IIT Palakkad
Technology IHub Foundation
Driving automation for energy and safety

Kaleidoscope

IPTIF, with support from NM-ICPS, DST, has moved into its fourth year of operations with a special focus on identifying and supporting technologies with wider impact and translational potentials, from academia, startups and industries. Past six months have proven to be very effective in implementing this strategy, adding many new Intellectual Properties (IPs) and startups to IPTIF's portfolio. IPTIF also excelled in scaling the activities under skill development and in forging new National and International collaborations. We are confident that with the support from all our stakeholders, IPTIF will make a significant impact in nurturing a regional deep-tech innovation ecosystem with global vision. Presenting you a list of IPTIF's activities undertaken in the past six months (October 2023- March 2024) in this issue of Kaleidoscope.

Volume 3, Issue 2

Chairman's Message

Prof. A. Seshadri Sekhar

Director, IIT Palakkad & Chairman, IPTIF

I am delighted to present to you the latest volume of IPTIF's newsletter, "Kaleidoscope," which chronicles the endeavors of the Hub over the past six months. During this time, IPTIF has embarked on over a dozen new translational R&D projects, welcomed an equal number of innovative startups, conducted numerous skill development programs, and forged several significant collaborations. IPTIF witnessed tangible outcomes in terms of technological advancement, new patents, publications, awards and honors. During this period, few very distinguished personalities and industry leaders have graced IPTIF with their visits, setting the stage for future collaborations.

I am also pleased to highlight that this edition features an insightful opinion piece by Prof. Asokan, my esteemed colleague at IIT Madras and Chair Professor, IPTIF.

I extend my heartfelt congratulations to the IPTIF team for their hard work, and anticipate a more focused expansion of their endeavors, creating a profound impact on the technology and innovation landscape in the coming months. I invite the readers to delve into this issue of "Kaleidoscope" and share their valuable feedback with the IPTIF team.

CEO's Message

Dr. Saishyam Narayanan

Chief Executive Officer, IPTIF

It gives me great joy to bring out this latest issue of "Kaleidoscope" in my role as CEO of IPTIF. I wish to express my heartfelt gratitude for the support and guidance received from the NM-ICPS leadership to IPTIF. Additionally, I am thankful for the visionary guidance by IPTIF's esteemed Chairman, distinguished Board of Directors, expert Advisors and dynamic Project Directors. I deeply appreciate the dedicated efforts of IPTIF's technical and administration team in driving many successful programs during this period.

Over the past six months IPTIF has been bustling with various programs and initiatives. Significantly, we have expanded our technology, product and startup portfolio through the IMPACT program and have had exciting success stories from our ongoing technology development projects, doctoral initiatives, and supported startups. Our network and reach have widened through strategic collaborations, hosting influential industry leaders, and organizing industry-relevant upskilling programs for students and faculty members across different institutions.

I invite the readers to go through this issue of Kaleidoscope to gain deeper insights into IPTIF's journey thus far and our path ahead. We thank you for your valuable feedback and continuous support to IPTIF.

Expert Speaks

Prof. Asokan Thondiyath
Professor, Department of Engineering Design,
IIT Madras & Chair Professor, IPTIF

Role of Artificial Intelligence in Modern Robotics

Design and development of "smart" autonomous robots for field and service applications has been a focus area in robotics for the last few decades. The technological challenges in sensing, perception, cognition, and control have restricted the development of fully autonomous robots. Probabilistic robotics promised many advancements in the early years; however, computational complexity and operational challenges limited their applications. One of the significant breakthroughs happened in the form of "big data", made available through large sensor networks and crowd-sourcing. This, coupled with the increase in computational power of modern machines, has led to the use of artificial intelligence (AI) for perception and planning in robotics. AI algorithms can analyse large amounts of data, identify patterns, and make decisions based on that information. AI enables machines to learn from past experiences, solve problems, and make decisions independently without needing instructions in the form of computer programs. Decision making was made based more on the "learnings" from experience.

How AI can Impact Robotics

Artificial intelligence in robotics can have multiple effects on the successful utilisation of robotics for many practical applications. Some of the significant impacts are listed below:

a) Autonomy for robots: Autonomous robots like driverless cars, warehouse robots, and shop floor robots will benefit hugely from the application of AI. Their dependence on exteroceptor sensors and sensor data processing will be reduced to a great extent due to the use of learning-based algorithms for the planning and execution of tasks. Future robots will learn from their environments, and their dependence on preprogrammed instructions will broadly decline. With the help of AI algorithms and learning techniques, autonomous robots can perceive, interpret, and respond autonomously and intelligently. This will lead to increased reliability, safety, and situational awareness. One significant outcome will be the increased task complexity that the autonomous robots can handle. Most complex robotic tasks, such as robotic surgery and underwater exploration using remotely operated vehicles will be handled efficiently by autonomous robots in the future.

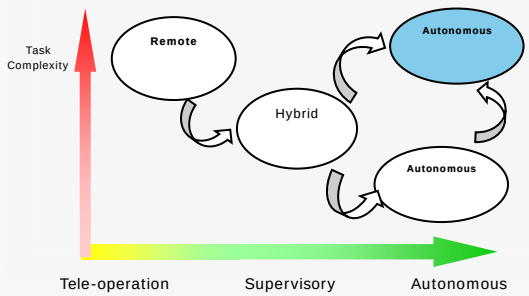


Figure 1: Robot autonomy and task complexity: AI-integrated autonomous robots will be capable of executing much more complex tasks in the future.

b) Safety in workplaces: The use of AI can drastically reduce safety issues in workplaces, especially on the shop floor, construction sites, warehouses, and many such environments. Robotics technologies coupled with AI can monitor the health of robots and other machines and predict potential safety issues well in advance. Future robots will be equipped with self-diagnosis tools and maybe self-repairing algorithms based on what they have learned from the robots deployed elsewhere (connected robot learning).

c) Social Robots: One of the significant impacts of AI in robotics will be the introduction of many new and varied applications of robots in our day-to-day lives. Alexa, Siri, and similar AI-powered tools are just the beginning of this revolution. Quality of life will be greatly improved with the use of such tools. AI-powered elderly assistant systems will be an essential aspect of elderly care in the future. They will be useful in medication management, fall detection, chronic health monitoring, etc. Social robots can interact with older adults and connect emotionally with them.

d) Assistive robots: Assistive robots will be more personalised to meet the specific requirements of individuals and will be capable of adapting to the environment through self-learning algorithms. Wearable robots like exoskeletons, rehabilitation robots, and prosthetic devices will be capable of exhibiting much more user-specific behaviors due to the AI enabled features.

e) Man-Machine Interactions: We interact with machines in the old-fashioned mode of input devices, Graphical User Interfaces (GUI) etc. With machines becoming smarter and their behavior highly contextual, how we interact with them will also see a paradigm shift. Highly personalised and environment-dependant interactions with the machines will be possible with AI-enabled interfaces. Conversational AI (CAI) can combine natural language processing, artificial intelligence, and machine learning to understand human languages and emotions and provide intelligent responses. With the help of CAI, field robots may not require instructions in any specific format to do tasks, and they learn the behavioral aspects of the user and make decisions based on the environment and operational scenarios.

Apart from the specific applications, AI agents (like ChatGPT and its derivatives) that have been enabled by large language models approach general-purpose AI by semi automating tasks previously considered complex. These agents can handle research surveys, summarization, code generation, debugging, etc. All these may need only appropriate prompts and tuning for specific applications, which has opened a new field of prompt engineering. Now there are models that can breakdown a large task and generate successive prompts to get the desired result. They can interact with people in other ways than just text; it can be image, audio, or video generation from a single prompt to re imagine the entire field of visual media and artistic styles. Since the future of robotics depends very much on human-centered operations, AI agents will play a crucial role in its evolution.

Challenges Ahead:

One of the major challenges to overcome in the use of AI in robotics is the lack of enough data for training the AI modules. Insufficient and/or inappropriate training may lead to severe errors in the robot's behavior, which may be detrimental to the system in which it operates. Too much focus on AI algorithms without giving enough attention to the hardware in which AI is integrated may be problematic as the hardware limitations may seriously impact the outcome. There is an urgent need for synergistic development of AI and Robotics to integrate both technologies to reap the benefits. Too much focus on algorithms without focusing on the hardware platforms will be

counterproductive in the long run. The need of the hour is to develop multimodal robotic platforms capable of operating in multiple environments in multiple modes of locomotion, integrated with AI technologies.

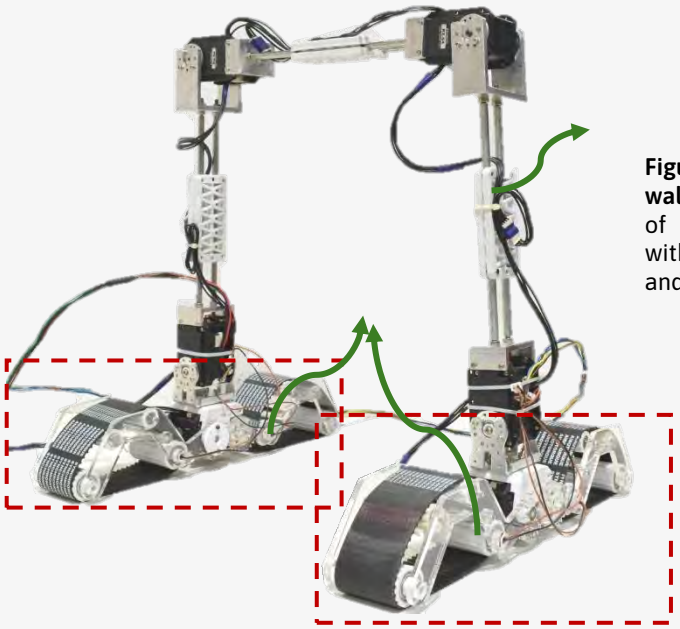


Figure 2: Multimodal robot capable of walking, rolling, and manipulation. Design of innovative robotic platforms integrated with AI will bring new impetus to the field and service robotics.

Conclusion:

Artificial intelligence-based applications, ethically integrated with robotics, will revolutionise the field of robotics and transform how we use robots in our daily activities. Whether we like it or not, AI in Robotics will play a significant role in future field and service robots' design, development, and application. As an academic community, it is our utmost priority to train the next generation on the ethical use of AI in robotics to leverage the technology and bring benefits to the society.

Technology Updates

New Translational R&D Projects Funded- **13**
New Doctoral Research Projects supported -**21**
Patents filed - **04**
Publications - **12**

New Translational R&D Projects
(IMPACT Program)

- High Efficiency Rooftop Vertical Axis Wind Turbine for Wind-Solar Hybrid Usage
- Swiss-roll fuel reformer.
- Compact and Efficient GaN-based Battery Pre-heater Module for Operations in Subzero Climatic Conditions
- Catalytic overlayered sensors for early detection of battery thermal runaways.
- Design and development of a passive battery thermal management system for electric vehicles.
- Design and Development of 3-D printer for Fabricating Sustainable Product.
- Optimal product configuration for SMT line.
- Model Based Development of Domain ECU (DCU) and Validation through Hardware in Loop (HiL) Simulation for Commercial Vehicle Applications.
- Methods to Improve the Reliability of the Wind Turbine GearBox System.
- Fabrication of low-cost sensor prototype device for the real-time detection of anesthetic drugs from human samples.

IIT Palakkad

- Safe human-machine interaction for manipulation of Deformable Objects **(IIT Jodhpur)**
- Edge AI based Advanced Driver Assistance Systems (ADASs) for Autonomous Vehicles (AVs) **(PSG College of Technology, Coimbatore)**
- BlockChain Powered Smart Energy Meter (**Karunya Institute of Technology and Science, Coimbatore)**

New Doctoral Research and Development Projects

- Optimal control of dynamical systems with learning methods (**IIT Palakkad**)
- Intrinsic Explainability in Deep Learning Models (**IIT Palakkad**)
- Control of a structural system with sudden nonlinearity using the sliding mode technique (**IIT Palakkad**)
- Flexible and Accelerate Runtime Monitors for In-field Verification of Software Applications (**IIT Palakkad**)
- Development of interfacing circuits for single element and differential capacitive sensors (**IIT Palakkad**)
- Deep Bayesian Methods for Meta-Learning (**IIT Palakkad**)
- Development of a wearable upper limb exoskeleton mechanism for reducing interaction forces due to misalignment (**IIT Madras**)
- A Continuous-Time Algorithm for Distributed Constrained Optimization on Strongly Connected General Digraphs with Time-Varying Constraints and Objective Function (**IIT Madras**)
- Real-time State Estimation for Autonomous Vehicles (**IIT Madras**)
- Localization of electromagnetic sources in the presence of scatterers (**IIT Madras**)
- A study on vulnerability of complex networks in centrality based node attack strategies (**IIIT Kottayam**)
- Hardware Acceleration of Bandwidth and Energy Efficient Deep Learning Architecture (**IIIT Kottayam**)
- Design of 802.15.4e TSCH Industrial IoT multihop networks for remote estimation and control (**IIST Thiruvanathapuram**)
- Development of Fractional Chaotic Observer for Secure Communication (**IIST Thiruvanathapuram**)
- Person re-identification using Optimal Transport Theory (**IIST Thiruvanathapuram**)
- A Low-cost Space-based Solution to Provide Information Access in Remote Regions of the World (**IIST Thiruvanathapuram**)
- UAV-Assisted HetNets for Public Protection and Disaster Relief (**IIIT Delhi**)
- Safe and Secure Cooperative Adaptive Cruise Control for Collaborative Autonomous Driving (**IIIT Delhi**)
- GNSS-free Localization for IoT Applications: LoRaWAN Approach (**IIIT Hyderabad**)
- Design and Implementation of control strategies for the coordination of shuttle playing robot (**NIT Calicut**)
- Development of the Power and Braking Systems for a Fixed Canard Dual-Spin Projectile (**IIT Kanpur**)

New Patents filed

AN UNMANNED GUIDED VEHICLE (UGV) BASED ROBOTIC SYSTEM FOR ARMED FORCES

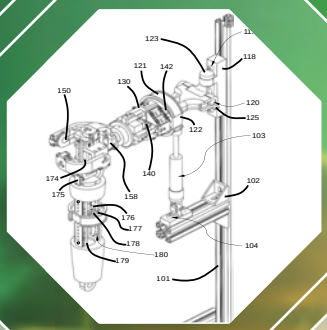
Dr. Santhakumar Mohan
Dr. Sareth Velloor Raghavan
Dr. Prashant Raturi

AN UNDERWATER VEHICLE FOR HIGH-ENDURANCE AQUATIC EXPEDITIONS

Dr. Santhakumar Mohan
Dr. Jagadeesh Kadiyam

TRANSCEIVER SYSTEM FOR NETWORKED CONTROL SYSTEM

Dr. Shaikshavali Chitraganti



BIOMIMETIC HUMAN SHOULDER PHANTOM MECHANISM FOR TESTING WEARABLE EXOSKELETON

Mr. Avinash S Pramod
Dr. Asokan Thondiyath
Dr. Santhakumar Mohan

Publications

- **Energy Efficient DNN Compaction for Edge Deployment.**
  Bijin Elsa Baby, Dipika Deb, Benuraj Sharma, Kirthika Vijayakumar & Satyajit Das
  https://link.springer.com/chapter/10.1007/978-3-031-42921-7_20

- **Comparative performance investigations of the intervention-class underwater vehicle with different possible thruster configurations using eight identical thrusters.**
  Arun Krishnan K.S, Jagadeesh Kadiyam, Santhakumar Mohan
  https://www.sciencedirect.com/science/artcle/abs/pii/S0029801823025313?via%3Dihub

- **Study on Various Encryption/Decryption Algorithms for Secure Communication using Chaotic based Hashed Key.**
  Meera Kannan Selvaganesan Narayanasamy
  https://ieeexplore.ieee.org/document/10442209

- **Performance Analysis of Cache-Enabled Handover Management for Vehicular Networks.**
  Neetu R.R, Gourab Ghatak, Vivek Ashok Bohara and Anand Srivastava
  https://www.iiitd.edu.in/~wirocomm/resources/Neetu_2023_TNSE.pdf

- **Cache Enabled UAV HetNets: Access-xHaul Coverage Analysis and Optimal Resource Partitioning.**
  Neetu R R, Gourab Ghatak, Anand Srivastava, Vivek Ashok Bohara
  https://arxiv.org/abs/2207.06822

- **Electromagnetic Torque Control of an Optimized Flux-Concentrated Transverse Flux Generator.**
  Sandeep Mohan Nayak, Jitendra Singh and Mangal Kothari
  https://arc.aiaa.org/doi/10.2514/6.2024-0020

- **A Novel Direct Digitizer for Leaky Differential Capacitive Sensors Using Phase Sensitive Integration.**
  Muhamed Jamshir M, Sreenath Vijayakumar, Satyajit Das, Karthick Thiyagarajan, Sarath Kodagoda
  https://doi.org/10.1109/LSENS.2024.3355249

- **A Noise Mitigation Approach for Improving Position Estimate in Indoor Vehicle Navigation Using Inertial Measurement Unit.**
  Vasumathi R, Subhadeep Kumar, Ramkrishna Pasumarthy, and Nirav Bhatt
  https://ieeexplore.ieee.org/document/10441905

- **Development of a novel three-axis force sensor-based monitoring device for static shoulder therapy.**
  Avinash S Pramod, Adithya R N, Poongavanam Palani, Naveenreddy V Varala, Siddhant Panigrahi, Santhakumar Mohan, Asokan Thondiyath

- **Development of an Autonomous Ground Robot Using a Real-Time Appearance Based (RTAB) Algorithm for Enhanced Spatial Mapping.**
  Jerin Peter, Mervin Joe Thomas, Santhakumar Mohan,
  https://www.researchgate.net/publication/372676653_Development_of_an_Autonomous_Ground_Robot_Using_a_Real-Time_Appearance_Based_RTAB_Algorithm_for_Enhanced_Spatial_Mapping

- **Conceptual Design And Structural Analysis Of A Multipurpose Agricultural Robot.**
  Mervin Joe Thomas , Rekala Sai Bharani Kumar Goud , Nagamalla Jayaprakash , Santhakumar Mohan
  https://link.springer.com/chapter/10.1007/978-981-99-6774-2_12

- **Characterizing Neural Network Weights for Class Imbalanced Learning**
  Siddharth R, Abhik, Banerjee, Vijendran Venkoparao
  https://doi.org/10.1109/PuneCon58714.2023.10449991

Entrepreneurship Development

New Startups Onboarded Under IMPACT Program

IIT Palakkad Technology IHub Foundation
Driving automation for energy and safety

IMPACT

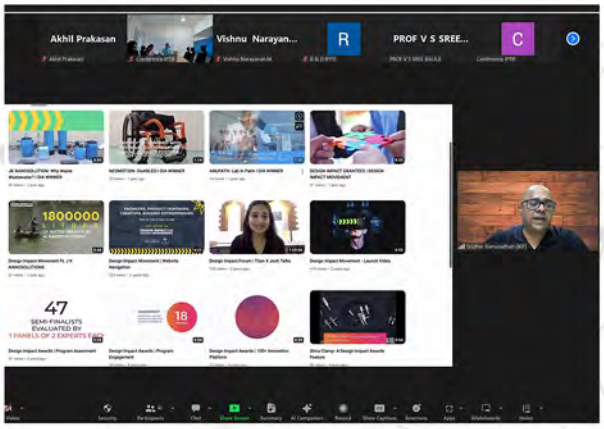
Innovation-to-Market Product Acceleration in Cyber Physical Technologies

- Fuselage Innovations Pvt. Ltd
- ARKLE Energy Solutions Pvt Ltd, Bengaluru
- Breeze Power Solutions Private Limited, Pune
- eDrift electric private limited
- Elexo Energy Private Limited
- InfinityX Innovations Private Limited
- Mazout Electric Private Limited
- MedCuore Medical Solutions Pvt Ltd
- Warbler PSM Private Limited
- BumbleBee Instruments

DESIGN IMPACT MOVEMENT

IPTIF partnered with IKP-EDEN in launching Design Impact Movement, a pan-Indian social initiative of Titan Industries to encourage young people to use design for a positive social effect. Provided sensitization and mentorship to scout for innovative ideas in focused areas. 89 application were submitted through IPTIF portal to the Design Impact Movement.

IPTIF in collaboration with IKP EDEN conducted multiple "Sensitization Webinar " introducing the Design Impact Movement. Dr. Sridhar Ramanathan, CEO of IKP EDEN and Dr. Rajeswari R, HR Manager, IPTIF led the sessions online and in-person at IIT Palakkad, Karunya University, Coimbatore, Kendriya Vidyalaya, Kanjikode, Palakkad and DDU KAUSHAL Kendra, CUSAT to encourage ideation from students, young researchers and Startups for solutions solving local and global challenges and submission of ideas to Design IMPACT Movement. 300+ enthusiastic participants joined these session.



EIR 2024 Entrepreneurship In Residence

IIT Palakkad Technology IHub Foundation
Driving automation for energy and safety

IPTIF Launched EIR 2024 seeking applications from young innovators, young startups and experienced industry persons to associate with IPTIF in their entrepreneural journey.

EIR 2024 Entrepreneurship In Residence

IIT Palakkad Technology IHub Foundation
Driving automation for energy and safety

IPTIF-Entrepreneur in Residence (EIR) Program aims to support budding entrepreneurs for developing, prototyping, validating and testing their deep-tech technology/product ideas to convert them into successful ventures. The program offers a package for an entrepreneur including monthly fellowship, mentoring, access to prototyping facilities and opportunities for future investments and network Under the National Mission on Interdisciplinary Cyber Physical Systems (NM-ICPS) scheme, IPTIF has special thematic focus on Intelligent Collaborative Systems (ICS) for addressing challenges in Energy and Safety sectors majorly, among others like Automotives, Defense, Healthcare, and Agriculture.

Fellowships
INR 30,000/month

Duration
12 months

Eligibility Criteria

- Any Indian Citizen above 18 years of age is eligible.
- Young Innovators, Founders of Startups incorporated less than 3 years ago, Individuals with Industry experience moving to Entrepreneurship etc., are all eligible.
- Should not be recipient of any EIR fellowship earlier.
- Should not be a recipient of any other IPTIF Startup funding support.
- Should not be receiving any other fellowships or Full time salary at the time of EIR.
- EIR fellowship is a full-time program and an EIR should be ready to incorporate a Startup by the end of 12 months, if not a Startup founder already.

Skill Development

IPTIF certified hands-on training workshop on "IoT and Embedded Systems" conducted at School of Engineering, CUSAT from November 1- 4th 2023 with 115 participants.

IPTIF certified 3-day hands-on training workshop conducted on "Mastering Robotics: Automation and Innovation" at Govt. Women's Polytechnic College, Nedupuzha, Thrissur, from 11-13th October with 30 Participants.

IPTIF certified three-day training workshop on "An Introduction to the Robotic Regime" at Jai Shriram Engineering College, Tirupur with 60 participants.

IPTIF certified two-day interactive workshop on "ROS (Robotic Operating System)" between 9th and 10th, of November 2023, at the Providence College of Engineering, Chengannur with 30 participants.

IPTIF certified five-day workshop on the topics "IoT and Embedded System Integration: Building Tomorrow's Technology" and “ElectroInsight: ML & DL Unveiled for Electronics” at Providence College, Chengannur with 30+ participants

A session on "Markov Decision Process and its Applications" was led by Dr. Dony J Muttath, Postdoctoral Fellow IPTIF, as part of an FDP at Muthoot Institute of Technology and Science, Kochi, on 19th January 2024. 12 faculties participated.

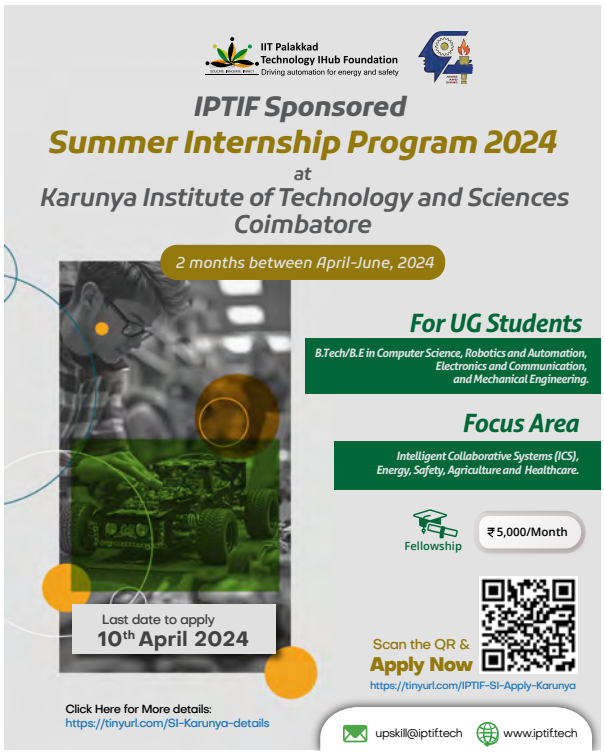
Dr. Siddharth R, Postdoctoral Fellow, IPTIF , handled a session on “Opportunities in Artificial Intelligence & Machine Learning based start-up Ideas” as part of an Entrepreneurship Awareness Program (EAP) conducted by KIED at Govt Victoria College, Palakkad on 19th January 2024.

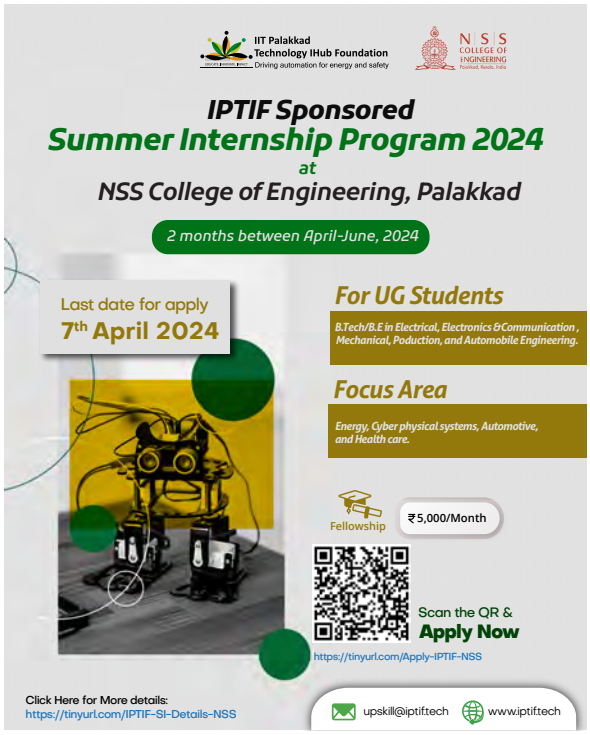
30 students from Government Engineering College (GEC) Wayanad had an inspiring Robotic Workshop on 16th February 2024., led by Dr. Vijay Muralidharan, Assistant Professor, IIT Palakkad, at IPTIF with hands-on experience of a few state-of-the-art robots.

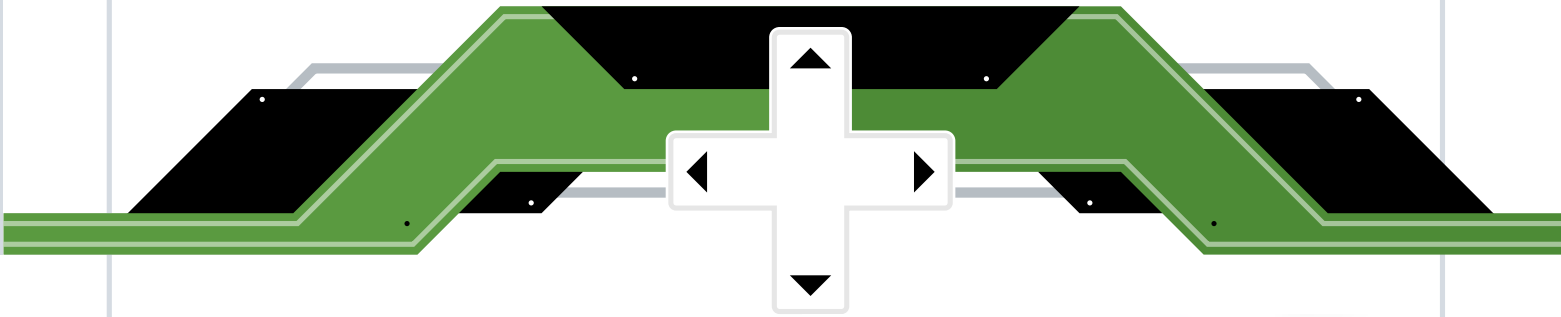
IPTIF- sponsored Intel workshop on "FPGA" was conducted on 19th November 2023, at IIT Palakkad, with Mr. Padmanabhan K, Software Enabling and Optimization Engineer at Intel, as the resource person. 22 researchers and students participated.

IPTIF's management training program, PARIVARTHANA, led by Dr. Rajeswari R, HR Manager, IPTIF was organized twice during this period for IPTIF employees to enhance their performance, interpersonal effectiveness and team work.

New Internship Programs Launched

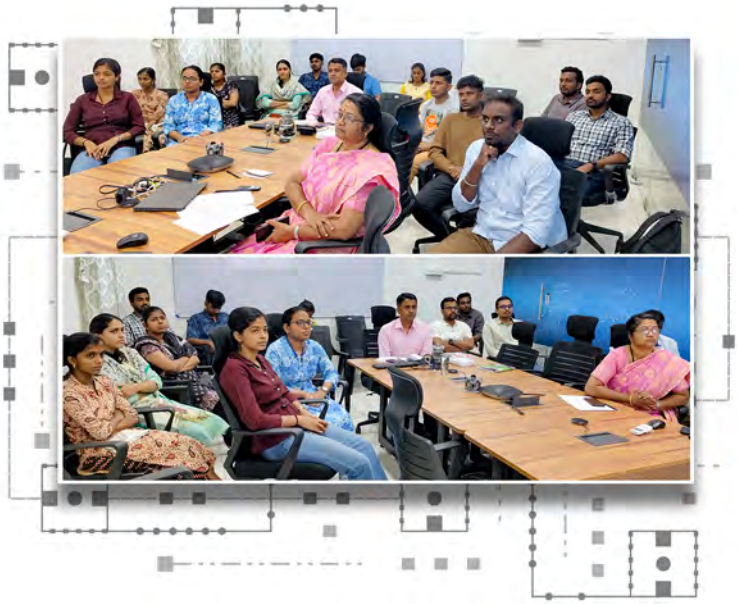






Events & Workshops

IPTIF team participated in 3rd Edition of National workshop on Technology Innovations on Cyber Physical Systems (TIPS 3.0) organized by C3iHub at IIT Kanpur, as part of the NM-ICPS mission and showcased progress on our technology developments.



IPTIF's 3rd Foundation day was celebrated in hybrid mode on 17th October 2023 with two knowledge sharing sessions on IP and startup finacing with eminent speakers and over 90 participants..

IPTIF Colloquium on “Industrial IoT & AI" with distinguished speakers from Factory of the Future and Digital Innovation Lab, School of Science, Computing & Engineering Technology, Swinburne University, Australia, was held at IIT Palakkad on 11th December 2023 with over 100+ participants.

IPTIF organised a colloquium at IIT Palakkad on "Automotive Technology Innovation" with senior domain expert Dr. Bharat Balasubramanian, Chief Mobility Research and Development Officer, University of Alabama, as the speaker, on 4th January 2024. Over 120 enthusiastic attendees participated.

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IPTIF co-hosted in organizing KERALA STARTUP MISSION (KSUM) "Founders Meet 15.0 ", a networking meeting of Startup Founders in Kerala, at IIT Palakkad, on 12th January 2024.

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IPTIF team showcased its technology products and startups at the 31st Convergence & 9th Smart Cities India expo 2024, held in New Delhi from 17th -19th January 2024.

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Dr. Akhilesh Gupta, Secretary SERB and Senior Advisor, DST, Govt of India & Dr.Ekta Kapoor, Mission Director, National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS) in the IIT Palakkad Campus on 14th December 2023. In his one-hour address to a packed audience at the Leadership talk, Dr. Gupta shared his invaluable insights into the R&D ecosystem and public Research funding in the country, while demystifying the "Anusandhan National Research Foundation (ANRF)".

New Collaborations

IPTIF, IIT Palakkad and Swinburne University signed a tripartite MoU for collaborations in R&D, technology developments, skill developments, and academics.

EDUCATE . INNOVATE . IMPACT

IKP EDEN

Collaboration For Design Impact Movement and Entrepreneurship Development

EDUCATE . INNOVATE . IMPACT

VIT Vellore Institute of Technology

R&D Collaboration for Technology Development under IMPACT Program

EDUCATE . INNOVATE . IMPACT

N S S COLLEGE OF ENGINEERING Palakkad, Kerala, India

Implementing partners for IPTIF Summer Internship Program 2024.

Visitors at IPTIF

Dr. Carl Hensman and Dr. Venkata Krishnan, Senior Program Officers at Water Sanitation & Hygiene (WaSH), Bill & Melinda Gates Foundation (BMGF) and Prof. Srikant Mutnuri, Professor in Department Biological Sciences & Dean International Collaborations at BITS Pilani Goa Campus visited IPTIF.

Mr. C Padmakumar, Special Officer and Mr. Rejeesh G R, GM, Marketing, Kerala Medical Technology Consortium (KMTC), Govt of Kerala.

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Mr. Daisuke Tanji, Founder CEO and, Ms. Mariko Hanaoka, Co-founder of Indobox Inc. (Japanese Startup)

Mr. Anoop Ambika, the CEO of Kerala Startup Mission visited IPTIF on February 22, 2024 to discuss partnerships and involvement aimed at advancing technology, startups, and entrepreneurship in the region and Kerala state.

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Dr. K. Subramanian, Senior Vice President, Product Development at Ashok Leyland visited IPTIF to understand IPTIF's technology portfolio and discuss about innovative and collaborative technology development.

Awards & Accomplishments


Clean energy & climate change

Anupam Kumar and Arvind Bhardwaj 28, 28

CO-FOUNDER AND CEO; CO-FOUNDER AND CTO, MINI MINES

Mini Mines collects used lithium-ion batteries from pan-India and recycles them to extract lithium, cobalt, and nickel. This makes the scarce, expensive resource of lithium available in the country and reduces the reliance on traditional mining for cobalt and nickel. The raw materials are sold to battery manufacturers, enabling a circular economy for lithium-ion batteries. Founders Arvind Bharadwaj and Anupam Kumar claim they can extract enough lithium, cobalt and nickel from spent batteries to power 66 lakh EVs. The applications are many—including pharma, glass manufacturing, catalyst producers, and more. They have received a grant of $0.5 million from Oil India.

- IPTIF Entrepreneur in Residence (EIR) Mr. Vimal Kumar C R his startup Vi INNOVATIONS™ Pvt. Ltd. through their IPTIF supported technology played a vital role in enabling Ms. Jilumol Mariet Thomas, differently abled without both arms, to obtain her four-wheeler driving License, being the first Indian woman to receive one.
- IPTIF EIR Mr. Govinda Hari Sonavane and his Startup Agri Waste Pvt. Ltd won the Agri Startup Awards 2024 from MANAGE. for the IPTIF supported technology, Automated Biochar Machine.
- Founders of startup MiniMines Cleantech Solutions Pvt. Ltd, supported under IPTIF Oorja Grand Challenge , was listed in the Forbes India 30 Under 30, 2024
- Mr. Avinash S Pramod, IPTIF Doctoral Fellow recieved Best Paper Award at IC-ETITE 2024 held at VIT Vellore, during 22nd-23rd February 2024.
- Fuselage Innovations Pvt. Ltd, IPTIF supported startup secured certification from the Directorate General of Civil Aviation (DGCA), Government of India, for their Made in India Agriculture Drone, FIA QD10.

Cherishing Moments at IPTIF

IPTIF team celebrated Christmas 2023 with lot of fun activities.

IPTIF celebrated Diwali at the office with vibrant decorations and colours.

Children's Day 2023 was celebrated at IPTIF with a very inquisitive batch of young friends from CAHSS, Wadakkanchery, and Assisi English Medium School, Kanjikode.

EDUCATE . INNOVATE . IMPACT

IPTIF

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