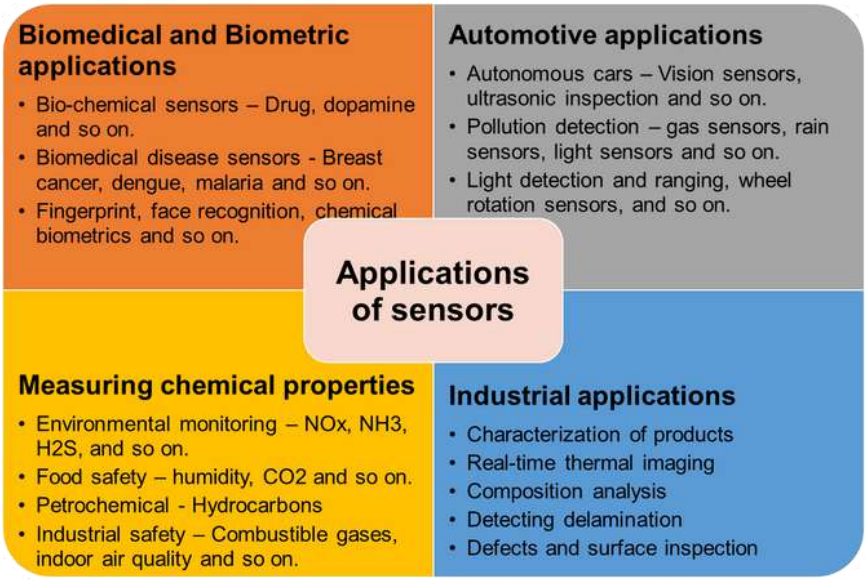
I sign off here on a positive note. As Aristotle said, "Well begun is half done" and so is true for IITH as well. In this crystal anniversary time for IITH, let's contribute to realizing the dream of IITH becoming a leader in scientific research.

Dr Chandrashekhar Sharma
Dean (Sponsored Research & Consultancy) & Professor,
Department of Chemical Engineering

Sensors & Devices @IIT Hyderabad

KID: 20220402

As we know, humans have five highly sophisticated natural senses (smell, taste, sight, touch, and hearing) and powerful mechanisms by which living systems interact with their surroundings. Also, each sense is highly sensitive and selective for target function to help living systems gather chemical or physical information from the surrounding environment. The remarkable properties of these natural sensors continue to inspire the development of new sensing technologies to detect various physical parameters in different applications that include biomedical and biometric applications, automotive applications, measuring chemical properties, and industrial applications [**Figure 1**].



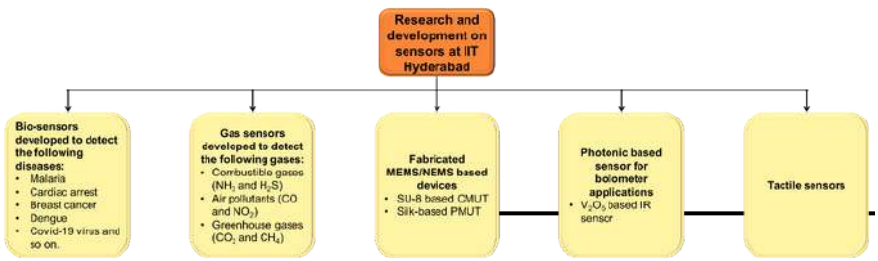
On the other hand, the development of the Internet of Things (IoT) is expected to offer great potential to the sensor industry by connecting a large number of digitally augmented physical objects to the Internet. These objects, especially sensors, are connected everywhere and are of interest at all times.In this regard, a wireless sensor network (WSN)-based IoT platform is popular in modern monitoring systems, where a WSN is a collection of sensor and routing nodes that can be integrated in the environment to predict physical conditions for example wind, temperature, and many more. Here, WSN collects and processes data from routing nodes and then transfers it to operators. The emerging WSN-based IoT platform plays an important role in a variety of applications such as environmental monitoring, chemical and biological assault detection, home automation, aquaculture, oil industries, agriculture, health care, tactical surveillance and many more. Among all these applications, in today's world, WSN-based IoT platform can play a very crucial role in aquaculture, agriculture, environmental monitoring and health care applications because of continuous tracking and monitoring of the conditions of specific locations. To bring the WSN-based IoT technology to real life for the above important applications, the most critical component is the sensor, and it should be miniaturized, portable, highly sensitive and selective to its physical parameter, detection limit is in ambient concentration, high stability, and inexpensive.

However, existing sensor technologies have many limitations such as non-selective to target physical parameter, limited detection limit, non-portable, poor stability and expensive.

Therefore, we have started developing various types of sensors not only for the critical applications mentioned above but also for other applications. **Figure 2** provides a summary of the research work on sensors at IITH. Summary of research works on the development of sensors at IIT Hyderabad. All these research works have been published in international high-impact journals.

In recent years, due to rapid growth in population, increasing demands on quality of life, and increasing pressure on environmental protection have led to the initiation of social reform for a more intelligent lifestyle. The desire to create technologies that enhance awareness of the surrounding environment has led to further progress in the development of various types of sensors, and indeed, sensors work in almost all fields to make human lives more accessible and better.

Since the second half of the 20th century, chemical sensors and biosensors have become an indispensable part of modern society with wide applications in environmental monitoring, food products, industrial chemical production processes, pharmaceuticals, industrial safety, security, indoor monitoring, and healthcare applications.



Summary of research works on the development of sensors at IIT Hyderabad

In light of this, we have focused on the research and development of electrically transduced biosensors and gas sensors. Regarding the development of biosensors, we have developed easy-to-use, next-generation, ultrasensitive nano-biosensor and point-of-care diagnostic devices for detection of target-specific antibodies (malaria, cardiac arrest) and DNA hybridization (Breast cancer, Dengue etc.). Furthermore, we have developed an affordable artificial intelligence-based Covid-19 Home (COVIHOME) test kit to detect and produce results within 30 minutes for symptomatic and asymptomatic patients [**Figure 3**]. In contrast to bio-sensors, we are also developing gas sensors to detect different types of gases such as flammable gases (NH3 and H2S), air pollutants (CO and NO2) and greenhouse gases (CO2 and CH4). These sensors are highly sensitive with superior selectivity and detecting ambient concentrations. The developed sensors can be suitable for many applications including environmental monitoring, food safety, and fuel-based household appliances. In fact, we are not limited to the development of sensors at laboratory level but are working in the direction of bringing these sensors to production level for monitoring in real-time applications.

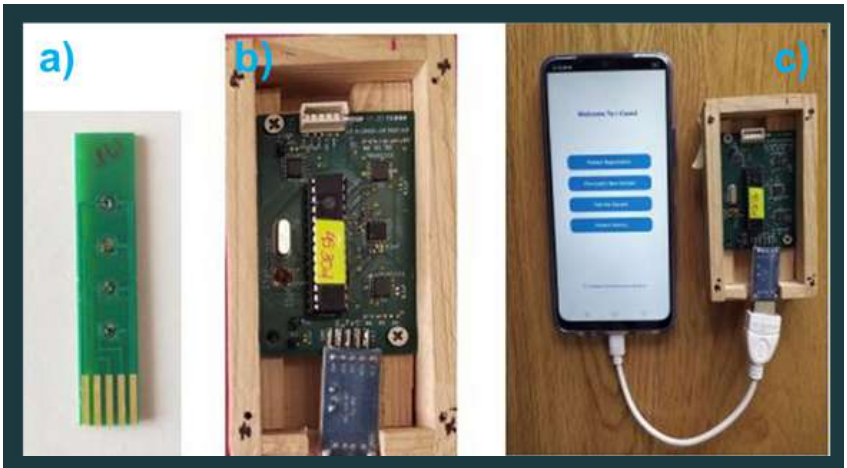


Figure 3 a) Sensor used for analysis. b) Readout circuit. c) Readout circuit connected to sensor and its interfacing with smart phone.

Moreover, we are working on the development of microelectromechanical systems (MEMS)/nanoelectromechanical systems (NEMS) and photonic based sensors. MEMS/NEMS based sensors have been instrumental in developing a robust and stiction free bulk micro machined process to achieve indigenous micro-bolometers, which are essential for developing thermal image camera, a long-standing dream of Indian defence and research embellishment. A reliable and robust MEMS hanging structure is a matter of significant concern, which often becomes the show-stoppers for micro-bolometer fabrication.

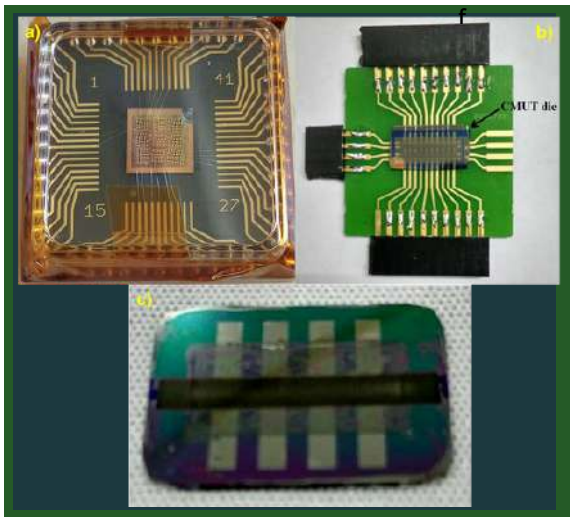


Figure 4. a) Fabricated device of Uncooled IR detector. b) Fabricated SU-8 based CMUT die with wire bonded on to the PCB. c) Fabricated device of Silk-based PMUT.

Towards this goal, an uncooled infrared (IR) detector based on vanadium pentoxide (V2O5) was fabricated and characterized thermally and electrically to determine their bolometric performance [**Figure 4a**].

In addition to that, we have successfully fabricated and characterized a SU-8 based capacitive micromachined ultrasonic transducer (CMUT) [**Figure 4b**] and silk-based piezoelectric micromachined ultrasonic transducer (PMUT) [**Figure 4c**]. Recently, we have started working on the development of tactile sensors for detecting external mechanical stimuli (e.g., strain, pressure, humidity, sound, and temperature), and measures the electrical signal corresponding to the mechanical stimuli [**Figure 4**]. Here, the electrical signal of tactile sensors depends not only on the relationship between the stimulus and the device properties but also on the stimulus properties. In detail, it provides data on the magnitude, shape, position, and distribution of forces derived from the tactile sense (stimulus properties). Currently, our goal is to develop a system that mimics human capabilities with the help of appropriate materials and signal-converting systems.

To this end, we are working on the development of a biocompatible silk thin-film based piezoelectric tactile sensor that can also be used for implantable applications.

Tactile sensor with human mimicking capabilities.

To bring the WSN-based IoT technology to real life for the above important applications, the most critical component is the sensor, and it should be miniaturized, portable, highly sensitive and selective to its physical parameter, detection limit is in ambient concentration, high stability, and inexpensive.

Dr Shiv Govind Singh
Head & Professor,
Department of Electrical Engineering
IIT Hyderabad

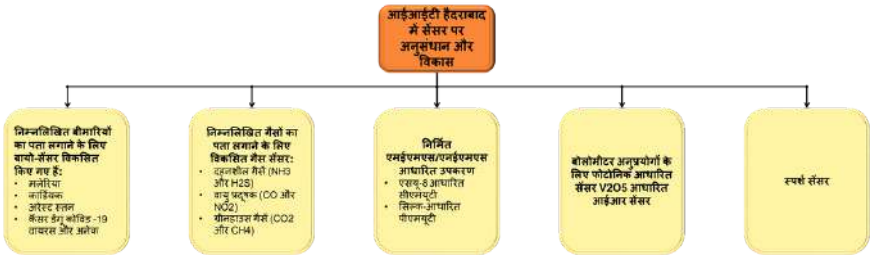
सेंसर एवं डिवाइस @आईआईटी हैदराबाद

KID: 20220403

जैसा कि हम जानते हैं, मनुष्यों के पास पाँच अत्यधिक परिष्कृत प्राकृतिक इंद्रियाँ (गंध, स्वाद, दृष्टि, स्पर्श और श्रवण) और शक्तिशाली तंत्र हैं जिनके द्वारा जीवित प्रणालियाँ अपने परिवेश के साथ परस्पर क्रिया करती हैं। साथ ही, जीवित प्रणालियों को आसपास के वातावरण से रासायनिक या भौतिक जानकारी एकत्र करने में मदद करने के लिए लक्षित कार्य के लिए प्रत्येक इंद्रिय अत्यधिक संवेदनशील और चयनात्मक है। इन प्राकृतिक सेंसरों के उल्लेखनीय गुण विभिन्न अनुप्रयोगों में विभिन्न भौतिक मापदंडों का पता लगाने के लिए नई संवेदन प्रौद्योगिकियों के विकास को प्रेरित करना जारी रखते हैं जिनमें बायोमेडिकल और बायोमेट्रिक अनुप्रयोग, ऑटोमोटिव अनुप्रयोग, रासायनिक गुणों को मापने और औद्योगिक अनुप्रयोग [**चित्र 1**] शामिल हैं।

दूसरी ओर, इंटरनेट ऑफ थिंग्स (IoT) के विकास से बड़ी संख्या में डिजिटल रूप से संवर्धित भौतिक वस्तुओं को इंटरनेट से जोड़कर सेंसर उद्योग को बड़ी संभावनाएं प्रदान करने की उम्मीद है। ये वस्तुएं, विशेष रूप से सेंसर, हर जगह जुड़े हुए हैं और हर समय रुचि रखते हैं। इस संबंध में, वायरलेस सेंसर नेटवर्क (डब्ल्यूएसएन) आधारित आईओटी प्लेटफॉर्म आधुनिक निगरानी प्रणालियों में लोकप्रिय है, जहां डब्ल्यूएसएन सेंसर और रूटिंग नोड्स का एक संग्रह है। जिसे हवा, तापमान और कई अन्य भौतिक स्थितियों की भविष्यवाणी करने के लिए पर्यावरण में एकीकृत किया जा सकता है। यहाँ, WSN डेटा एकत्र और संसाधित करता है रूटिंग नोड्स और फिर इसे ऑपरेटरों को स्थानांतरित करता है। उभरता हुआ डब्लूएसएन-आधारित आईओटी प्लेटफॉर्म पर्यावरण निगरानी, रासायनिक और जैविक हमले का पता लगाने, गृह स्वचालन, जलीय कृषि, तेल उद्योग, कृषि, स्वास्थ्य देखभाल, सामरिक निगरानी और कई अन्य अनुप्रयोगों में महत्वपूर्ण भूमिका निभाता है। इन सभी अनुप्रयोगों के बीच, आज की दुनिया में, विशिष्ट स्थानों की स्थितियों की निरंतर ट्रैकिंग और निगरानी के कारण, WSN- आधारित IoT प्लेटफॉर्म एक्वाकल्चर, कृषि, पर्यावरण निगरानी और स्वास्थ्य देखभाल अनुप्रयोगों में बहुत महत्वपूर्ण भूमिका निभा सकता है। उपरोक्त महत्वपूर्ण अनुप्रयोगों के लिए WSN-आधारित IoT तकनीक को वास्तविक जीवन में लाने के लिए,

सबसे महत्वपूर्ण घटक सेंसर है, और इसे छोटा, पोर्टेबल, अत्यधिक संवेदनशील और इसके भौतिक पैरामीटर के लिए चयनात्मक होना चाहिए, पता लगाने की सीमा परिवेश की एकाग्रता, उच्च स्थिरता और सस्ती है।



चित्र 2: IIT हैदराबाद में सेंसर के विकास पर शोध कार्यों का सारांश

हालांकि, मौजूदा सेंसर तकनीकों की कई सीमाएं हैं जैसे भौतिक पैरामीटर को लक्षित करने के लिए गैर-चयनात्मक, सीमित पता लगाने की सीमा, गैर-पोर्टेबल, खराब स्थिरता और महंगी।

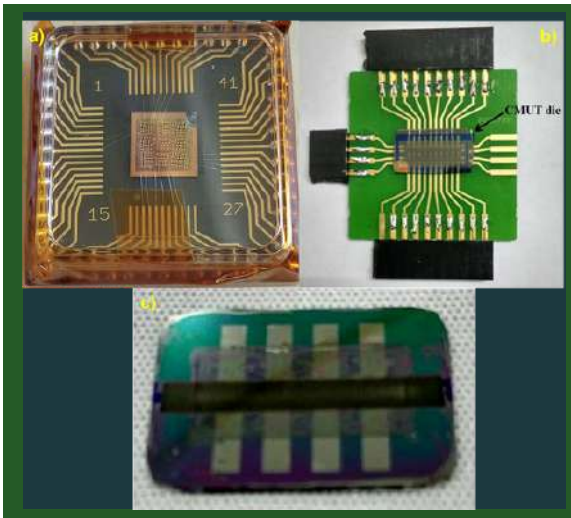
इसलिए, हमने न केवल ऊपर उल्लिखित महत्वपूर्ण अनुप्रयोगों के लिए बल्कि अन्य अनुप्रयोगों के लिए भी विभिन्न प्रकार के सेंसर विकसित करना शुरू कर दिया है। **चित्र 2** IITH में सेंसर पर शोध कार्य का सारांश प्रदान करता है। IIT हैदराबाद में सेंसर के विकास पर शोध कार्यों का सारांश ये सभी शोध कार्य अंतर्राष्ट्रीय उच्च प्रभाव वाली पत्रिकाओं में प्रकाशित किए गए हैं।

हाल के वर्षों में, जनसंख्या में तेजी से वृद्धि, जीवन की गुणवत्ता पर बढ़ती मांगों और पर्यावरण संरक्षण पर बढ़ते दबाव के कारण अधिक बुद्धिमान जीवन शैली के लिए सामाजिक सुधार की शुरुआत हुई है। आसपास के वातावरण के बारे में जागरूकता बढ़ाने वाली तकनीकों को बनाने की इच्छा ने विभिन्न प्रकार के सेंसर के विकास में और प्रगति की है, और वास्तव में सेंसर मानव जीवन को अधिक सुलभ और बेहतर बनाने के लिए लगभग सभी क्षेत्रों में काम करते हैं।

20वीं सदी के उत्तरार्ध के बाद से, रासायनिक सेंसर और बायोसेंसर पर्यावरण निगरानी, खाद्य उत्पादों, औद्योगिक रासायनिक उत्पादन प्रक्रियाओं, फार्मास्यूटिकल्स, औद्योगिक सुरक्षा, सुरक्षा, इनडोर निगरानी और स्वास्थ्य देखभाल अनुप्रयोगों में व्यापक अनुप्रयोगों के साथ आधुनिक समाज का एक अनिवार्य हिस्सा बन गए हैं।

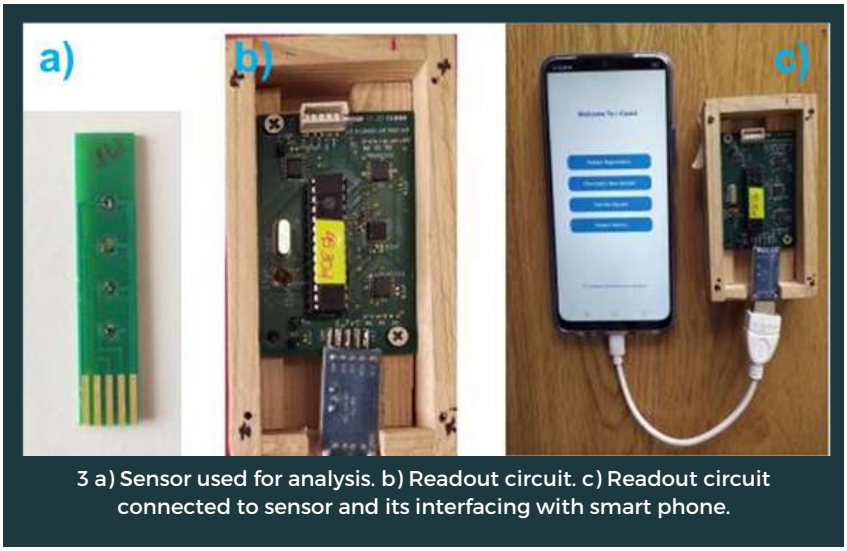
इसके आलोक में, हमने विद्युत रूप से ट्रांसड्यूस्ड बायोसेंसर और गैस सेंसर के अनुसंधान और विकास पर ध्यान केंद्रित किया है। बायोसेंसर के विकास के संबंध में, हमने लक्ष्य-विशिष्ट एंटीबॉडी (मलेरिया, कार्डियक अरेस्ट) और डीएनए संकरण (स्तन कैंसर) का पता लगाने के लिए उपयोग में आसान, अगली पीढ़ी, अल्ट्रासेंसिटिव नैनो-बायोसेंसर और पॉइंट-ऑफ-केयर डायग्नोस्टिक डिवाइस विकसित किए हैं। , डेंगू आदि)। इसके अलावा, हमने रोगसूचक और स्पर्शोन्मुख रोगियों [**चित्र 3**] के लिए 30 मिनट के भीतर परिणामों का पता लगाने और उत्पादन करने के लिए एक सस्ती कृत्रिम बुद्धिमत्ता-आधारित कोविड -19 होम (COVIHOME) परीक्षण किट विकसित की है। बायो-सेंसर के विपरीत, हम विभिन्न प्रकार की गैसों जैसे ज्वलनशील गैसों (NH3 और H2S), वायु प्रदूषकों (CO और NO2) और ग्रीनहाउस गैसों (CO2 और CH4) का पता लगाने के लिए गैस सेंसर भी विकसित कर रहे हैं। ये सेंसर बेहतर चयनात्मकता और परिवेशी सांद्रता का पता लगाने के साथ अत्यधिक संवेदनशील हैं। विकसित सेंसर पर्यावरण निगरानी, खाद्य सुरक्षा और ईंधन आधारित घरेलू उपकरणों सहित कई अनुप्रयोगों के लिए उपयुक्त हो सकते हैं। वास्तव में, हम प्रयोगशाला स्तर पर सेंसर के विकास तक ही सीमित नहीं हैं बल्कि वास्तविक समय के अनुप्रयोगों में निगरानी के लिए इन सेंसर को उत्पादन स्तर तक लाने की दिशा में काम कर रहे हैं।

भारतीय रक्षा और अनुसंधान अलंकरण की। एक विश्वसनीय और मजबूत एमईएमएस हैंगिंग संरचना महत्वपूर्ण चिंता का विषय है, जो अक्सर सूक्ष्म-बोलोमीटर निर्माण के लिए शो-स्टॉपर्स बन जाती है।



चित्र 4. a) अनकूल्ड आईआर डिटेक्टर का गढ़ा हुआ उपकरण। b) फैब्रिकेटेड एसयू-8 आधारित सीएमयूटी पीसीबी से जुड़े तार के साथ मर जाते हैं। c) सिल्क आधारित पीएमयूटी का फैब्रिकेटेड डिवाइस।

इस लक्ष्य के लिए, वैनेडियम पेंटोक्साइड (V2O5) पर आधारित एक अनकूल्ड इन्फ्रारेड (IR) डिटेक्टर को उनके बोलोमेट्रिक प्रदर्शन [**चित्र 4a**] को निर्धारित करने के लिए थर्मली और विद्युत रूप से तैयार किया गया था।



3 a) Sensor used for analysis. b) Readout circuit. c) Readout circuit connected to sensor and its interfacing with smart phone.

इसके अलावा, हम माइक्रोइलेक्ट्रोमैकेनिकल सिस्टम (एमईएमएस)/नैनोइलेक्ट्रोमैकेनिकल सिस्टम (एनईएमएस) और फोटोनिक आधारित सेंसर के विकास पर काम कर रहे हैं। एमईएमएस/एनईएमएस आधारित सेंसर स्वदेशी माइक्रो-बोलोमीटर प्राप्त करने के लिए एक मजबूत और कड़ी मुक्त बल्क माइक्रो मशीनीकृत प्रक्रिया विकसित करने में सहायक रहे हैं, जो थर्मल इमेज कैमरा विकसित करने के लिए आवश्यक हैं, एक दीर्घकालिक सपना।

इसके अलावा, हमने SU-8 आधारित कैपेसिटिव माइक्रोमाचिन्ड अल्ट्रासोनिक ट्रांसड्यूसर (CMUT) [चित्र 4b] और रेशम-आधारित पीजोइलेक्ट्रिक माइक्रोमशीन अल्ट्रासोनिक ट्रांसड्यूसर (PMUT) [चित्र 4c] को सफलतापूर्वक गढ़ा और चित्रित किया है। हाल ही में, हमने बाहरी यांत्रिक उत्तेजनाओं (जैसे तनाव, दबाव, आर्द्रता, ध्वनि और तापमान) का पता लगाने के लिए स्पर्श संवेदक के विकास पर काम करना शुरू कर दिया है।

और यांत्रिक उत्तेजनाओं [**चित्र 4**] के अनुरूप विद्युत संकेत को मापता है। यहां, स्पर्श संवेदकों का विद्युत संकेत न केवल उत्तेजना और उपकरण गुणों के बीच संबंध पर निर्भर करता है, बल्कि प्रेरक गुणों पर भी।

विस्तार से, यह स्पर्शनीय भावना (प्रोत्साहन गुण) से प्राप्त बलों के परिमाण, आकार, स्थिति और वितरण पर डेटा प्रदान करता है। वर्तमान में, हमारा लक्ष्य एक ऐसी प्रणाली विकसित करना है जो उपयुक्त सामग्री और सिग्नल-कनवर्टिंग सिस्टम की मदद से मानवीय क्षमताओं की नकल करे। इसके लिए, हम एक बायोकंपैटिबल सिल्क थिन-फिल्म आधारित पीजोइलेक्ट्रिक टैक्टाइल सेंसर के विकास पर काम कर रहे हैं, जिसका उपयोग इम्प्लांटेबल एप्लिकेशन के लिए भी किया जा सकता है।

मानव नकल क्षमताओं के साथ स्पर्श संवेदक

उपरोक्त महत्वपूर्ण अनुप्रयोगों के लिए WSN- आधारित IoT तकनीक को वास्तविक जीवन में लाने के लिए, सबसे महत्वपूर्ण घटक सेंसर है, और इसे छोटा, पोर्टेबल, अत्यधिक संवेदनशील और अपने भौतिक पैरामीटर के लिए चयनात्मक होना चाहिए, पता लगाने की सीमा परिवेशी सांद्रता में है, उच्च स्थिरता, और सस्ती।

डॉ शिव गोविंद सिंह
प्रमुख और प्रोफेसर,
विद्युतीय अभियांत्रिकी विभाग
आईआईटी हैदराबाद

Microactuators, Microsensors and Micromechanisms (MAMM) 2022 Snippet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KID: 20220404

The 6th International Conference on Microactuators, Microsensors and Micromechanisms under the aegis of the International Federation for the Promotion of Mechanism and Machine Science (IFToMM) was organized in IIT Hyderabad from 3-5 December 2022 which was followed by a pre-conference workshop in microsystem design, fabrication, and packaging on 2nd December 2022.

The conference was inaugurated by the Chief Guest Dr G Satheesh Reddy, Scientific Advisor to Defence Minister, in the presence of Prof. B S Murty, Director IIT Hyderabad, Dr. Nagahanumaiah, Director CMTI Bangalore, Prof G K Ananthasuresh, Mentor, MAMM 2022, Prof Ashok Kumar Pandey, Co-Chair MAMM 2022, Prof Prem Pal, Co-Chair MAMM 2022, invited speakers, delegates, and students.

The theme of the conference includes a wide range of topics related to microactuators, microsensors, and micromechanisms. There were good number of papers and abstracts. A total of 108 presentations were arranged in two parallel sessions that included keynote speakers, invited lectures, oral presentations, and posters.

The selected full papers have been published in the Mechanisms and Machine Science (MMS) series by Springer Nature Switzerland which is available online https://doi.org/10.1007/978-3-031-20353-4

> **The selected full papers have been published in the Mechanisms and Machine Science (MMS) series by Springer Nature Switzerland**

[1] Prof Ashok Kumar Pandey,
Department of Mechanical & Aerospace Engineering,
[2] Prof Prem Pal,
Department of Physics

Dignitaries during Conference Journal launch

Electrospun Metal oxide nanofibers based H2S gas sensor

KID: 20220405

A tragedy that was a catastrophe and had no parallel in the world's industrial history. Tons of toxic gas leaked and spread throughout the city. Talking about estimated numbers, 10,000 people died, and 5,00,000 suffered. Yes, we are talking about the Bhopal gas tragedy of 1984. In another example, 12 people died, and more than 580 were injured; during a gas leakage at Vishakapatnam in 2020. How many more such gas leakage incidents do we suffer to understand that "prevention is better than cure." CARBON LAB at IIT Hyderabad jointly with Dr Mahesh Kumar (IIT Jodhpur) is working on detecting one of the most poisonous gases, H2S, through a flexible metal oxide gas sensor.

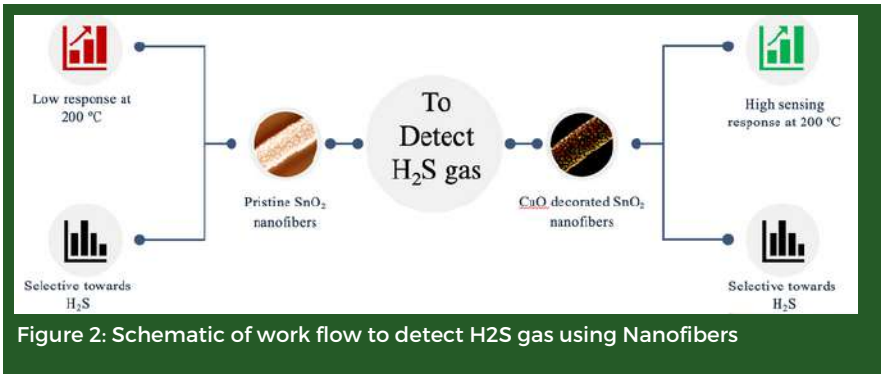

Figure 2: Schematic of work flow to detect H2S gas using Nanofibers

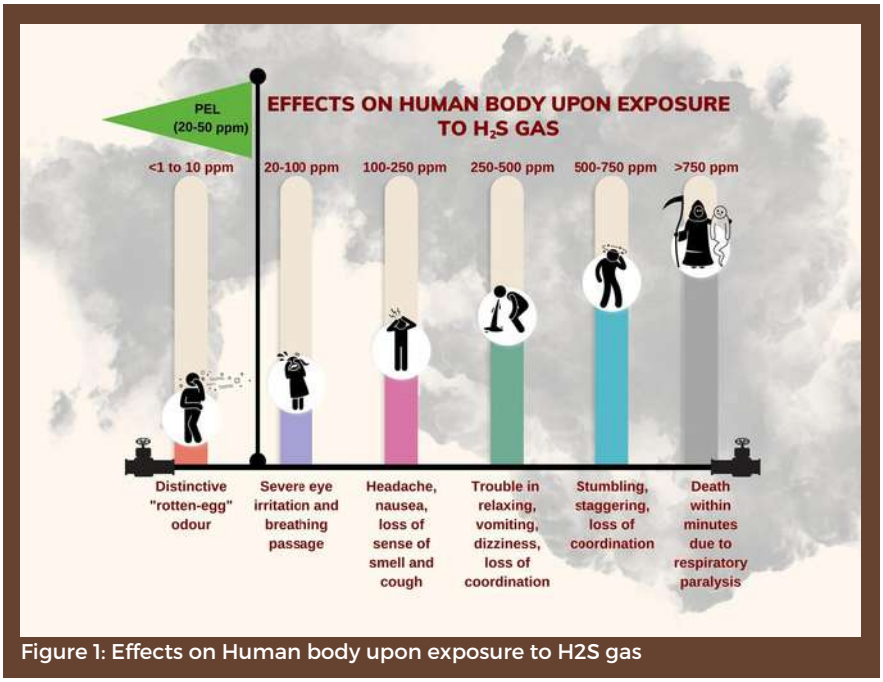

Figure 1: Effects on Human body upon exposure to H2S gas

A tragedy that was a catastrophe and had no parallel in the world's industrial history. Tons of toxic gas leaked and spread throughout the city. Talking about estimated numbers, 10,000 people died, and 5,00,000 suffered. Yes, we are talking about the Bhopal gas tragedy of 1984. In another example, 12 people died, and more than 580 were injured; during a gas leakage at Vishakapatnam in 2020. How many more such gas leakage incidents do we suffer to understand that "prevention is better than cure." CARBON LAB at IIT Hyderabad jointly with Dr. Mahesh Kumar (IIT Jodhpur) is working on detecting one of the most poisonous gases, H2S, through a flexible metal oxide gas sensor.

Although the permissible exposure limit (PEL) by Occupational Safety and Health Administration (OSHA) for H2S is 20-50 ppm, it can cause severe damage to health and death if exposed to more than the permissible exposure limit. To detect H2S gas, we utilize one-dimensional nanofibers synthesized via electrospinning, as these provide high surface area and ease of surface functionalization. For the detection of H2S gas, we have utilized the electrical properties of metal oxide semiconductors that behave differently as the surrounding atmosphere changes. For better understanding, we selected SnO2 as the primary material due to its high chemical sensitivity, faster gas response, and good thermal stability. A comparative study was done to understand the role of sensing material for H2S gas. Next, the SnO2 sensing was compared with CuO-decorated SnO2 nanofiber. The response for CuO-decorated SnO2 was higher at 200 °C operating temperature than the pristine SnO2 nanofiber. As the sensitivity of each material was high for H2S, our work concludes that SnO2 is a good material for detecting H2S gas. The sensing performance will be enhanced by functionalizing nanofibers with noble metals (Pt, Au, Ag, etc.) for low operating temperatures and using a flexible substrate for an easily portable device.

Reference:

1. Ruksana Shaik, Roopa Kishore Kampara, Amit Kumar, Chandra Shekhar Sharma, Mahesh Kumar, “Metal oxide nanofibers based chemiresistive H2S gas sensors”,Coordination Chemistry Reviews,Vol. 471,2022, 214752, https://doi.org/10.1016/j.ccr.2022.214752

> **As the sensitivity of each material was high for H2S, our work concludes that SnO2 is a good material for detecting H2S gas.**

[1] Prof Chandra Shekhar Sharma,
[2] Ms Shaik Ruksana,
[3] Mr Kampara Roopa Kishore
Creative & Advanced Research Based On Nanomaterials (CARBON) Laboratory,
Department of Chemical Engineering,

Embedded PZT Sensor Arrays for Comprehensive Local & Distributed Sensing of Concrete Structures

KID: 20220406

A low-cost, embedded PZT-based sensor that can be used for continuous monitoring of concrete after casting is developed. The embedded sensor can be placed inside the concrete and used for cure monitoring of concrete. The sensor also provides the capability of vibroacoustic detection for use in the structural health monitoring of concrete structures. The instrumentation, data collection, and processing algorithms for different applications have been also developed and tested. The sensing element in the sensor is a 20 mm Lead Zirconate Titanate (PZT) patch. A robust protection scheme for the sensing element ensures the long-term performance of the sensor placed inside the concrete. The embedded PZT sensor was evaluated for sensitivity to measurement and long-term stability when embedded inside the concrete. The sensor has also been tested for ruggedness in field use. A photograph of the PZT sensor is shown in **Figure 1.**

Figure 1: Embedded PZT-sensor

The embedded sensor sensitively monitors the local state of the material from the measured electrical response of the PZT patch. The electrical impedance (EI) measurements obtained from the embedded PZT are used to provide a local measurement of the material. The EI measurement depends on the dynamic response of the embedded PZT placed inside a medium. When placed inside the concrete, the measured EI response accurately provides a local measure of its stiffness. Continuous EI measurement accurately reflects the changes in concrete stiffness over time due to hydration. The interpretation of the signals from the embedded sensor requires an understanding of the coupled electromechanical response of the PZT surrounded by the concrete medium. A mechanics-based approach for interpreting the measured response and providing a realistic assessment of the material stiffness has been developed and calibrated using laboratory and field studies.

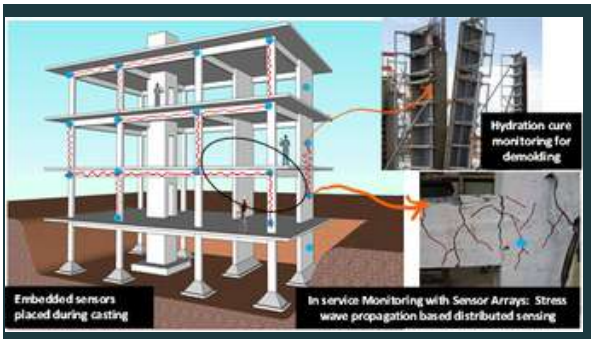

Figure 2: Embedded PZT sensor arrays for local & distributed sensing.

The sensor can be placed in concrete at the time of casting, and it provides information about the gain in concrete strength with time. Applications for determining the stripping time of the formwork are being developed that would be beneficial for the construction industry in terms of efficient use of forms, and speedy construction (**Figure 2**).

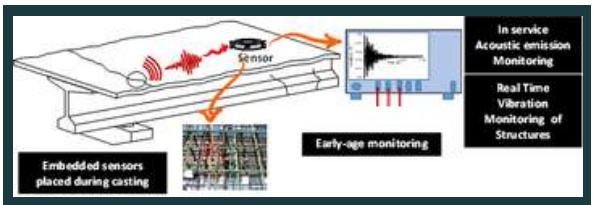

Figure 3: Embedded PZT sensors for continuous monitoring after casting and during service life of structure

Applications for assessment of concrete strength gain are being developed to assist the concrete construction industry in obtaining realistic in-situ strength assessment in concrete structures. Currently, such tools or sensors are not available. The successful development of this application will impact the current construction industry practices and lead to efficient construction. The embedded PZT sensor also provides the ability to monitor vibrations in the structure. Structural vibrations produced by the transient loads are detected by the sensors. The embedded PZT sensors detect the stress variations in the surrounding medium in the form of electric signals that can be digitized & analyzed. Additionally, the embedded PZT sensor can also detect stress wave propagation produced by small microcracks forming in the concrete. The embedded PZT sensor also provides the ability to monitor vibrations in the structure. Structural vibrations produced by the transient loads are detected by the sensors. The embedded PZT sensors detect the stress variations in the surrounding medium in the form of electric signals that can be digitized and analyzed. Additionally, the embedded PZT sensor can also detect stress wave propagation produced by small microcracks forming in concrete.

The PZT sensor provides acoustic emission monitoring capability for detecting damage in the material (**Figure 3**).

With an application of alternating current, the sensors can also be used to produce stress waves in the medium. Each embedded sensor can be used for generating and detecting ultrasonic waves. Pair of embedded PZT sensors can be used in ultrasonic wave-based monitoring of the concrete between the sensors (**Figure 2**). A spatial network of embedded sensors can be deployed in the structure to provide continuous monitoring of the structure (as shown in Figure 2). Each PZT sensor in the sensor array is used for determining the local state of the material through EI measurements. These sensors provide distributed sensing capability with ultrasonic wave propagation measurements. Additionally, over the life of the structure, the vibrations of the structure and acoustic emission can be monitored in a passive mode. The embedded PZT sensors, therefore, provide for comprehensive monitoring of a concrete structure immediately after casting and throughout its service life. Combining information about the local state of materials from the EI measurements with the ultrasonic wave propagation measurement and vibration and acoustic emission monitoring gives comprehensive information about the state of the structure. These PZT sensor arrays deployed for continuous, life-long monitoring of concrete structures can be used for asset management of concrete structures.

Dr K V L Subramaniam
Professor
Department of Civil Engineering,

Sensors for Food Packaging Applications


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KID: 20220407

Smart/Intelligent food packaging is emerging as a novel technology, capable of monitoring the quality and safety of food during its shelf-life time. This technology makes use of indicators and sensors that are applied in the packaging and that detect changes in physiological variations of the foodstuffs (due to microbial and chemical degradation). These indicators usually provide information, e.g., on the degree of freshness of the product packed, through a colour change, which is easily identified, either by the food distributor or the consumer.

Our cellulose and composites research group at MSME, IITH is working on food packaging to enhance the shelf life of fresh farm produce. We are also working on integrating anthocyanin into existing packaging films to make pH-sensitive films for monitoring food freshness.

Anthocyanin-loaded films change colour based on the pH of the packed fruits/vegetables thereby helping the consumer to get an idea of spoilage. As anthocyanin has antioxidant properties, it can also be used as an oxygen scavenger.

“Our cellulose and composites research group at MSME, IITH is working on food packaging to enhance the shelf life of fresh farm produce. We are also working on integrating anthocyanin into existing packaging films to make pH-sensitive films for monitoring food freshness.

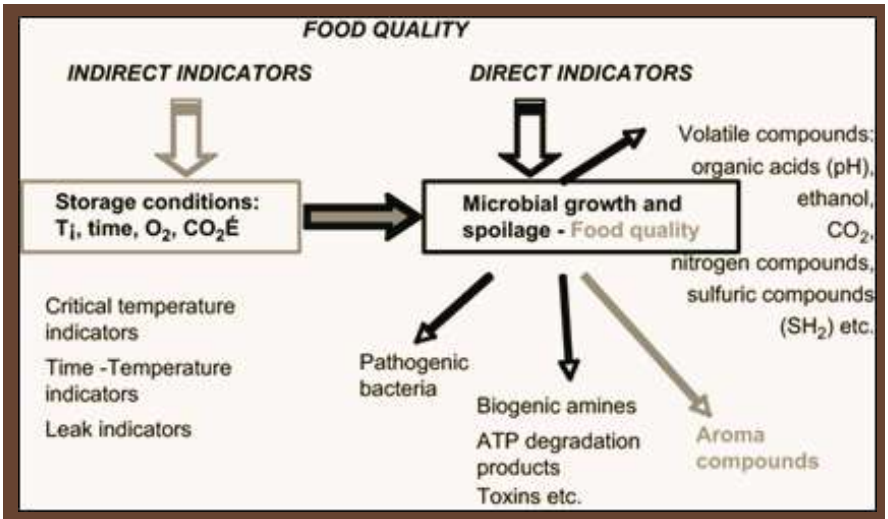


Figure 1. Food Quality Indicators.

As per the Sustainable Development Goals, we are looking for sustainability in every aspect. The current trend in food packaging is to create sustainable packaging materials made of natural materials and extracts of anthocyanin, which is a polyphenol pigment of plants endowed with antioxidant activity and pH-responsive properties to monitor microbial food deterioration of fresh cut fruits and vegetables as customers are inclined towards the consumption of cut packed fruits and vegetables. Anthocyanins change colour at different pH levels because their molecular structure shifts as the pH of the solution they are in changes from acidic to basic and vice versa. This makes these pigments unique compared to other natural colours.

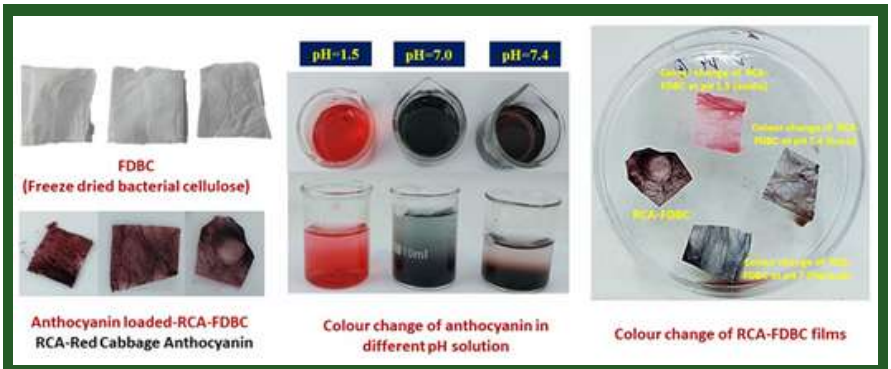


Figure 2. pH sensitive indicators for food packaging.

[1] Mr Partha Pratim Das
MTech 2nd Year
[2] Mr Shreyansh Agarwal
BTech 3rd Year
[3] Dr Mudrika Khandelwal
Associate Professor
Department of Materials Science and Metallurgical Engineering,

Magneto-Electric Nanocomposites based Magnetic Field Sensors and Energy Harvesters

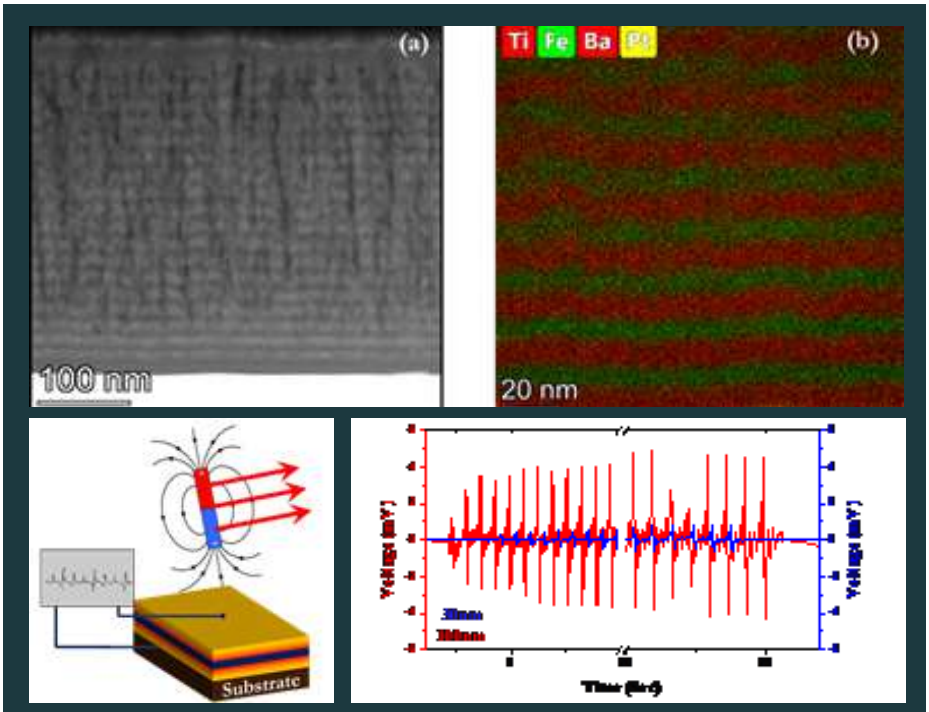
KID: 20220408

Magnetoelectric (ME) multiferroic composites couple the electric and magnetic order parameters of different materials and establish a relation between them via strain. Columnar growth of a ferroelectric (Ba0.85Ca0.15Zr0.1Ti0.9O3 (BCZT)) and a ferromagnetic layer (CoFe2O4 (CFO)) was evident from magneto-electric (ME) coefficients (620-840 mV/cm.Oe). The ME coupling was found to be influenced by a variety of parameters such as morphology, interface quality, volume fraction, and interfacial strain.

The average interfacial strain in trilayer configuration is estimated as ~7% which gets relaxed at 25-35nm away from the interface. Under a magnetic field, the ME composite experiences an induced strain due to the magnetostriction phenomenon at the ferromagnetic layer. This induced strain is transferred to the ferroelectric layer due to the columnar grain-to-grain epitaxy-like feature which leads to voltage generation due to the piezoelectric phenomenon. Multilayers with periodicity with strained interface exhibited ~25 to 26 % increase in piezoelectric coefficient (d33) in the presence of the magnetic field. Due to interfacial strain, a multilayer with a periodicity of 40-60nm showed a linear response of displacement curve for a wide range of applied voltage.

The vertically ordered columnar grains between BCZT and CFO interface with crystallographic relation between the sharp interfaces and lower defect densities are grown to enhance the strain coupling between the phases. The effective strain operating region is estimated to be ~30nm to 35nm where it exhibits 27% enhancement in inverse piezomagnetic effect and is found to relax beyond this region from the interface.

The effect of periodicity on piezoelectric properties is evaluated by cross-sectional piezo-response force microscopy.



Effect of Periodicity on Piezoelectric Properties

The multilayer ME composite with a periodicity between 40nm and 60nm exhibits the highest percentage of increment in d33 where there is an effective strain coupling across the interface of the two phases. The relaxation time for polarization switching of a multilayer with a periodicity of 40nm is found to be lesser compared to higher periodicities.

This confirms interfacial strain present in the multilayers with periodicities was found to directly influence the energy required for the polarisation to rotate.

The voltage generated by the multilayers of different periodicity shows a nonlinear response for ME composites with periodicity above 40nm. (DRDO - Indian Patent Application No: 202111048321).

Thus the nanocomposites offer a potential application of sensing magnetic fields and converting them into an electrical signal that can be either transmitted and/or stored for energy applications.

The effective strain transfer across layers makes them a potential candidate for actuators as well.

> **The effect of periodicity on piezoelectric properties is evaluated by cross-sectional piezo-response force microscopy**

Dr Ranjith Ramadurai
Professor,
Department of Materials Science and Metallurgical Engineering,

Monitoring of Vehicular Emissions: Highly Selective and Sensitive Chemiresistive Gas Sensors

KID: 20220409


1


2

Air pollution is one of the most concerning public health topics of the 21st century. According to statistics, more than seven million people die annually due to air pollution, especially in low- and middle-income countries, where people suffer from the highest exposure. Alongside, since the mid-20th century, climate change has also become a hotly debated topic because of the impact of global warming on the Earth's climate, which is caused by increasing levels of greenhouse gases (GHGs). This is actually occurring on Earth due to increased air and environmental pollution, which is mainly caused by vehicle emissions. In fact, various air pollutants such as Inhalable micrometer particulate matter (PM2.5 and PM10), nitrogen dioxide (NO2), sulfur dioxide (SO2) and carbon monoxide (CO), and GHGs such as carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs) and ozone (O3). Therefore, effective methods for monitoring these gases and VOCs are in great demand for atmospheric environmental measurement and control, as well as human well-being and health monitoring.

These gases can therefore be accurately quantified using highly sensitive analytical techniques such as spectrophotometry, gas chromatography (GC) and high-performance liquid chromatography (HPLC). While these techniques are accurate and precise, they are generally expensive, unportable, and power-intensive. Further, such methods frequently require complex and time-consuming pretreatment steps, as well as highly skilled operators. Therefore, to replace these conventional methods, alternative systems for monitoring these gases are needed. In this aspect, electrically-transduced chemiresistive sensing platform are considered due to their simplicity, non- line-of-sight detection, compatibility with wireless transmissions and standard electronic equipment, the possibility of continuous monitoring, and portability.

Here, in our studies, we chose two air pollutants (CO and NO2) as shown in **Fig 1** and two GHGs (CO2 and CH4) because these gases are mainly emitted from various sources including vehicle emissions. To monitor vehicle emissions, we need an increased spatial coverage system because vehicle emissions are a mobile source. Therefore, we have successfully fabricated a four different chemiresistive sensors to detect these air pollutants and GHGs. These four sensors exhibited the following characteristics, such as the largest sensing response to the target gas, high selectivity with respect to interfering gases, adequate detection limits for ambient levels, short response time and recovery time, and good long-term stability. Figure 1 illustrates a summary of the gas sensing performance of the fabricated sensors for monitoring two types of gases.

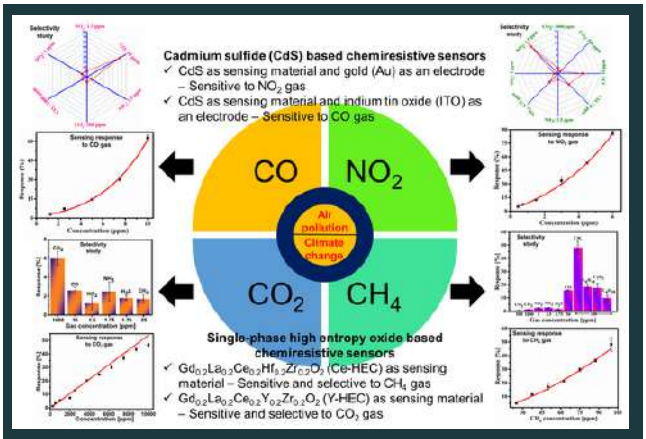


Figure 1. Summary of the gas sensing performance of the fabricated sensors for monitoring two types of gases.

Initially, to detect CO and NO2 gases, we fabricated three chemiresistive sensors with three different electrode materials (silver (Ag), gold (Au) and indium tin oxide (ITO)) using cadmium sulfide (CdS) as the sensing material. Interestingly, the CdS-based sensor with Ag electrode showed a response to CO and NO2 gases due to the formation of ohmic contact between CdS and Ag. Therefore, to improve the selectivity of CdS sensor, we transformed the contact from ohmic to Schottky by using electrode materials to Au and ITO. As a result, the CdS-based sensor with Au electrode showed a maximum response to NO2 gas due to the large potential barrier height. between CdS and Au and the highly reactive nature of NO2 gas. While the CdS-based sensor with ITO electrode displayed a response only to CO gas only but not NO2, due to low potential barrier height between CdS and ITO and the non-reactive nature of CO gas. On the other hand, we also fabricated two chemiresistive sensors by using two different single-phase high entropy oxides as sensing materials to detect CO2 and CH4 gases.

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1. Naganaboina, V. R., & Singh, S. G. (2021). Graphene-CeO2 based flexible gas sensor: Monitoring of low ppm CO gas with high selectivity at room temperature. Applied Surface Science, 563, 150272.

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[1] Mr Venkata Ramesh Naganaboina
PhD Scholar
[2] Dr Shiv Govind Singh
Professor,
Department of Electrical Engineering

Nanoionics-based memristor device for albumin detection

KID: 20220410

Background

Sensors that can detect bio-molecules have been of great interest as conventional methods pertinent to their detection suffer from high throughput, sensitivity, dynamic range, detection limit, etc. Hence, there is a quest for the development of improved analytical techniques that would allow rapid, trustworthy, cost-effective biomolecule detection. In this regard, nanoelectronic biosensors are promising alternatives, which offer label-free, high-sensitive, and real-time detection of biomolecules that are important for biomedical applications. Despite all the above, these devices can be prepared as miniaturized devices that may be helpful for the development of lab-on-chip devices.

Albumin is the most abundant protein in vertebrate blood and helps in transporting protein. Bovine serum albumin (BSA) is a widely used albumin in the research field as a model protein due to its structural similarities with human serum albumin (HSA). Several analytical methods are used for BSA detection such as spectroscopy, immunoassays, and chromatography; but these methods are cumbersome and labor-intensive.

Objective

It is of interest to detect bovine serum albumin through an electrical method using a nanoionics-based memristor device.

A memristor device is one which changes its resistance state with an externally applied voltage. Indeed, there are several memristor devices such as Tunnel magnetic resistance (TMR), Giant magnetoresistance (GMR) phase change memory (PCM), resistive random access memory (RRAM), etc. Among them, RRAM-based memristors are simple and one can fabricate easily. Here, the resistance state can be switched between a high resistance state (HRS) to a low resistance state (LRS) depending on the polarity of the applied voltage bias. The physics of such devices can be understood by the formation and rupturing of conducting filaments formed due to oxygen defects in the device.

Methodology and Results

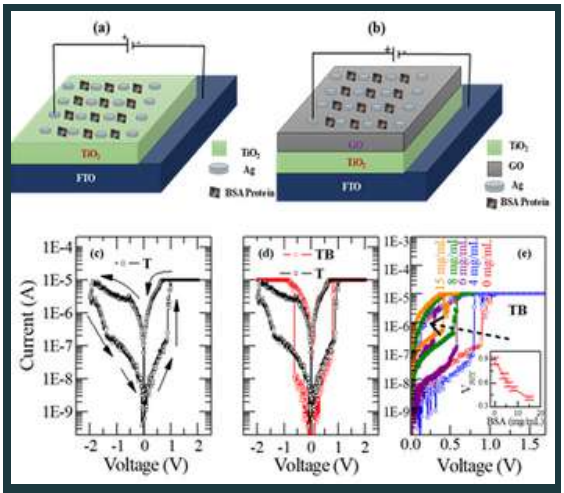


Fig. 1: (a) & (b) Schematic of the devices Ag/BSA/TiO2/FTO (TB) & Ag/BSA/GO/TiO2/FTO (TGB) respectively. (c – d) I – V characteristics, which demonstrates that these devices are sensitive to the detection of BSA.

The present device is fabricated using titanium dioxide (TiO2) as an active material, to which BSA protein was added (Fig. 1a). In addition, we also tried to prepare Ag/BSA/GO/TiO2/FTO (TGB) (Fig. 1b) device for BSA detection with better sensitivity. For all the devices silver (Ag) and fluorine-doped tin oxide (FTO) were used as top and bottom electrodes respectively. Fig. 1c depicts typical I – V characteristics of an Ag/ TiO2/FTO-based bipolar RRAM device, Upon adding BSA to Ag/ TiO2/FTO device (Fig. 1d), as depicted there is a variation in switching voltage.

Further, variation of switching voltage is evidenced by increasing the concentration of BSA (from 0 – 15 mg/mL), (Fig. 1e). Despite the above, a graphene oxide (GO) layer was inserted between TiO2 and BSA to enhance the sensitivity of the detection for the lower concentrations of BSA (4 mg/mL) (Ag/BSA/GO/TiO2/FTO (TGB)). Graphene oxide contains oxygen functional groups on its surface, which enhances the conductivity properties, thereby increasing the sensitivity of the device to detect bovine serum albumin. The devices were also tested for their durability, which could be cycled 650 times.

Apart from the above, the constituents of the device (TiO2, GO and BSA) are environmentally friendly, economic, and bio-compatible. This is a proof of concept and extensive work is being carried out to make a portable device to render as lab-on-chip for BSA detection. Therefore, this kind of new concept will try to put a step forward in the development of efficient tools for protein detection.

Reference

1. Dwipak Prasad Sahu & S. Narayana Jammalamadaka, Detection of bovine serum albumin using hybrid TiO2 + graphene oxide based Bio – resistive random access memory device, Scientific reports 9, 16141 (2019).

2. S. Narayana Jammalamadaka and Dwipak Prasad Sahu Patent Application No: 201941034084; Filing Date: August 23, 2019 (published by Indian Patent Office in the Official Journal No. 09/2021).

> **Graphene oxide contains oxygen functional groups on its surface, which enhances the conductivity properties, thereby increasing the sensitivity of the device to detect bovine serum albumin.**

Dr Suryanarayana Jammalamadaka
Associate Professor
Department of Physics

The upturned leaf of destiny

KID: 20220411

Nature plans intricately to make something happen when it is genuinely aspired for. My journey to IITH and my selection as a Ph.D. scholar for the Bio-sensor laboratory in the Electrical engineering department was the result of such an aspiration. Cancer, the emperor of all maladies caused me a personal tragedy too and I sincerely wanted to work for the prevention and cure of this disease. But as an engineer, I was clueless to contribute to this cause. Then my destiny came into the picture and offered me this beautiful opportunity to work for the development of bio-sensors for the early detection of Ovarian cancer in women.

In these years when the world was already grappling with life-threatening diseases like cancer, cardiovascular diseases, Alzheimer's, etc the outbreak of the COVID-19 pandemic had ineluctably created a dearth and thereby a dire need to develop a class of biosensors that could be cheaper and do a rapid, sensitive and selective classification/ quantification of biomarkers for the early detection and monitoring of diseases.

This would facilitate a timely medical intervention to save a patient's life. Recently in our Littilings lab (biosensor lab), we developed a COVID-19 detection kit that is based on nucleotide detection similar to the RTPCR test and gives results in just 30 minutes.

Along with this, various other formidable projects are going on for the development of portable point-of-care devices to detect and monitor the advent of ovarian cancer, cardiovascular diseases, TBI, Alzheimer's diseases, and eye disorders like (retinopathy of prematurity). The development of biosensors requires the synthesis of nanomaterials, probe immobilization techniques, and clinical/control sample tests.

In some cases, it also requires the integration of sensors with microfluidic channels, android devices, and portable readouts to create a point-of-care device.

In our country where rural areas still do not have access to good medical facilities and equipment for timely diagnosis of diseases.

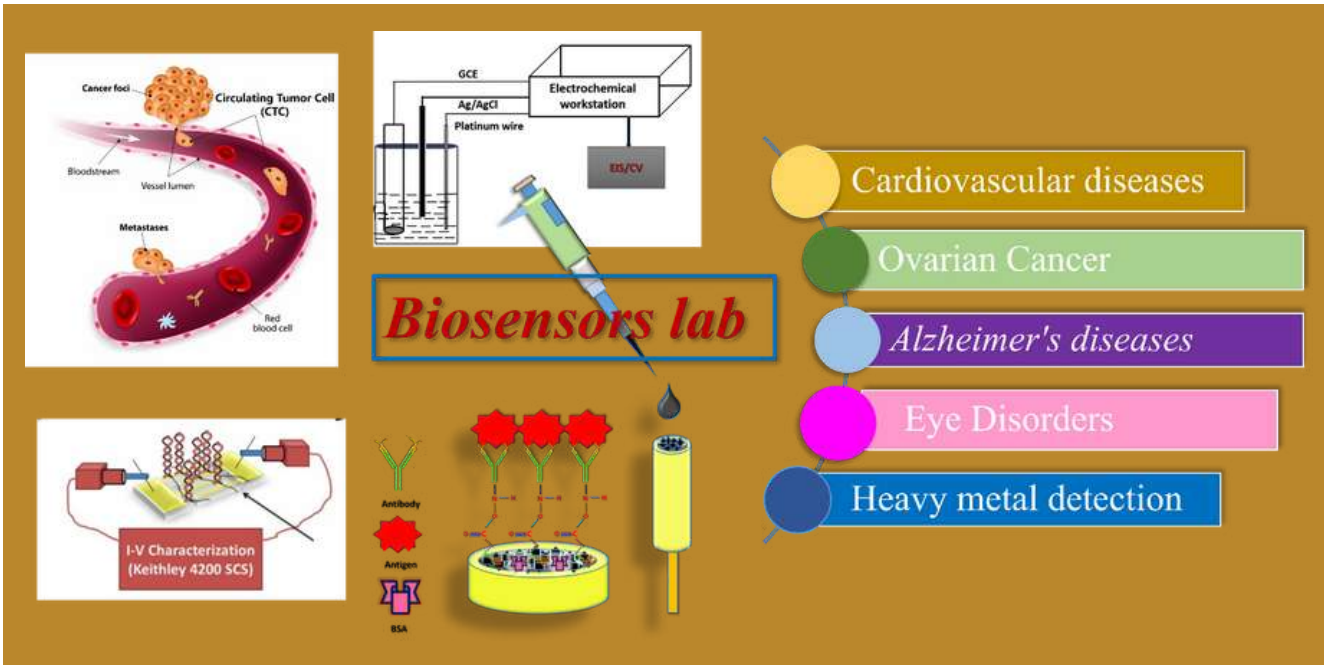
The research in the development of biosensors to get a substantial breakthrough can save thousands of lives

The Development of cheaper biosensors can also help to understand how far and deeply the demography of the region is affected by a particular disease so that adequate medical measures and social awareness can be created to control and delimit it. Personally, this research domain inspires me immensely and fills me with an indomitable spirit to work tirelessly for this cause.

I strongly feel that to do research is to meditate deeply to understand the riddles of nature and life, to adulate God's creation, and to exploit this knowledge in tandem for alleviating the maladies of living beings in harmony with nature.

> Research in the development of biosensors can save thousands of lives

Mr Ullas Pandey
PhD Scholar
Biosensors Lab
Department of Electrical Engineering



Decoding Luck

KID: 20220412

Intro:

Hey, do you know why stories are given a lot of importance? It is because, through stories, things pass on. People die, and stories live. It is said that the Skill of Storytelling is one very important criterion as to why a group of living beings can be called a civilization. The sheep on the planet do not form a civilization but we humans are a civilization.

So why am I telling you this? Because I have a story to tell and I want you to listen. And while you listen, keep holding onto a newer and broader perspective.

I am Armaan, I am 18 years old and I happen to be the college opener of the BTech batch of 2022 of IIT Hyderabad. So how did I get Lucky?

What does JEE demand?

Story:

Let me take you down the story lane for some time -

Imagine - breathe in - breath out - 2 sec

You're standing on hard, muddy ground and it is a sunny day and you feel thirsty. You try to look around you but you see people beside you. They are wearing the same white shirt and blue shorts as you are. Wait a minute, you're all standing in a line.

Now it struck you, you're waiting for your name to be called out. And after that you're going to have to run as fast as you can coz you'll be timed coz you're in a race.

At this point winning is all that matters. It doesn't matter whom your crush spoke to or why the paneer tasted so salty the previous night. All that matters is that you need to give your best and run as if a zombie is chasing you.

At this point what is the only thing you can mentally hold onto? Is it luck? For me, it would be the thought of not giving up and putting in nothing less than 100% of my capabilities. And I'm pretty sure that this is what most students would think.

Reality:

So what does JEE demand? I'll answer this part as honestly as possible. As I write this, it's 18th Jan 2023 and the JEE mains is going to be held from 24th to 31st Jan 2023, and the official #ExamTime begins.

My juniors back at school are slowly getting into the stress that comes along with this exam.

Did you know that JEE is the 2nd most difficult exam in the world and the most difficult exam in India? In such a scenario what can you mentally hold on to? For a significant amount of time during my preparation, I used to think that I had to give 100% every time. And I used to do that.

(Let me put this straight, I am not one of those people who can crunch numbers at the speed of light, neither can I visualize complex chemical compounds in my head without even touching the pencil, nor do I have the inborn talent of just being born for MPC)

But let us come back to reality coz this is where reality differs from the story. Is it practical to practice this attitude? Does this attitude sound familiar? Hustle culture? This is the same trend that grew toxic and people pushed themselves so hard that they needed hospital support for days because of neglect of health. So what is it that students can do?

The catch here is to be smart. You need to be able to condense fact from the vapour of nuance at any point in time. Judge the situation rightly and take the appropriate step. If it really is possible then all your energy is what you should give. If not then the steering is in your hand and steer wisely.

Why am I saying all this?

What am I doing?

Let me tell you how I want my story to unfold at IIT Hyderabad. I want to eventually start my own company and I currently believe that in today's competitive environment, this very behavior will help who so ever has it.

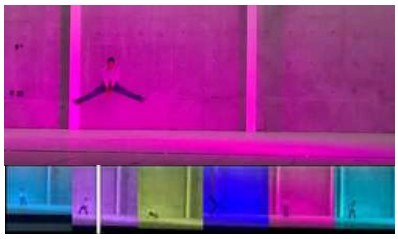
So who am I?

The name is Armaan, I am also the college opener of the IITH BTech batch of 2022 and I secured a rank of 368 in JEE Adv, I would love to help anyone who's looking for help. With this, signing off

-Armaan

> The catch here is to be smart. You need to be able to condense fact from the vapor of nuance at any point in time. Judge the situation rightly and take the appropriate step.

Armaan with his buddy Laptop in Dance Room



Armaan Smart Steps during New Year's Eve at OAT, IITH

Mr Shaik Armaan
BTech 1st Year
Department of Computer Science & Engineering

Chemiresistive gas sensors: Mixed gas sensing with analytical methods

KID: 20220413

I started my journey with IITH on 25th July 2014 as an MTech student in the Electrical Engineering department. As a part of the MTech thesis, I worked in the sensors domain. It involves the development of chemical sensors at low cost using eco-friendly approaches. In this process, I motivated myself to pursue higher studies and enrolled for PhD in Jan 2016. In PhD, I joined a different group, which is working on biosensors. My PhD supervisor, Prof Shiv Govind Singh, asked me to choose a research topic related to my MTech thesis or gas (or bio) sensors. I wanted to start something new that IITH had not explored till then. So, I chose gas sensors for my research.

The global gas sensors market in 2017 was valued at over USD 800 million and it was expected to grow at a rate of 7% CAGR till 2030. But nearly 50% of the market share belongs to electrochemical gas sensors and the semiconductor gas sensors share is too low. I have done an extensive literature survey to know the reason behind this. Both electrochemical and semiconductor sensors offer significant benefits such as high accuracy, reliability, and ease of use. However, electrochemical sensors outperform semiconductor sensors in the case of specificity and power consumption. These benefits translate into cost savings over the device's useful life. The power consumption of the semiconductor sensors can be reduced by operating them at low temperatures but at the cost of sluggish response.

On the other hand, the shelf life of electrochemical gas sensors is limited compared to that of semiconductor gas sensors. Moreover, the initial cost of the electrochemical sensors is too high to use them as use and throw sensors. For example, monitoring the freshness of perishable products need gas sensors for a few hours to a few days. In this case, multiple gases should be detected accurately at low power consumption using inexpensive sensors.

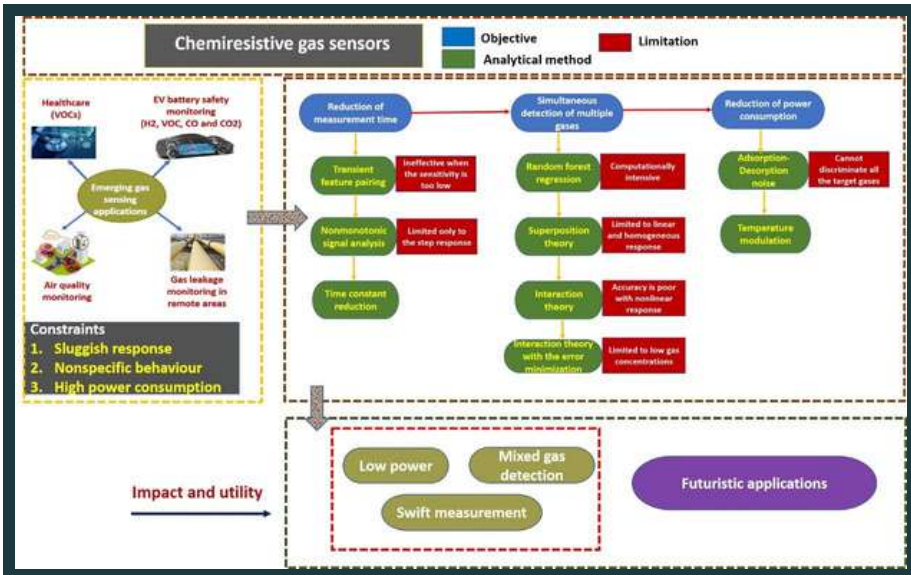


Fig. 1: (a) & (b) Schematic of the devices Ag/ BSA/TiO2/FTO (TB) & Ag/BSA/GO/TiO2/FTO (TGB) respectively. (c – d) I – V characteristics, which demonstrates that these devices are sensitive to the detection of BSA.

Based on the above analysis, I identified three grand challenges that need to be addressed to utilize resistive gas sensors in existing as well as emerging applications: (1) sluggish response, (2) non-specific behavior, and (3) high-power consumption. The research started with the design of the gas-sensing instrument.

I visited the places like IISc Bangalore and CEERI Pilani to know what type of instruments they are using for gas sensing. Surprisingly, no one had done the experiments on mixed gas sensing in India by the time we started working on it. That is the only way to address the non-specificity of the gas sensors. Then, I discussed with my supervisor and designed an advanced gas sensing system required to conduct my experiment.

After this, I experimented with the research plans with different materials and reported our results in various analytical journals like Analytical Chemistry, Sensors and Actuators B, and ACS Measurement Science. As per my knowledge, we are the first to implement strategies that track rapidly varying mixed gas concentrations.

Finally, I can say that I am satisfied with the research I have done during my PhD program. I advise new PhD students to choose their supervisor wisely. Better prefer to work with people who are interested in quality research instead of more publications. You don't need to compete with others as you can progress at your own pace.

> **I advise new PhD students to choose their supervisor wisely. Better prefer to work with people who are interested in quality research instead of more publications. You don't need to compete with others as you can progress at your own pace.**

Dr Srinivasulu Kanaparthi
MTech (2016) & PhD (2022)
Postdoctoral Researcher
Department of Electrical Engineering,
IIT Hyderabad

Every day was best @IITH

KID: 20220414

I am Dr D Rajesh Reddy and I have been working in the Advanced Data processing Research Institute (ADRIN), Indian Space Research Organization (ISRO), Department of Space, Govt. of India, Secunderabad since 2007. I got admission into PhD program, CSE Dept, IIT Hyderabad in a part-time mode in August2017, with my prior qualifications BTech (CSE) and MTech (CSE).I was awarded PhD from the Department of Computer Science& Engineering, IIT Hyderabad in August 2021

IIT has been one of the best institutes competing with older IITs and also offers PhD admission throughpart-time mode. Most importantly, my workplace and institute are located in the same city, which helped me a lot tobalance both work and academics.

IIT Hyderabad is known best for its fractalacademics. The selection of subject is made as per our interest. Hence I enjoyed all the subjects, which I have opted for course work. Especially, I enjoyed the subjects which were enrolled by many graduates and post-graduates just to see our performance with young and sharp brainsbeing a PhD research scholar.

Being a Part-time PhD student, I was not involved much. However,

I used to play Shuttle Badminton during my coursework at the ODF hostel. I got exposure to the latest trends in the research and development of techniques in the field of computer vision, machine learning, and pattern recognition. I got an opportunity to focus more on research and developmental activities of projects I have been assigned at my working place.

Indeed, every day was the best moment for me @ IIT Hyderabad. Enjoy the learning process and be competitive and enjoy the most of it and Undoubtedly, Faculty is IITH's strength. Involve interested alumni also in the events.

I can be reached through my mail rajesh.isro@alumni.iith.ac.in

Dr D Rajesh Reddy
PhD (2022), Department of Electrical Engineering
Scientist/Engineer-SF
Advanced Techniques Division,
Advanced Data Processing Research Institute (ADRIN),
Department of Space, Govt of India

> Enjoy the learning process and be competitive, enjoy the most of it and Undoubtedly, Faculty is IITH's strength.

Dr D Rajesh Reddy during 11th Convocation at IIT Hyderabad

Challenges help us Grow!

KID: 20220415

I come from the state of Odisha, the land of Lord Jagannath. Both my parents are academicians, and my elder brother is an electrical engineer. Our family life is centred around my three-year-old nephew these days. I currently stay in the Netherlands and am a postdoctoral researcher at the University of Twente. I moved here in September 2022. Before that, I worked as an Assistant Professor at IIIT Surat for a year.

My answer may sound silly, but to be honest, the only reason I had back in 2014 when I joined IITH for my doctoral degree, was its proximity to my home state. It is just a day's train journey from Hyderabad to Bhubaneswar, which somehow seemed important back then. Now that I have passed out and I gained some experience, I can give a sophisticated answer to this question. But I am afraid that won't be the correct one.

As part of my coursework, I attended lectures for only four subjects, and I did like them all. But if I have to pick one, then VLSI Technology. Primarily because it dealt with the practical aspects of things I have always found intriguing. Apart from research, and irregular outings with friends, I would say none. I was somehow not very active socially at IITH. I usually preferred to spend most of my time in and around the lab. And once I was off the lab, I liked having the rest of the day to myself. This is not something I am proud of, but I feel this has something to do with my practices and preferences being a writer. Mostly, I spent my time reading literature; poetry in particular. I was also very much occupied with my theatre activities in Hyderabad. Back then, I was regularly writing plays for a theatre group called Kash.

Being a PhD Scholar, everything I did was in some way part of specialized training. And not just for me, this would in general be true, for all doctoral students across departments at IITH. Even the simplest of experiments we do in the lab was in a way stepping stones for something greater. That's how we learn, isn't it? I was rather fortunate that I got to work on a couple of interdisciplinary applicational problems, which required a lot of preparation on my part. It was definitely challenging, but at the same time, it helped me grow as a researcher.

I currently work as a Postdoctoral Researcher at the University of Twente, and most of my work here involves microfabrication inside a cleanroom. I acquired the necessary skillset at IITH while working in the NanoX facility. My current project also involves biosensing at the single particle level, using a technique called impact electrochemistry. This is obviously new for me and is exciting. I have learnt the basics of Electrochemistry and other associated analytical techniques during my doctoral work at IITH. That experience is now proving very helpful in approaching the current challenges. But to be very honest, it cannot just be the technical skills I acquired or the tools I learnt or the training I received at IITH, that prepared me for this job. It has to be much more than that. I feel, my tenure at IITH had prepared me to look beyond my comfort zone, and always try something new and challenging. This has been a driving factor in my journey post-IITH.

From a researcher's point of view, I think it has to be the moment when our COVID-19 test kit COVI-HOME received validation from CCMB Hyderabad. The test kit was developed with a lot of hard work and commitment, during the lockdown. Those were testing and stressful times. But somehow we did not give up, despite all the challenges. And when the product was validated after the medical trial, it was a moment of pure joy for the entire team.

Maybe I can just share a quote by Fabiola Gianotti, which I have found very inspiring. Miss Gianotti is a particle physicist at CERN, Switzerland, and she is rather well known for her contribution to the discovery of the Higgs boson. She says, "This job is a great scientific adventure. But it's also a great human adventure." We must all remember this, don't we?

Dr Surya with his mentor Prof SG Singh at IIT Hyderabad

Please feel free to drop an email to the alumni ID.

You can also write to me. at suryasnata.tripathy@gmail.com.

> I got to work on a couple of interdisciplinary applicational problems, which required a lot of preparation on my part. It was definitely challenging, but at the same time, it helped me grow as a researcher.

I think IITH is providing really great facilities to its researchers today and is constantly evolving as a premier research destination. This is a matter of pride for all the alumni. I hope in the coming years, we work a bit more towards maintaining a better work-life balance in our community. The mental health of students has been an alarming issue lately, across institutions in India. I am sure our authorities must already be thinking about this.

Dr Suryasnata Tripathy
PhD (2020), Department of Electrical Engineering
Postdoctoral Researcher,
University of Twente,
Enschede, Netherlands

PRAANHITA BIOTRONICS

Protecting Life

KID: 20220416

At the advent of COVID-19, there were no kits available that could test the Gold standard at a rapid pace. Seeing the need, Prof Singh groups at IITH developed a COVID-19 test kit, based on a nucleotide test, where the biosensors on the test kit are inherently field effect devices, comprising of conductive nanofibers and capture probes specific to SARS COV-II RNA, where the said capture probes are anchored on to the nanofibers, via chemisorption.

The test kit consists of three distinct sensors, which specifically hybridize to different regions of the target RNA, under favorable conditions, and the said hybridization results in amendments in the sensor response, which is recorded as an electrical signal, using a dedicated readout, and a smartphone-based application.

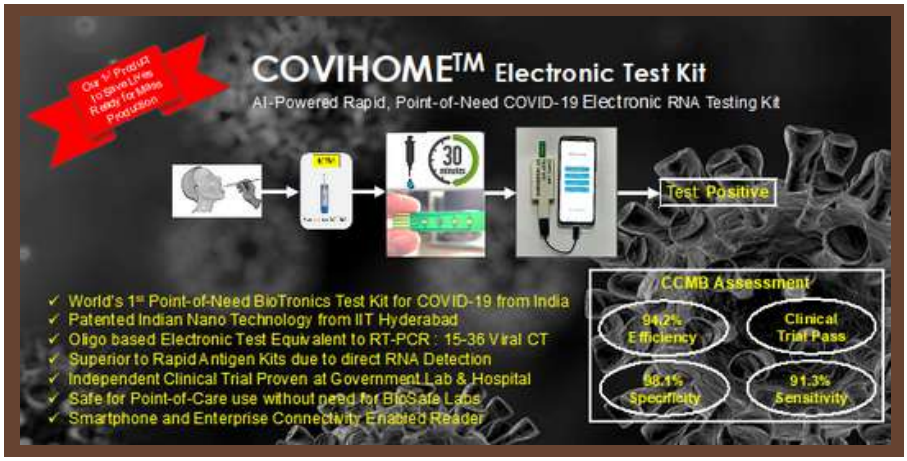
The electronic signals corresponding to the sensor responses, before and after their interaction with the test sample, serve as inputs to a decision-making Algorithm (which is included in the software application), which provides a qualitative assessment, and identifies the test samples as 'COVID-Negative' and 'COVID-Positive'. This test kit is fundamentally different from any existing devices in use. (The Gold standard test like RT-PCR required highly trained manpower, sophisticated instrumentation, and BSL2 facility for extraction and purification of RNA, etc).

In this device, we have immobilized a specific COVID-19 genomic sequence from the fairly conserved region of the virus and measured the change of electrical signal response before and after the exposure of the patient sample. Therefore, it does not require highly trained manpower, sophisticated instrumentation and a BSL2 facility.

Further, this platform has the ability to extend it for other diseases diagnosis at the point of the site. Which will play an important role in telemedicine.

The global point-of-care diagnostics market size was valued at USD 37.03 billion in 2021 and is expected to expand at a compound annual growth rate (CAGR) of 6.8% from 2022 to 2030.

> प्राण = Praan = Life
>
> हिता = Hita= Well-being
>
> Protect Life with BioTronics



Seeing the rapid growth and need for such a device Prof Singh along with other co-founders Dr Ranjana Singh form Praanhita Biotronics.

Our Charter

- Exploit the electrical properties of bio-molecules including DNA, RNA, Antibodies & Proteins.
- Build low-cost biosensors with nanotechnology to measure small changes in electrical properties accurately.
- Combine the power of Electronics, Biosensors & AI into BioTronics to detect viruses and pathogens.
- Touch Billions of people's lives with accurate diagnostic kits to protect against and prevent spread of disease & illnesses.
- Play a vital role in the biotech process industry to accelerate vaccine and pharma production

> Further, this platform has the ability to extend it for other disease diagnosis at point of site. Which will play important role for telemedicine.

[1] Dr Ranjana Singh
Co-founder & CEO, Praanhita Biotronics

[2] Prof Shiv Govind Singh
Founder & Director, Praanhita Biotronics
Professor, Department of Electrical Engineering, IIT Hyderabad
Incubated at FabCI, IITH

HANS INDIA

IITH COLLABORATES WITH SMC FOR TERRESTRIAL VEHICLES

The developed technology at IITH will enable the conversion of a Drive-by-wire Vehicle into an Autonomous vehicle by integrating different sensors for perception, localisation and navigation

the pioneer

Sat, 24 Dec-22; Pioneer - Hyderabad; Size : 146 sq.cm.; Circulation:55000; Page : 3

IIT-Hyd signs MoU with AUT for global partnership

PNS ■ HYDERABAD

Indian Institute of Technology Hyderabad (IITH), has signed a Memorandum of Understanding (MOU) with Auckland University of Technology (AUT), New Zealand, to facilitate joint research in disciplines of mutual interest on Friday.

Tarun K. Panda, Dean of International Relations, IITH said, "This MoU will promote and expose the members, faculty and students to the realities of international practices, providing them a subsequent platform as well as exchange of knowledge between the two organisations. We share mutual committed to develop both the universities on a global network collaboration."

Professor Guy Littlefair, Pro Vice-Chancellor, AUT, said, "We have shared a long association with India since 1992 and we want to build up close and strategic collaboration with top technical institutions of India and AUT, New Zealand. We have had personal connections with IITH since 2014 and through this partnership there will be wonderful opportunities for students on both sides as well as the faculty to collaborate on research platforms.

Today, we signed a new MOU setting the bar even higher for our joint aspirations to form the strongest of strategic alliances."

AUT has an existing collaboration with IIT Madras. Professor Guy Littlefair visited IIT Madras campus recently to discuss the status of MoU signed in 2020 with IITM and to build strategies on further course of action in progress of this partnership.

ఈనాడు epaper.eenadu.net

అమెరికాకు లేని నాసల్ వ్యాక్సిన్ భారత్‌లో..

• ఐఐటీ(బాంబే) పూర్వ విద్యార్థుల సమ్మేళనంలో డాక్టర్ కృష్ణ ఎల్ల

Date : 24/12/2022 EditionName : GREATER HYDERABAD PageNo : 20

THE TIMES OF INDIA

Fri, 07 Oct-22; Times Of India - Hyderabad; Size : 304 sq.cm.; Circulation:267065; Page : 7

INNOVATION PROPELS IIT-H STARTUP HUB

Copyright©2022 Telangana Today
Sat, 05 Nov-22; Telangana Today - Hyderabad; Size : 161 sq.cm.; Circulation:149245; Page : 7

IIT-H develops cheaper 'super' concrete

STATE BUREAU

Researchers at the Indian Institute of Technology-Hyderabad have developed an affordable special Ultra-High Performance Fiber Reinforced Concrete (UHPFRC) using locally available materials like cement, fly-ash, river sand, ground granulated blast furnace slag, micro-silica, water, steel fiber, polypropylene fibers and high-range water-reducing agents (HRWRA). The breakthrough development is expected to bring down the cost by two times when compared to the commercially available proprietary products, the Institute said in a press release here on Friday. The newly developed composition combines the best features of self-consolidating concrete (SCC), fiber-reinforced concrete (FRC), and high-performance concrete (HPC) and is used in construction of bridge girders. Complimenting Prof Suriya and his team on the findings, the institute director Prof B S Murty said strong and durable infrastructure is a must for holistic development of any nation. "Developing construction materials with improved strength using locally available raw materials is a creditable stride towards realising our dream of Aatma Nirbhar Bharat. I am sure such innovation will not only benefit local development in terms of economic and efficient infrastructure but extend its advantage to the infrastructure sector globally," he said. Prof S Suriya Prakash said the aim was to develop UHPFRC using locally-available materials to understand the behavior of UHPFRC in compression, tension, fracture, and direct shear.

UHPFRC Concrete is expected to reduce the cost by two times.

THE TIMES OF INDIA
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Sat, 10 Dec-22; Times Of India - Hyderabad; Size : 145 sq.cm.; Circulation:267065; Page : 4

IIT-H logs 508 offers, electronics batch walks away with hefty package of ₹63L

MNC JOBS & FAT SALARIES

DECCAN Chronicle
Fri, 18 Nov-22; Deccan Chronicle - Hyderabad; Size : 152 sq.cm.; Circulation:43000; Page : 2

IIT-H, Suzuki to tie up for localised autonomous cars

The Indian Express

IIT-H develops affordable fibre reinforced concrete

EXPRESS NEWS SERVICE

HANS INDIA

Acclimatisation Boot Camp launched at IIT Hyderabad

DESIGN EXAMS AF

the pioneer
© 2022 The Pioneer. All Rights Reserved
Sun, 23 Oct-22; Pioneer - Hyderabad; Size : 148 sq.cm.; Circulation:55000; Page : 3

IIT Hyderabad, DRDO ink an MoU for setting up DRDO Centre of Excellence

PNS ■ HYDERABAD

Indian Institute of Technology (IIT) Hyderabad and the Defence Research and Development Organisation (DRDO) signed a Memorandum of Understanding (MoU) for setting up of DRDO Industry Academia Centre of Excellence. The MoU was signed in the presence of Union Defence Minister Rajnath Singh during the Defence Exhibition and Conference DefExpo 2022 being held in Gandhinagar, Gujarat.

DRDO Cell was established in IIT Hyderabad in 2020-21, which is working as a satellite center for RIC Chennai. The then director of RIC, Dr Natarajan took the initiative to contact various defence laboratories in and around Hyderabad, collect the problem statements and share them among IIT Hyderabad faculty members. IIT Hyderabad faculty and several DRDO scientists put tireless efforts in first drafting the proposals to cater to the exact requirement of the defence, after which 13 proposals worth several crores were sanctioned at rocket speed.

Expressing his delight on this milestone, Prof B S Murthy, Director IIT Hyderabad said, "Country's defence is not only the responsibility of those who fight the battle on the border but also every Indian who can be a significant contributor in their own way. IIT Hyderabad is committed to serving humanity through invention and innovation in technology. The centre of excellence is another indication of the high innovation quotient we are known for," he said.

DRDO Chairman Samir V Kamat exchanging copies MoU with IIT Hyderabad Director Prof. B S Murthy at DefExpo 2022 in Hyderabad on Saturday.

THE TIMES OF INDIA
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Dec-22; Times Of India - Hyderabad; Size : 22; Circulation:267065; Page : 4

IIT-H celebrates 3rd alumni day in hybrid mode

ABN ఆంధ్రజ్యోతి

ఐఐటీహెచ్ హెరిటేజ్ సైన్స్‌లో ఫెలోషిప్‌లకు ఎస్వీవైఆర్‌ఐతో ఒప్పందం

IITH exhibited the indigenous 5G testbed developed by it & IIT Madras, IIT Kanpur, IIT Bombay, IIT Delhi, IISc Bangalore CEWiT, "Sameer" at the India Mobile Congress 2022 inaugurated by Hon'ble PM of India Shri Narendra Modi.

Research on UAV & Nano Ornithopter Technologies DRDO Cell IITH.

Video Abstract:
https://youtu.be/Mr1yeSP7nno

Prof Kiran Kuchi explaining IITH developing plan 6G of IITH to starting from scratch, and planning to deploy in late 2029 to Shri Ashwini Vaishnaw,

Ranging from Healthcare to Defense, IIT Hyderabad demonstrated IInventiv Exhibition's Industry-ready Technologies.

DuroKea Technology, self-disinfecting surfaces nanotechnology developed at IITH.
Video Abstract: https://youtu.be/sWB5G-p5IW8

Advancement in Biomedical is redefining the arena of defense technology.

Have a look at how Biomedical Products Development DRDO Cell IITH is taking forwarding initiative to make India self reliant, Aatma Nirbhar, & safe.

Video Abstract:
https://youtu.be/nuY3oGN29U8

Have a look at the research on UAV & Nano Ornithopter Technologies DRDO Cell @IIT Hyderabad.

Video Abstract:
https://youtu.be/Mr1yeSP7nno

Sand Animation was done by BDes 21- 25, guided by Prof Delwyn Jude Remedios, Department of Design, IITH, under his own course of Animation Basics. This short film contributed to the Equinox Mountain Film Festival 2022. A documentary by Lijin.

Video Abstract:
https://youtu.be/aYoD2wyxHNI

Research on Space Application Technologies DRDO Cell IITH

Video Abstract:
https://youtu.be/jNAZF0JLRgQ

Hon'ble Defense Minister Shri Rajnath Singh launched Acclimatization Boot Camp (ABC) for Defense Startups, a program by iTIC Incubator at IITH during DefExpo 2022.

Electronic Release:
https://youtu.be/Wm3GWVCO2xI
Read more:
https://pcr.iith.ac.in/files/pressrelease/ABCDITIC.pdf

Rapidly deployable lightweight bridge system is a lightweight man-portable composite bridge system developed by IITH & GRSE.

Video Abstract:
https://youtu.be/WTP9OVJAtk8

An Improved Sequential Batch Reactor for Wastewater Treatment by IITH

Video Abstract:
https://youtu.be/hvKZQvt6WRs

nLite360®, is an Intelligent Phototherapy System that provides customized Phototherapy for Neonatal Jaundice by HeaMac CfHE IITH.

Video Abstract:
https://youtu.be/PaOQVbq3ZOU

ArmAble Game-Based Arm Rehabilitation Device by Beable CfHE IITH. The technologies have also been displayed alongside the 75 amazing inventions at IInvenTiv, IIT Delhi.

Video Abstract:
https://youtu.be/rUElUlhVZn8

IITH has developed an affordable Ultra-High Performance Fiber Reinforced Concrete (UHPFRC) for Bridge and Other Infrastructural Applications

Electronic Release:
https://youtu.be/LwaAfzabPjE

Read more:
https://pcr.iith.ac.in/files/pressrelease/UHPFRC.pdf

Adaptive Optics & Image Processing Group IITH is undertaking remarkable research in the field to address the hassles of Defence Applications.

Video Abstract:
https://youtu.be/dvFjl1vqc-g

IITH is conducting various path-breaking research in the field of 5G & 6G. One such unique innovation is 5G Technology: NB-IoT System-on-Chip (SoC). Know from Prof Kiran Kuchi all about it. The technology has also been displayed alongside the 75 amazing inventions at IInvenTiv IIT Delhi.

Video Abstract:
https://youtu.be/PsuQHR4DRQ0

Have a look at how DRDO Cell IITH is undertaking remarkable research in the field of Artificial Intelligence to make India Aatma Nirbhar.

Video Abstract:
https://youtu.be/KdxOet2Ygac

IITH has been working on innovative products in the space of Electric Vehicles and Energy Storage Technologies. The technologies have also been displayed alongside the 75 amazing inventions at IInvenTiv, IIT Delhi.

Video Abstract:
https://youtu.be/b5hWy_KvsOA

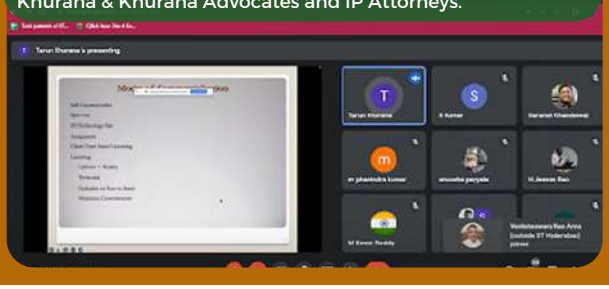
ZPHS - Rudraram School Students Visit IITH for Interaction & Demonstration of Entrepreneurship & Career in Science & Technology

Dept of EM under the aegis of IIC_IITH IITH organized a lecture by Dr Smiju Sudevan on a variety of topics related to project management

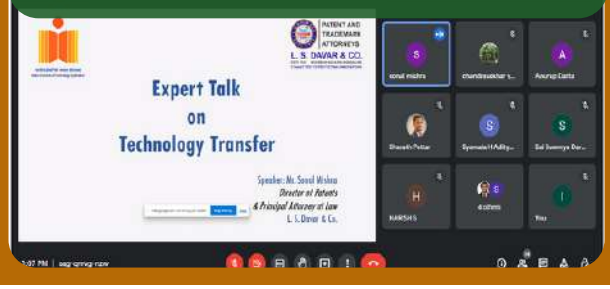
IITH has concluded the 6th International Conference on Microactuators, Microsensors, and Micromechanisms (MMAM) 2022.

SICE 2022, organized by Department of Mechanical & Aerospace Engineering, Convener: Dr Viswanath Chinthapenta & Co-Convener: Dr Gangadharan Raju

IPFC under the aegis of IIC, IITH conducted an Expert Talk on " Technology Transfer" by Tarun Khurana, Co-founding partner, Khurana & Khurana Advocates and IP Attorneys.



IPFC under the aegis of IIC, IIT Hyderabad conducted an Expert Talk on "Technology Transfer" by Mr Sonal Mishra.

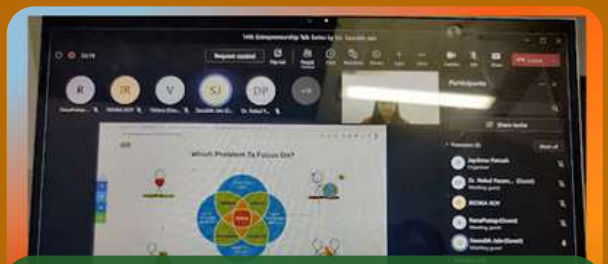


A talk by Prof J N ReddyO'Donnell, Foundation Chair IV, J Mike Walker '66 Chair Professor, Dept of Mechanical Eng, Texas A&M University USA, & Distinguished Professor, IITH

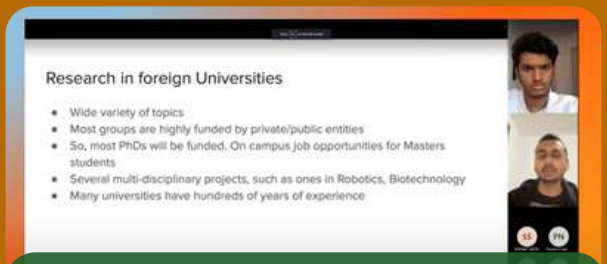
Department of Mathematics, IIT Hyderabad has decorously celebrated National Mathematics Day

Rural Girl Students Mentoring Program by Rural Development Centre IITH and a CSR Initiative by RESustainability

Advanced Functional Analysis and its Applications - 2022, a workshop by Department of Mathematics IIT Hyderabad



Entrepreneurship Talk series by Mr Saurabh Jain, Founder & CEO Fun2DoLabs



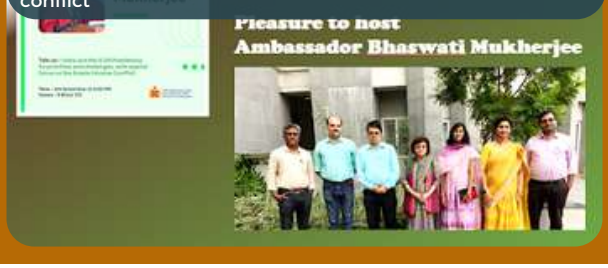
"Research opportunities in foreign universities & app process" by Mr Raktim Goswami, BTechEE21 as part of Alumni Talk Session 5, Foster2022 Vol3 Higher Studies.

IITH & CII organized a workshop on Developing Research Mind

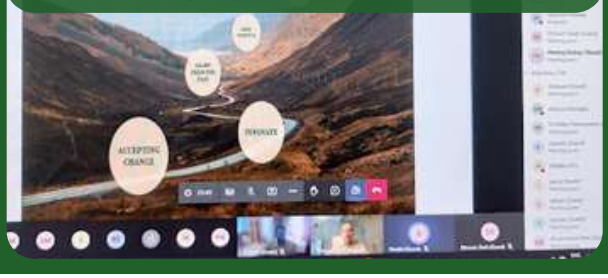
Prof M Vidyasagar, Dist Prof, IITH went live on DD Yadagiri. He talked about the latest trends & employment opportunities in the IT sector. Talk: - https://youtube.com/watch?app=desktop&v=6tTv5m1Fi2w

A talk on Vigilance Awareness by Ms Chandrima Roy, Senior Deputy General Manager & Chief Vigilance Officer, South Central Railway to observe Vigilance Awareness Week-2022

IITH welcomed Ambassador Bhaswati Mukherjee for a Talk on India & the G20 Presidency, outlining its challenges & priorities with a special emphasis on the Russia-Ukraine conflict



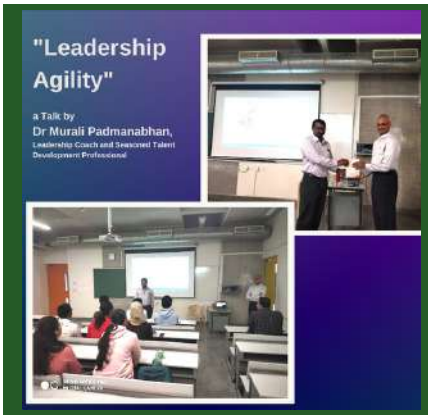
15th Lecture as a part of the Entrepreneurship Talk series by Mr Pankaj Dubey, Founder of DSPIN Consulting Pvt Ltd



Elan & nVision, IITH conducted a workshop in collaboration with RemarkSkill Education. The workshops have had more than 700+ students attending from various colleges in Hyderabad

Institute Safety Office, IITH organized the Industry cum Academic Seminar Series titled "Overview of Chemical Regulations & its Implications," by Dr Manisha Karale & Dr Chia-Sui Hsu as Expert Panelist.

EntrepreneurshipCell, IITH organized a Pre E-Summit, to announce E-Summit '23 Esummit.



Dr Amrita Datta, Liberal Arts, IITH shared her insights at 'Internal Migration & Evolving Policy Frameworks for Governance' at the CPR Dialogues organised by Centre for Policy Research, New Delhi.

Link to the session:
https://www.youtube.com/watchv=D1rblu0XbjM&authuser=0

In an enthusiastic spirit IITH has celebrated the ConstitutionDay/ SamvidhanDivas to commemorate the adoption of the Constitution of India, with a session of Preamble Reading by IITH fraternity and a talk on the theme "Responsibility of Citizens" by Shri M Ramana Kumar, Superintendent of Police, Sangareddy, Telangana.

Department of Civil Engineering, IITH, organized an invited talk by Dr S K Gupta, Head of Department, Hematology and Oncology, ContinentalHospitals on Cancer awareness with a focus on Blood cancer

Committee for Gender Concerns, IITH has organized a talk on "Tech for Social Good by Nonprofits" by Dr Bollineni Keerthi, President, Vasavya Mahila Mandali.

The Hon'ble Prime Minister, Shri Narendra Modi, appreciated the All IITs R&D Fair Iinventiv organised at IIT Delhi on October 14-15, 2022. During the R&D fair, more than 75 promising innovations were demonstrated by the 23 IITs.

Indian Institute of Technology Hyderabad witnessed 508 offers (which includes 54 international offers) made from 144 companies during Phase-1 of Campus Placements.

17 Faculty and 1 PhD Scholar (2021), a total of 18 Scientists have made it to the Top 2% of Scientists by Stanford University; published by Elsevier Connect.

TIP & TRP, CoEs & Innovation Cells are focused towards driving Innovation & Entrepreneurship Outlook at IITH, Prof B S Murty, Director, IITH, elaborated various such initiatives to Mr KranthiKumar ETV.

Link to full Interview:
https://www.youtube.com/watch?v=AZey7hMk9Os

How is Innovation Ecosystem flourishing IIT Hyderabad ? by Prof B S Murty, Director, IITH, explains in a candid conversation Mr PV Rao 10TV.

View full interview:
https://www.youtube.com/watch?v=UZOLd8Epja8

IITH is pleased to announce the "Saroj Sharma Memorial Award for Research Excellence for female UG students", Instituted by Prof Chandra Shekhar Sharma, Chemical Engineering.

IITH is pleased to announce the constitution of the Vision2030 Committee to ensure the sustainable development of the institute in the next 10 years.

IIT Hyderabad is elegantly entering its Crystal Year (15th Year). A creative alteration of existing logo has been released this alumni day. Designed by: Mr Sai Likhith Bonila, a 2019 Batch BTech from Engineering Science BTech.

IITH revamped the Committee for Gender Concerns (CGC) website.
Please visit the website and read in detail at: https://cgc.iith.ac.in

Delegates from UiA visited IITH to discuss various avenues for future collaboration

IITH being a happy host for the delegation of journalists/editors from Sri Lanka and Seychelles visited India for a familiarization visit to IITH Campus.

Vigilance Awareness Week & Unity Day 2022 Valedictory Function at IIT Hyderabad

Team IITH made it to the 'Top-5' in the Inter IIT Aquatics Meet 2022 held at IIT Delhi

With immense pride, IITH is glad to share that it has won the General Championship Women's in the Inter IIT Staff Sports Meet 2022

IIT Hyderabad has triumphed in the Inter IIT Sports held at IIT Delhi with 7 Medals & 1 Champion Trophy.

Instilling the Pursuit of Passion, the activities of Hobby Clubs (Eco Club, cookery Club, and Art Club) DAV School, IITH

A Field Trip to the Botanical Gardens (LKG, UKG and Grade-4) by DAV School, IITH to observe a wide range of plants that are grown for scientific and educational purposes.

IITH concluded Rashtriya Ekta Divas 2022 with Week-long Celebration with Unity Run, Pledge & an Exhibition on the life of the Iron Man of India Shri Sardar Vallabh Bhai Patel.

IITH has conducted a quiz on the life of Sardar Vallabh Bhai Patel on the Occasion of Rashtriya Ekta Divas 2022

Mime Performances by DAV Club, IITH

Essay, Speech & Painting Competition to create awareness & observe the Vigilance Awareness Week-2022

IITH community took the integrity pledge to mark the beginning of the Vigilance Awareness Week - 2022

IITH welcomed NCC into its fold, inaugurated by our beloved Director, Prof B S Murty.

IITH is delighted to have "Little Munchkins", a New Day Care, inaugurated by our beloved Director Prof B S Murty.

IITH is pleased to welcome Prof Venkatasubbaiah K as Dean - Students.

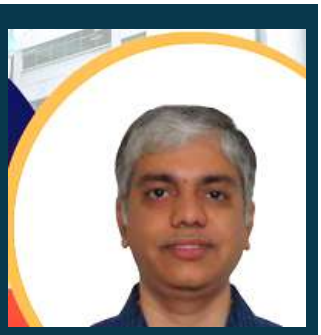
SPICMACAY IITH Subchapter Team has organized a screening of Charlie Chaplin's movie for IITH Community.

Department of Design, IITH has conducted "Inktober" a display of Graphic Narratives done by BDes students.

IITH is pleased to welcome Prof Subramaniam Kolluru V L as Dean - Planning

Besler's Book of Flowers is a kid's pop-up book designed by Ankita Tiwary, MDes (21-23), Department of Design, IITH, inspired by "Hortus Eystetensis" a botanical book by Basilius Besler

A Field Trip to the Botanical Gardens (Grades 1 to 3) by DAV School, IITH to observe a wide range of plants that are grown for scientific and educational purposes.



IITH is pleased to welcome Prof Surya Kumar S as Dean - Innovation, Translation & Startups.

Illustrious Light Animation created by Creatives Minds of Department Of Design under the mentorship of Mr Delwyn Jude Remedios, depicting implausible 10-year journey IITH

Department of Biotechnology, IITH introduced Bi-annual Hands-on Lab Training(HLT) Program in Biotechnology/ Bioinformatics

IITH is pleased to welcome Dr Prasad S Onkar as Head of the Department - Design.

Dandiya and Bathukamma Night

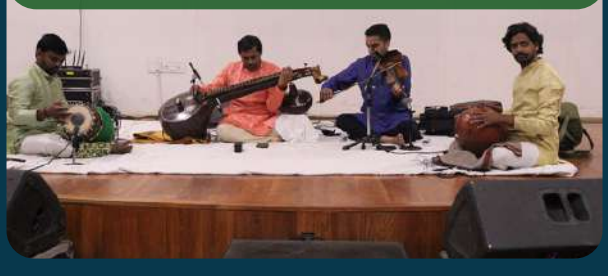
Ayudhpooja or Saraswati puja on Dasara Festival at Itic Incubator.

Colors of Rangoli, Lit of Colorful Diya, Twinkle of sky touching Lamp,a glimpse of Dazzling Diwali at IITH.

Hostel Utsav, to create an avenue for cohesive interaction among students

"Entrants Fiesta", the Freshers' Fest at IITH.

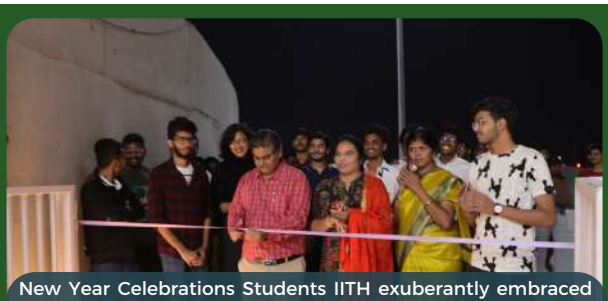
SPICMACAY graciously organized a Veena Recital event by Shri D Srinivas, accompanied by co-artists Vid Mallela Teja, Vid Ch Ramakrishna, Vid M Chandrakant



Dept of Biotechnology celebrated BT Foundation day to celebrate one year of inauguration of the BT Dept Building

Dept of Biomedical Engineering celebrated "BME Day - BMilaap 2.0" on occasion of the completion of one year in new BTBM Building.

iTIC Incubator at IITH has completed its iconic journey of 7 years of establishment via making a century of (100+) startups supported across the years.



New Year Celebrations Students IITH exuberantly embraced the entry into New Year 2023 with fun-filled Culturals and DJ night.

Comprehensive Solid Waste Management Systems at IIT Hyderabad. **Full Movie:** https://youtu.be/NIf81-xkhME

Weed Removal & Waste Collection as a Special Campaign 2.0 under Swachh Bharat Abhiyan by NSS Club IITH

IITH has successfully conducted the Plantation Drive for December 2022 by planting Gulmohar, Neam, and Bauhinia. that were propagated in our own Nursery.

IITH has successfully conducted the plantation drive for November 2022 by planting Bahunia, Gulmohar, Mango, and Sapota.

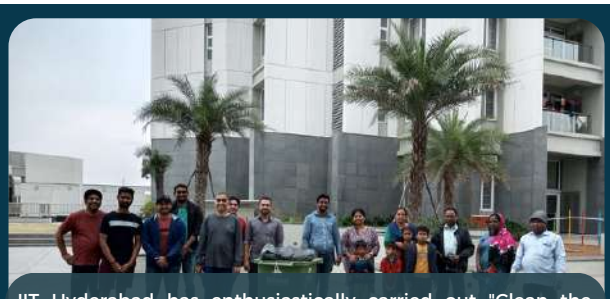
Clean Campus drive at IITH on the occasion of Gandhi Jayanti

Swachh Campus Drive at IITH (Hostels, Academic Quads & Residential areas).

Swachh Campus Drive at IITH by Department of Chemical Engineering & Chemistry

Clean Campus drive at IIT Hyderabad on the occasion of Gandhi Jayanti

Team EWaste Resource Engineering & Management of IITH visited DAV High School, IITH for E-Waste Awareness Program to observe International EWasteDay.



IIT Hyderabad has enthusiastically carried out "Clean the Campus Day" for December 2022

Suzuki Motor Corporation

IITH collaborates with Suzuki Motor Corporation for India-specific AutonomousCar - ADAS Technology Development.
Read more: https://pcr.iith.ac.in/files/pressrelease/SZTIH.pdf

Sri Visweswara Yoga Research Institute (SVYRI)

IITH & Sri Visweswara Yoga Research Institute (SVYRI) announce MRD-Heritage Research Fellowships MRDHRF for PhD in Heritage Science & Technology HST.
Read more: https://pcr.iith.ac.in/files/pressrelease/MRDHRF.pdf

National Centre for Additive Manufacturing (NCAM)

National Centre for Additive Manufacturing (NCAM) & IIT Hyderabad Exchanged MoU for adhering to the principles of equality, mutual benefits, mutual trust, mutual assistance and complementary advantages, both organizations.

Hexagon

Hexagon & IIT Hyderabad signed an MoU for collaboration related to Industrial Metrology and Inspection Systems

IIIT Raichur

An official hand over of IIIT Raichur has been done by IITH. IITH has extended support to put strong foundation for sturdy growth of IIIT Raichur in coming years.

Defence Research and Development Organisation

Dr Samir V Kamat, Chairman DRDO & Secretary DDR&D, exchanged MoU with Prof B S Murty, Director, IITH, for setting up DRDO Industry Academia (DIA) Center of Excellence at IITH in the presence of Hon'ble Raksha Mantri Shri Rajnath Singh during DefExpo22, Gandhinagar.
Read more: https://pcr.iith.ac.in/files/pressrelease/DIAH.pdf

Tata Consultancy Services

Tata Consultancy Services and TiHAN, IITH exchanged MoU for mutual benefit in the areas of Interest related to Academics & Research.

MRIET

IITH signed an MoU with Malla Reddy Institute of Engineering & Technology (Autonomous), Hyderabad, MRIET, to provide advice for improving Technical Education, Academic Research and mentor the faculty and students at MRIET in academic activities in mutually agreeable areas of interest

Auckland University of Technology

IITH signed an MoU with Auckland University of Technology for Collaborative research, and access to AUT academics for Central government initiatives and Expert talk/Seminars by AUT academics, Vice-Versa, visit & seminars by IIT Hyderabad Academicians

IITH rejoiced the decade-long-journey this Alumni Day with the first graduating batch.
Read More: https://pcr.iith.ac.in/files/pressrelease/AD22.pdf

IITH Alumni Association has announced its 1st 10/10 winners during Alumni Summit 2022.
Event Broadcast: https://youtu.be/zYVJ_eUI0SA
Read more:
https://pcr.iith.ac.in/files/pressrelease/1010.pdf

IITH announced the Institute Alumni Awards 2022

Delhi Greet & Meet - IITH Alumnimeet IITDelhi

On the occasion of hosting Prof Desai in Japan, IITH Alumni Association, IITH, has organized the Annual Alumni Meet - 2022, Japan, powered by Suzuki Innovation Center.

Office of Alumni Relations releases a monthly digest carrying news exclusive to IITH Alumnus - Alma Connect. To get your copy write to office.ar@iith.ac.in

Alumni of IIT-H get together for a meetup in Tokyo

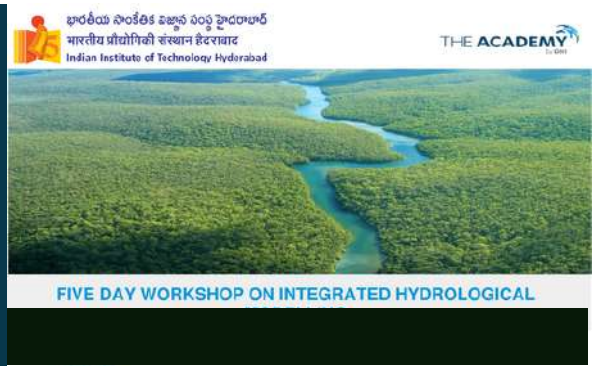
Bengaluru Greet & Meet - IITH Alumni meet IIM Bengaluru

Department of Civil Engineering, IIT Hyderabad is organizing a Seminar on "Rapid Construction of Bridges and Viaducts" on 27th January, 2023 jointly with Indian Institution of Bridge Engineers (Hyderabad Chapter).

Time: 2 PM to 5:30 PM
Venue: Auditorium, Academic Block A, IIT Hyderabad

Department of Civil Engineering, IITH along with DHI is jointly organizing a 5-day hands-on-course “National workshop on Integrated Hydrological Modelling”.

Time: 10:00 am to 5:00 pm
Date: Feb 13 - 17, 2023
Venue: IIT Hyderabad
Link to Register: https://bit.ly/3IYJmy4
Last Date r Registration: Jan 31, 202



Department of Mathematics, IITH, is organizing a National Conference on Commutative Algebra and Algebraic Geometry (CoCAAG 2023).

Conference Date: February 08-11, 2023.

Conference website:
https://sites.google.com/math.iith.ac.in/cocaag/home

Elan & ηVision, IITH brings to you, the theme for its 14th edition, the mystical town of Valenrow.

Elan & ηVision is all set for this year's fest to be held from 17th - 19th February, 2023.

Academic Staff

Dr Sivakumar Vaidyanathan

Associate Professor
Department of Chemistry

Before joining IITH as an Associate professor at the Department of Chemistry, Dr Sivakumar Vaidyanathan spent more than a decade as a faculty at NIT Rourkela, Odisha. Dr Sivakumar obtained his Bachelor's and Master's degrees in chemistry from Muthurangam Govt Arts College - affiliated with the University of Madras. After working for one and half years as a research fellow/synthetic chemist, Dr Sivakumar moved to the Indian Institute of Technology Madras (IITM), to pursue his doctoral studies. In 2007, he received his Doctoral degree under the supervision of Prof U V Varadaraju. His doctoral thesis focused on Lanthanide luminescence in mixed Metal Oxides and Silicates. After completing PhD in 2007, he worked as a Brain Korea 21 Post-Doctoral Research fellow at the Korea Advanced Institute of Science and Technology, Republic of Korea in the field of Molecular materials for display and lighting applications and then moved to Commissariat à l'Energie Atomique (CEA), Saclay, France to do his second Post-Doc in the field of Optoelectronics. His doctoral work was adjudged as the best thesis in Inorganic/Analytical Chemistry for the year 2007 by IIT-Madras and awarded the Prof Alfred Werner medal. His current research focused on optoelectronic materials for Organic Light-emitting Diodes (OLEDs), Smart LEDs, Sensors, etc.,

My Experience at IITH:
My experience at IITH is amazing and my colleagues are very cooperative and helpful in nature. Moreover, we have a visionary Director who has given opportunities to vibrant young people who can contribute to the overall growth of the Institute and mark the IITH identity around the globe.

Dr Ayon Borthakur

Assistant Professor
Department of
Artificial Intelligence

Before joining IIT Hyderabad, Dr Ayon worked at Innatera Nanosystems in the Netherlands as a Senior Neuromorphic Engineer-Machine Learning. At Innatera, he worked on marrying deep learning and analog computing towards ultra-low power and latency radar target recognition. Before that, he completed his PhD at Cornell University, USA. As part of his PhD, Dr Ayon worked on neuroscience-inspired Artificial Intelligence for learning in the wild, including a focus on its implementation in neuromorphic chips such as Intel Loihi. Dr Ayon completed his Bachelor of Technology in Electrical Engineering from IIT Dhanbad.

My Experience at IITH:
During my short time at IITH, I have found the environment to be open, supportive, and innovative. I believe this is important for a new faculty member to thrive as an individual and as a community member. During this short time, I got the opportunity to propose and teach an exciting lab course on neuromorphic AI. Moreover, events such as Innovation Day depict the inclination of this young institute to find solutions to some of the most pressing problems facing humanity. In the foreseeable future, I think this environment will give me ample opportunities to grow and also contribute to the institute's growth.

Dr Debasish Koner

Assistant Professor
Department of Chemistry

Dr Debasish Koner joined as an Assistant Professor in the Department of Chemistry, IIT Hyderabad on 1st December 2022. Prior to joining IITH, Debasish was an INSPIRE Faculty at IISER Tirupati from October 2020. Before working at IISER Tirupati, he was a postdoctoral fellow at the University of Basel, Switzerland from January 2017. He pursued his doctoral degree at IIT Guwahati in 2016. Debasish completed his Bachelor's and Master's studies at Visva-Bharati University. He is a computational and theoretical chemist. His research areas are Chemical Reaction Dynamics, Spectroscopy, and the application of Machine Learning in Chemistry, Chemical Physics, Biology, and Medical Diagnosis.

My Experience at IITH:
So far, my experience at IITH is very pleasant. After my joining, I received a warm welcome in my department. I had a great conversation with our director and my HOD in our first meeting at IITH. We had an eventful and exciting new year's evening. My colleagues in the Chemistry department as well as in the institute are incredibly helpful. I have been learning a lot from my colleagues. I enjoy working in this environment, which is dynamic and friendly. I consider it a blessing to work at IITH.

Prior to joining IITH, he served IIT Guwahati as an Assistant Professor in the School of Data Science and Artificial Intelligence for about a year. He held a post-doctoral position at the School of Informatics, University of Edinburgh, UK. He obtained his PhD in Deep Learning and Computer Vision from the Indian Institute of Science, Bengaluru. He finished his master's in Visual Information Processing and Embedded Systems from the Indian Institute of Technology Kharagpur. He completed his BTech from the University College of Engineering, JNTU Kakinada. His broad research interests are Deep Learning, Data Science and Engineering, Computer Vision, and Image Processing. Specifically, some of his ongoing research projects are on Data-Efficient Deep Learning, Robustness and Security aspects of Deep Learning models, Handling Data Imbalance in Deep Learning, Explainability in Deep Learning based Computer Vision systems, etc. He likes to play Cricket and Badminton. He likes to read and write (blog).

Dr Konda Reddy Mopuri

Assistant Professor
Department of
Artificial Intelligence

My Experience at IITH:

It's been only a month and half here at IITH and I already love the place. I find the institute generous and very cooperative. The Dept. of AI has extended a warm welcome and made my shift very smooth. I feel excited to be part of a young, ambitious, and fast-growing ethos such as IITH. I am very much looking forward to growing here and being part of IITH's future. Feel free to reach me if you need any more information.

Dr Yogesh Kumar Srivastava

Assistant Professor
Department of Physics

Dr Yogesh obtained my PhD from Nanyang Technological University (NTU), Singapore and an MTech degree in Materials Science from the Indian Institute of Technology Kanpur. Before joining IIT Hyderabad, he was a post-doctoral research fellow at the Centre for Disruptive Photonic Technologies (CDPT), NTU Singapore, for more than three years and as a Materials Failure Analysis Specialist for three years with Finisar Malaysia Sdn. Bhd. His main research interests include terahertz spectroscopy, active/passive metamaterials, superconductor photonics, sensors, and ultrafast quantum photonic devices.

My Experience at IITH:

I recently joined as an Assistant Professor at the Department of Physics, IIT Hyderabad. So far, my experience at IIT has been fantastic as I have found warm and welcoming colleagues, professional administration, and motivated students. Until now, I received a lot of professional and friendly advice from my colleagues, especially those with cubicles in the same office. This reflects the institute's multicultural, accommodative, supportive, and friendly environment. I consider myself fortunate to be a part of such a young and dynamic institution.

Prior to joining IITH in December 2022, Dr Anuj Goyal was a research scientist at National Renewable Energy Laboratory (NREL) in Golden, Colorado. Anuj received his PhD in Materials Science and Engineering in 2015 from the University of Florida, and his BTech & MTech in Metallurgical and Materials Engineering from the Indian Institute of Technology Madras in 2010. Prior to joining NREL in 2019, Anuj worked as a postdoctoral fellow at the Colorado School of Mines. His research interests are in employing first-principles computational modeling to search, design, and predict properties of materials for energy and electronic applications.

Dr Anuj Goyal

Assistant Professor
Department of MSME

My Experience at IITH:

I recently joined as an Assistant Professor in the Department of Materials Science and Metallurgical Engineering. I am grateful for the welcoming atmosphere at the department as well as at the Institute, and the supportive initial guidance provided to me by my colleagues. I am also thankful to the admin staff for helping me out in completing the due formalities and with the information needed. I look forward to contributing and building my academic career at IITH.

Dr Shirshendu Das

Assistant Professor
Department of Computer Science & Engineering

Dr Shirshendu Das is an Assistant Professor in the Department of Computer Science and Engineering, at IIT Hyderabad. Prior to joining IIITH, he was an Assistant Professor at IIT Ropar from 2018. Before working at IIT Ropar, he was an Assistant Professor at the Indian Institute of Information Technology Guwahati from 2015. Shirshendu did his MTech and PhD from the Indian Institute of Technology Guwahati. His research interests are in the fields of Computer Architecture, Hardware Security, and Emerging Memory Technologies.

My Experience at IITH:
I have joined the institute in December 2022. After joining I have found a friendly and welcoming environment in the CSE department. I am glad to be a part of such a fast-growing institute.

Dr Archak Purkayastha

Assistant Professor
Department of Physics

Prior to joining IIITH, Dr Archak Purkayastha was a postdoctoral fellow at the Center for Complex Quantum Systems, Aarhus University, Denmark. Before that, he was a postdoctoral fellow at the Thermodynamics and Energetics of Quantum Systems Group at Trinity College Dublin, Ireland. He did his BSc in Physics (Hons) from Jadavpur University, Kolkata, and MSc in Physics from IIT, Kanpur. He obtained his PhD from the International Center for Theoretical Sciences, Tata Institute of Fundamental Research (ICTS-TIFR), Bengaluru. His research interests are in the field of non-equilibrium quantum statistical physics, specifically in the theory of driven dissipative quantum many-body systems, having strong overlaps with quantum condensed matter, chemistry, information, and thermodynamics. He has worked with collaborators across various countries including Ireland, Denmark, the UK, Spain, Germany, the USA, Canada, and Poland.

My Experience at IITH:
What I find most appealing about my limited experience at IITH so far is the clear drive for growth at all levels. From rapid infrastructure development to the introduction of new programs and courses aimed at training young minds to be professionals at the cutting edge of science and technology, the institute sends a clear message of wanting to be at the forefront of technological progress. This, coupled with the department's friendly and supportive atmosphere, motivates me to strive for excellence at a personal level.

Dr Abhishek Subramanian

Assistant Professor
Department of BioTechnology

Dr Abhishek Subramanian has been appointed as an Assistant Professor in the Department of Biotechnology, IIT Hyderabad. Prior to joining IITH in December 2022, Abhishek was a Staff Scientist at VIB-KU Leuven Center for Cancer Biology, Leuven, Belgium from September 2022. Before joining as Staff Scientist, he worked as a postdoctoral research scientist at the same institute. Abhishek did his PhD at CSIR-National Chemical Laboratory and M.Sc in Bioinformatics from Bioinformatics Centre, University of Pune. His research interests include the development of constraint-based models of biological systems, inference of condition-specific biological networks using biological 'omics' data and machine learning applications for various biological questions.

My Experience at IITH:
I think it is every scientist's dream to set up his/her independent research group/ lab, train students and impart knowledge. In this respect, I was already very happy to secure a position at the Department of Biotechnology, IITH. The HR faculty office did a wonderful job in patiently explaining the joining procedure through emails and helped in my smooth transition from Belgium to Hyderabad. Also, IITH graciously accepted my request to stay at the IITH Guest house until I get settled. Most importantly, I have wonderful young colleagues at the Biotech department who are continuously helping me with their advice regarding opportunities & official procedures at IIT-Hyderabad, funding opportunities in India and are providing tips to sail through this academic ocean. Special thanks to my HOD, Dr Anindya Roy who was so humble and helpful from day one of my joinings. I was also offered a nice office with a superb view in front of our beautiful BTBM building and a lab space to set up an independent lab. Also, the first couple of weeks were a bit rough as both I and my wife were sick with an infection. The IITH Health centre has wonderful doctors who diagnosed our situation aptly and provided suitable medical treatment; will sure

Non- Academic Staff

Mr Mohan Kumar Palle

Assistant Registrar
Hostel Office

Mr Mohan Kumar has done MBA in Operations Management from Sikkim Manipal University. Before joining IIT Hyderabad, he served in the Indian Navy for 15 years as a Marine commando (MARCOS) an elite special force of India and after retirement 2 years in Marine Security. Before he was appointed Assistant Registrar, he had served as Executive Assistant and as Section Officer in IIT Hyderabad since Feb 2015. Mr Mohan Kumar has interests in cross country & sports and is also a recipient of the Best Employee of the month for Feb 2021 and the Staff Excellence Award for 2020.

My Experience at IITH:

My stay in IITH is wonderful and enjoyable. I am actively participating in the Rural development centre and any social cause. I am presently in Hostels as Assistant Registrar. I am really happy giving time to my family. I love cycling on this pollution-free campus, and hitting the grounds or swimming pool to beat the stress or recharge myself.

Mr Mohammad Abdul Junaid has done BE in Electronics and Communications Engineering from Deccan college of engineering and technology affiliated with Osmania University, Hyderabad. Before joining IIT Hyderabad, he served in a couple of IT Services and Software Product Companies like CA Technologies, FactSet Research Systems, TCS, etc. He has overall 10 years of experience in the field of System Administration, Network Security, Cloud, Cyber Security Incident Response, and Engineering.

My Experience at IITH:

It gives me immense pleasure to be a part of IITH, so far it's been a great experience of learning and I feel happy to be surrounded by exceptional people who are very knowledgeable and equally friendly to approach. I like the campus and enjoy my work and I strongly feel that I am at the right place to fulfill my passion for technology and achieve greater success in life. I hope my contributions will be mutually beneficial for IITH's success!!!

Mr Mohammad Abdul Junaid

Technical Superintendent
Department of MSME

Mr Bala Prakash T

Section Officer
Finance & Accounts Section

Mr Bala Prakash T is a Graduate (Commerce) from Osmania University and holds a CMA (Intermediate) qualification from the Institute of Cost Accountants of India. He has more than 24 years of experience working for various Central Autonomous Institutes. Before joining IITH, he served as Office Superintendent (Admin) at the National Institute of Plant Health Management, Hyderabad.

My Experience at IITH:

I joined as Executive Assistant at IIT Hyderabad in March 2019 and was posted to work at the Construction & Maintenance Division of the Institute. It was a challenging and valuable experience as I got an opportunity to learn about major construction-specific accounting principles and financial reporting. Overall, it's been a fulfilling and rewarding experience as it paved the way for career growth to become a Section Officer at IITH.

Mr Siva Krishna Reddy

Assistant Engineer (Electrical)
Construction and Maintenance Division

Mr Sivakrishna Reddy has done BTech in Electrical and Electronics Engineering from VITAM College of Engineering, Visakhapatnam. After completion of his graduation, he served as an Engineer Trainee (Electrical) at Seshasaila Power and Engineering Pvt. Limited, as an Assistant Engineer (Electrical) at Power Grid Corporation of India Limited, and as Senior Engineer (Electrical) at Ecoren Energy India Pvt. Ltd. Thereafter, he joined as Junior Engineer (Electrical) in IIT Hyderabad in 2018. He is equipped with 12 years of experience in the field of Construction of EHV Substations like 220/33kV Substation works including Civil foundation works associated with 200MW Wind Power Plant, 132/33kV Substation works under OPTCL Projects, 33kV DP Switchyards, New and Augmentation of 33/11kV Substation work, 33kV and 11kV Feeder Lines, Erection, Testing and Commissioning of Electrical Equipment, Rural Electrification works under High Voltage Distribution System (HVDS) and also Operation & Maintenance of HT and LT Electrical Equipment, LT Electrical maintenance works at Building Level. Mr Sivakrishna is a recipient of "The employee of the Month Award for February 2022 at IIT Hyderabad".

My Experience at IITH:

I feel immensely proud to be a part of the dynamic institute in the second generation of IITs. During the growth of the institute, it gave me abundant learning experience and refined my abilities to deal the situations better. The construction and Maintenance Division has an excellent team who are very supportive in all aspects. Special thanks to our beloved Director Prof B S Murty sir, for his tremendous support for the growth of the IITH Campus.

Mr Satheesh K Telagamsetti

Technical Officer (PEPS)
Department of Electrical Engineering

Mr Satheesh is a Post Graduate (Integrated Power Systems) from VNIT Nagpur. Before joining IITH as Technical Officer, he worked as Technical Superintendent in PEPS of EE Dept, IITH. Before that, he had worked for IIT-Bombay as R&D Manager.During this time, he is said to have designed and developed a Solar PV Cook-stove that won Rs.1 Million as prize money from ONGC. He also holds a Guinness World Record for conducting a workshop to 5000+ school kids about Solar PV in one session. He has experience in software like -MATLAB, PLECS, PSCAD etc. He also has experience in PCB design, circuit simulation and 3D modelling. His areas of interest are Advanced Electrical Machines, Solar EV Charging Stations, Off-grid Solar PV Systems, and Battery Management Systems. He is interested in tinkering with electronics, coding for embedded systems, and Numismatics.

My Experience at IITH:

The IITH campus is well-equipped with modern amenities and is known for its beautiful architecture. I am privileged to be part of the IITH's energetic, vibrant, and dynamic environment to grow. The Institute has a diverse and dedicated staff that provides essential support for the Institute's academic and research mission. Institute has a strong emphasis on research and innovation, and staff members have the opportunity to be involved in cutting-edge research projects and initiatives. Here I got very good colleagues and administration. My experience at IITH so far is fantastic at both the Institutional and Department level. My interaction with the HoD & the dept has been pleasant, as they have been upfront for any queries & support. Staff members are encouraged to attend workshops and seminars to keep abreast of the latest developments in their field and to develop their skills. The energy and passion for research at IITH are very high. I got the chance to interact with Prof Murty, the Director of the institute and a visionary. It was a great interaction, where I got to know about the institute's vision, culture, and activities. I feel very happy, and motivated, and looking forward to growing in this vibrant environment. Overall, working at IIT Hyderabad can be a challenging but rewarding experience for staff members, with opportunities for professional growth and development in a stimulating and supportive environment.

Mr Imtiaz Ahmed

Technical Officer
Computer Centre

Mr Imtiaz Ahmed holds a master's in Computer Networks and Information Security from Jawaharlal Nehru Technological University Hyderabad in the Year 2015 & completed BTech in Computer Science Engineering from Osmania University. Prior to joining as a Technical officer in the Computer Center - IITH, he was serving as Technical Superintendent in Computer Science Engineering since 2019 and also served as a Project Officer in Computer Center since 2015. He is an experienced professional in the field of system administration with more than 7 years of experience in the field of Servers, Storage, Cloud, Virtualization, High-Performance cluster, Networking, and Maintaining Data Centers. His areas of interest are Private Cloud, Hyper-Converged Infrastructure, BigData cluster, Data Center Infrastructure, and Cyber Security. He is certified in CISCO CCNA and Microsoft Azure Administrator Associate.

My Experience at IITH:

IITH is one of the best institutes in India to work. My experience in this institute has been great. IIT Hyderabad has given me many opportunities to learn and grow both professionally and personally, and I'm able to take full advantage of the infrastructure to help me in my career growth. Working under highly professional faculty has helped me immensely in enriching my skills and they always motivated and guided me on the correct path.

Dr Bhojaraju Gunjal

Chief Library Officer
Library

Dr Bhojaraju Gunjal has been appointed as Chief Library Officer in the Library at the Indian Institute of Technology Hyderabad, Telangana, India. Prior to this, he served as Deputy Librarian at the National Institute of Technology Rourkela, Odisha; Deputy Librarian at Thapar University, Patiala, Punjab; and Knowledge Management Consultant at TATA Consultancy Services and Cognizant, Bangalore. Dr Gunjal has over 22 years of professional experience in Library Management, Knowledge management, Enterprise Content Management, and Project Management in academic and IT Sectors.

His academic background is PhD in Library and Information Science from the University of Mysore, Mysore; MLISc from Karnataka University, Dharwad securing a Gold Medal; PGDLAN from the University of Hyderabad, Hyderabad and qualified M-SET for lectureship. He was an Endeavour Research Fellow in 2008 to visit Australia to conduct his research study at the School of Computer science and Mathematics, Victoria University, Melbourne. He has published and presented technical papers over 46 papers in Knowledge Management, Library, and Information Science in both national and international conferences, books, chapters, and peer-reviewed journals, and attended various professional training programs. Has organized various events such as conferences, workshops, consortia meetings, etc., and won many awards. He was also invited to deliver talks, session chair, and Panel member at various international and national conferences. He is also a member of Library and Knowledge Management associations such as SLA, ASIS&T, ILA, IASLIC, SIS, MILAN, BOSLA, and others.

His areas of interest include Library Management, Knowledge Management, Research Data Management, Research Visibility & Support, and Scholarly Publishing.Research areas include Digital Libraries, Knowledge Organisation Systems, Electronic Theses and Dissertations, Digital Curation, Institutional Repositories, Information Retrieval, Semantic Web, Linked Data, and Open Access.

My Experience at IITH:
I feel proud to be a part of IITH - one of the fastest-growing and reputed institutions. I would like to thank the IITH administration for making my joining process smooth. I am delighted to be part of the IITH family, and I look forward to contributing to the growth of the institute and the nation by supporting the teaching-learning and research fraternity of IITH with the support of my colleagues.

Mr Vikram Singh Kanawat has done his BCom from MDSU Ajmer and has worked in CCRAS as MTS. He belong to Mewar, Rajasthan the land of Maharana Pratap.

My Experience at IITH:
Although it has been only 1 month since joining, my experience has been fantastic. I have witnessed a congenial and healthy environment at the department and institute levels. The departmental colleagues with whom I have the pleasure to meet/interact have been very welcoming and cooperative. I am positive that IITH, being a dynamic and diverse institute, will provide outstanding opportunities for a young person like me to learn, explore, and grow professionally and personally. I feel thrilled to work in such a vibrant atmosphere at IITH and I look forward to contributing and growing with it

Mr Vikram Singh Kanawat

Multi Skill Assistant
Department of
Artificial Intelligence

Mr Shaik Sameer Ahmed

Multi Skill Assistant
Computer Center

Mr Shaik Sameer Ahmed has done BTech in Electronics and Communication Engineering from Jawaharlal Nehru Technological University, Hyderabad. After completing his education, he worked as Front Desk Associate at CSCE Computer Education, Sangareddy.
He had 3 years of experience in the field of Office Administration.

My Experience at IITH:
I am happy to be part of the IITH family and eager to contribute to the growth of the Institute. I am very fortunate to be working with experienced staff in my department and institute level who are very helpful and supportive. The work assigned lets me learn new things every day. I look forward to growing along with contributing to the institute's goals.

Mr Kalinga Chandra Mohan

Multi Skill Assistant
Department of Entrepreneurship and Management

Mr Kalinga Chandra Mohan pursued a Diploma in mechanical engineering from Government Polytechnic College, Jogipet. Before joining IITH he worked for IIIT Raichur. He has good work experience in Administration.

My Experience at IITH:
I feel honored to get an opportunity to work with an esteemed organization like IITH. I feel more confident because of the friendly work culture and the great support of my colleagues. I am enjoying my work and looking forward to exploring more and growing along with contributing to the institute's goals.

Dr Mallikarjun has been awarded PhD in Physical Education from Gulbarga University Karnataka and Diploma in Sports Coaching in Table Tennis from NSNIS Patiala Punjab. Before IIT Hyderabad he worked in various prestigious institutes/organizations like the University of Agricultural Science, Dharwad, Karnataka. Petroleum Sports Promotion Board Delhi and Central University of Karnataka, Kalaburagi. He has 8 years of experience in the field of coaching, Physical education & Sports. As a coach, he produced national-level Table Tennis Players and many state medalist players. He has also trained International Para (Physically Challenged) Table Tennis Player. As a player, he got gold, silver, and bronze in various state Table Tennis tournaments and represented in university-level tournaments many times.

My Experience at IITH:
I found the extraordinary infrastructure in IITH and still construction is going on. I am very excited about our upcoming SNCC Building. I found a lot of potentiated students for the inter IIT meet. The environment gives positive energy to work, and our faculty in charge of Sports, and colleagues are very supportive. Feeling honored to be part of this great institute.

Dr Mallikarjun

Physical Training Instructor

Dr Somashekara M A
MTech (2011) & PhD (2016)
Department of Mechanical & Aerospace Engineering
Appointed as a Head of the Department Mechanical, Materials and Aerospace Engineering (MMAE), IIT Dharwad.

Prof Amit Acharya
Ms Nikitha
Mr Tarun &
Mr Vinay
Department of Electrical Engineering
Won the Design & Verification Conference India 2022 Hackathon "AI on FPGA"

Mr Satya Prasanna Malick
Research Scholar, Department of Physics
Won the Best Poster Presentation Award at SCOP (Students Conference in Optics and Photonics) Conference, Ahmedabad.

Ms Mitalee Agrawal
Public Relations Officer
Received the PRCI Award for 'Digital Marketing' under 'Future Ready Category' & being appointed as the 'Joint Editor' for 1st ever 'Women PR Magazine' - "Aadhvika", by PRCI

Dr Sai Manikiran Garimella
Phd (2022), Department of Chemical Engineering
Appointed as an Adhoc Faculty at Department of Chemical Engineering, National Institute of Technology, Andhra Pradesh.

Dr Anish Hirwe
PhD (2020), Department of Computer Science & Engineering
Appointed as an Assistant Professor at Department of Computer Science & Engineering, IIT Palakkad

Dr Illa Mani Pujitha

Dual Degree MTech & PhD (2020)
Department of Materials Science and Metallurgical Engineering

Appointed as an Assistant Professor at Department of Metallurgical and Materials Engineering National Institute of Technology, Tiruchirappalli.

Dr Kancharla Parimala

PhD (2022), Department of Electrical Engineering (CSP)

Appointed as an Assistant Professor in the School of Computing & Electrical Engineering at the Indian Institute of Technology Mandi

Dr Baadiga Ramu

PhD (2022)
Department of Civil Engineering

Appointed as an Assistant Professor at Department of Civil and Environmental Engineering, IIT Patna

Mr Harsh Raj Gond

MDes, Department of Design

Winning Poster competition in 'Typography Poster' on Gond Type Design at TYPODAY 2022 organized by IDC, IIT Bombay

Dr Pankaj Sahlot

MTech (2010), Department of Materials Science & Metallurgical Engineering

Appointed as an Assistant Professor at Department of Mechanical Engineering NIT Kurukshetra

Mr Vineet Gairola

PhD Scholar
Department of Liberal Arts

Received the Emerging Scholar Award 2023 during Thirteenth International Conference on Religion & Spirituality in Society by Religion in Society Research Network USA

Dr Srijith P K

Associate Professor, Department of Computer Science & Engineering

Received the Sony Research Award 2021

Dr Murali K Rajendran

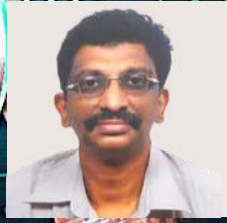
PhD (2020), Department of Electrical Engineering (Micro Electronics & VLSI)

Appointed as an Assistant Professor at National Institute of Technology, Tiruchirappalli

Mr Himadri Karmakar

PhD Scholar
Department of Chemistry

Received the Best Poster award at 27th ISCB International Conference (ISCBC-2022)



Prof Giridhar Madras

Department of Chemical Engineering

Received the Best Chemistry Scientists in India Leader Award by Research.com for being ranked in the Top 10 Scientists in India in Chemistry

Prof Shashidhar T & His Collaborators

Department of Civil Engineering

Received "THE Award for International Collaboration of the Year 2022" which is widely recognised as the Oscars of Higher Education' in the UK by "The Global Monitoring Consortium"

Mr Abhisek Sinha

PhD Scholar
Department of Physics

Received the Best Poster Award at the 12th Asian Symposium on Intense Laser Science held in Singapore

Ms Shweta Thakare

MA - Development Studies (2021), Department of Liberal Arts
COO & Co-founder - GramHeet

Her Startup GramHeet being featured in 'Forbes Asia 100 to Watch List'

Mr Gopabandhu Panigrahi

PhD Scholar, Department of Chemistry

Received the Best Oral Presentation Award at the International Conference on Frontiers in Chemical Sciences (FICS - 2022) hosted by IIT Guwahati

Mr Biswajit Panigrahi

PhD Scholar
Department of Liberal Arts

Received the Best Paper Award at the International Conference jointly organized by IIT Roorkee & Arizona State University USA

Mr Sanjiv Kumar

PhD Scholar
Department of Liberal Arts

Received the Best Paper Award at Doctoral Conference Organized by IIM Lucknow

Ms Aswathy Vijay

PhD Scholar, Department of Biomedical Engineering

Received the Best Paper Presentation Award at the International Conference ISPhOA 2022

Ms Ramya

PhD Scholar, Department of Biomedical Engineering

Won the Start-up Pitch Challenge at AMTECH Hyderabad on "3D Printing in Craniomaxillofacial Reconstruction"

Dr Nagaveni

PhD (2021)
Department of Electrical Engineering

Appointed as an Assistant Professor at IIT Dharwad

Mr Sayantan Ghosh

PhD Scholar, Centre for Interdisciplinary Programme

Secured the First Prize in the Rural Hackathon Organized by BioNEST of IIT Guwahati

Ms Isha Paliwal

PhD Scholar
Department of Mechanical & Aerospace Engineering

Received Smart System Technology Development Award from ISAMPE under student category by National Aerospace Laboratories

Mr Aszad Alam

PhD Scholar
Department of Materials Science & Metallurgical Engineering

Received the Best Poster Presentation Award by the American Chemical Society (ACS) And for receiving a CashPrize at the "International Conference on Biomaterials, Regenerative Medicine, and Devices (BIO-Remedi 2022)"

Ms Ibtesham Tarannum

PhD Scholar
Department of Chemistry

Received the Best Poster Award with a cash prize at the 2nd Asian conference on Molecular Magnetism (ACMM-II) held at the Indian Institute of Science Education and Research Bhopal (IISERB)

Dr Swathi Krishna S

PhD Alumnus (2018)
Department of Liberal Arts

Appointed as an Assistant Professor in the School of Humanities, Social Sciences, & Management at IIT Bhubaneswar

Prof Mahendrakumar Madhavan

Department of Civil Engineering

Elected as a Fellow of the Institution of Civil Engineers (ICE) London

Mr Parikshith Shashikumar & Ms Anushree Gupta

Department of Liberal Arts

Selected for the Future Research Talent fellowship at the Australian National University

Dr Anupam Gupta

Department of Physics

Published his Work in Nature Materials Journal

Ms Harsha Gopal Agrawal

PhD Scholar
Department of Chemistry

Receiving the Best Poster Award at IC-AIE-FA 2022 the International Conference on Aggregation- Induced Emission from Fundamentals to Application held at K K Birla Goa Campus

Dr Sikandar Shaikh

Adjunct Faculty
Department of Biomedical Engineering

Conferred with the HALL OF FAME Award by Tamilnadu and Pondicherry State Chapter IRIA Indian Radiological and Imaging Association

Chanchala Devi, Ruchi, Purva & Aruna
Badminton - Women (Silver)

Women's General Championship

Sugirtha Gayathri G
Shot Put (Bronze)

Purva Kherkar
Shot put (Gold) & Discus Throw (Silver)

Ruchi Yadav
Discus Throw (Bronze)

Sonu Anirudha NV
Shot put (Gold)

Team IIT Hyderabad
Fantabulous Performance
at
55th Inter-IIT Sports Meet 2022
Overall Rank - 6
(7 Medals & 1 General Championship)

Anil Kushwaha
Shot Put (Gold)

भारतीय सांकेतिक विज्ञान संस्थ हैदराबाद
भारतीय प्रौद्योगिकी संस्थान हैदराबाद
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Contact: +91 40-2301 6099, +91 83310 36099
E-Mail: pro [at] iith [dot] ac [dot] in