# Kaleidoscope

We are excited to present the inaugural issue of our newsletter "Kaleidoscope" which will provide you with insider access to our research, design, concept, and execution. Our first issue focuses on what's new – a look at our vision, mission, goals, and initial initiatives. We look forward to engaging with you every quarter and giving you timely updates on our stimulating journey.

## Genesis

The Technology Innovation Hub on Intelligent Collaborative Systems (TIH-ICS) was born in the thick of the COVID-19 pandemic when the National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS) and the Department of Science and Technology wanted to step up their efforts to make India a leader in Cyber-Physical Systems (CPS) technology. The IIT Palakkad Technology IHub Foundation (IPTIF) manages this Hub.

## Stakeholders

The IIT Palakkad Technology IHub Foundation (IPTIF), a Section 8 (non-profit) organisation, provides a robust platform by way of a healthy, innovative ecosystem in which it can nurture technology-based start-ups and entrepreneurs. It engages with research institutes and labs both inside and outside of India and closely collaborates with industry to produce marketable technologies and commodities. TIH-ICS draws talent and utilises capabilities accessible across the country through IPTIF to foster scientific discovery, world-class technology, and product development.

## Reach

The technological activities envisioned at TIH-ICS through projects, start-up initiatives and workshops will provide enormous benefits to a variety of sectors, including healthcare, agriculture, urban transportation, manufacturing, energy, and defense.

## Vision

IPTIF encourages cutting-edge research, creative product development, industry-relevant up-skilling, and comprehensive entrepreneurial assistance in the domain of Cyber-Physical Systems.

## Mission

IPTIF will increase India's competitiveness, allow long-term sustainable economic growth, and create jobs by encouraging and expanding research, skill development, translational research, and product development in cyber-physical systems with a focus on Intelligent Collaborative Systems.

- IPTIF will give a boost to innovation and entrepreneurship in India by establishing conditions that foster creative and inventive thinking.
- IPTIF will provide academics, innovators, and innovation-driven start-up ecosystems with the necessary knowledge, skills, and real-world experience to enable them to flourish in research, skill development, and technological product creation.

## Objectives

- To encourage and strengthen ICS research, skill development, technological product development, and international partnerships to increase competitiveness, long-term economic growth, and job creation.
- To promote innovation and entrepreneurship by creating environments that support creative and imaginative thinking.

# Chairman's Message

## Prof. P. B. Sunilkumar

Director, IIT Palakkad

In light of the COVID-19 pandemic, it is only reasonable to draw from the words of Steve Jobs that if we did not confront any type of threat, it would be impossible to understand what would push us to innovate; and that is the same philosophy that inspires us at IPTIF. In my capacity as Director of IIT Palakkad, I am honoured to serve as Chairman of IPTIF. It is thrilling to be at the top of an organisation that aims to make India a worldwide leader in technology and innovation.

As we transition into Industry 4.0 and see intelligent systems permeate practically every aspect of life, it is crucial to up-skill individuals to become better users and creators of these technologies. It is with this in mind that the Department of Science and Technology (DST) established the National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS) with the goal of positioning India as a leader in CPS technology.

This objective resulted in the establishment of 25 Technology Innovation Hubs(TIH). Through product or technology development, start-up creation, and national and international partnerships. These TIHs are projected to play a critical role in revolutionising CPS technology and innovation in India and throughout the world. To meet the mandate of the TIH at IIT Palakkad, we formed the IIT Palakkad Technology IHub Foundation as a Section-8 corporation (IPTIF). Through focused research and development efforts, this organisation will endeavor to bring to fruition innovative CPS technologies for boosting safety and energy efficiency.

IPTIF has created programmes and activities to help those who aspire to be entrepreneurs develop their entrepreneurial skills. Among our various efforts are undergraduate and doctoral scholarships, as well as Entrepreneur-in-Residence (EIR) programmes. We also provide a variety of skill development programmes, courses, and webinars. We at IPTIF are committed to creating an ecosystem that nurtures innovation, creativity, and excellence in our stakeholders.

# Project Director's Message

**Dr. Albert Sunny**

Assistant Professor, IIT Palakkad
Project Director TIH ICS

I'm delighted to be talking to you through this first-ever edition of the Newsletter. IPTIF was established in October 2020 to facilitate the speedy tracking of technological development efforts, as an augmentation to the on going efforts of IITs in the same direction. Immediately after IPTIF was established, we started off by discussing how to set up our infrastructure along with understanding what existing strengths, tangible or otherwise, we could leverage.

We launched the Entrepreneur-in-Residence (I-EIR) programme by selecting six promising entrepreneurs who started getting an amount of INR 30,000 monthly from us as a means to defray costs. A week-long EIR virtual gala was held between November 8 and 12, 2021 where young minds participated in the break-out sessions with the industry's topmost leaders.

The Pitch AARAMBH event resulted in us shortlisting five of the 10 start-ups; 2 of these 5 have qualified to get funding for their projects. Funding will be facilitated for projects involving hardware prototyping through PRAYAS.

IPTIF has offered 42 AGNI Fellowships to motivate UG students who want to work in the area of Intelligent Collaborative Systems, and 26 Dctoral fellowships to individuals pursuing full-time Ph.Ds. in the area of CPS-ICS.

Our original ambitions would converge on technological development and with the intent to plant the seeds for this as early as college, we have begun our efforts regionally and we intend to grow to a national level.  I-Skill is a skill development programme that is a part of the i-TREND Centres' capacity building efforts. I'm very happy to share that talks with colleges in the region have already resulted in 11 colleges in Kerala and Tamil Nadu signing up to be a part of the I-Skill initiative.

In retrospect, 2021 was an exciting year despite several obstacles which we were able to nimbly maneuvre. In 2022, we plan to approach enterprises about establishing micro laboratories to help them overcome technological challenges. ICS systems or CPS technologies will be employed, with an emphasis on energy and safety. I am confident that 2022 will further supplement our on-going efforts and help us discover our place in the ecosystem.

# The Three Pillars of IPTIF

The ethos of the IPTIF is built on three pillars, viz., Technology Development, Entrepreneurship, and Skill Development.

## Technology Development

- Serve as a nodal point for product and technology related investments
- Use projects to enable product and technology development
- Assist with intellectual property and license to industry
- Connect venture capitalists, industries, start-ups, academics and technologies/products

## Entrepreneurship

- Nurture start-ups
- Offer Entrepreneur-in-Residence programmes
- Create a seed support system
- Set up accelerator programmes
- Plan grand challenges

## Skill Development

- Set up i-TREND centres to conduct skill development programmes
- Disburse graduate, post-graduate and doctoral fellowships
- Facilitate national and international collaborations

# Our Technology Journey in 2021

Despite the fact that COVID-19 compelled us to start our operations only in the latter part of 2021, we are pleased with the work we have achieved in the three verticals, which we are glad to share with you. Under the Technology Development vertical, IPTIF has made significant headway in implementing 9 long-term projects with IIT Palakkad and IIT Madras.

**1** Design, Development and Control of a Multi-purpose Mobile Manipulator for intelligent and collaborative manipulation tasks

**2** Design and Development of an Intervention-class Underwater Robotic Vehicle with Tilting Thrusters for marine applications

**3** Development of Low-altitude Microsatellites using Long-endurance Glider Plane Collaboration

**4** Motion Capture System

**5** Aerial Dexterous Manipulators, Grasping and Transportation

**6** Real-time Monitoring and Control of Road Bridge Structure

**7** Cyber-Physical Systems in Collaboration with Artificial Intelligence for Smart Agriculture improving energy efficiency and environment safety

**8** Unified Framework for Collaborative Intelligent Systems

**9** Energy-Efficient Distributed Estimation and Control of Networked Robots and its Implementation Architectures

## Entrepreneur-in-Residence

The IPTIF Entrepreneur-in-Residence (I-EIR) programme helps aspiring entrepreneurs pursue their entrepreneurial dreams by

- Lowering the risks associated with establishing start-ups.

- Providing critical feedback to help them develop their goals and objectives.

- Giving opportunities such as co-working spaces for developing ideas into marketable products.

- Providing exposure to best practices for starting a business and broadening professional networks.

The EIR virtual gala between Nov 8 and 12, '21 was a huge success. Young minds had the opportunity to participate in discussions and break-out sessions with the industry's top leaders. It gave them the confidence to put their business ideas into action. The fact that six EIR fellows were enlisted as a result of the gala's success was encouraging to us.

EDUCATE . INNOVATE . IMPACT

TECHIN
IIT PALAKKAD

## AARAMBH - A Pitch Event

▶ IPTIF and TECHIN (the incubator arm of IIT Palakkad) co-hosted the first ever workshop-cum-pitch event.

Workshop was on 'Intelligent Collaborative System' (ICS) solutions for safety and energy.

Held between Nov and Dec 2021.

Winning team secured grant of up to 7 lakhs for prototyping and incubation start-up support.

IPTIF aims to support more such innovations.

## Skill Development Vertical - Highlights

### I-Skill Initiative

- Skill development program of IPTIF.

- Youth to be trained at Skill Development centres and will benefit from – improved technical skills, increased productivity, being able to build capacity by preparing them for the evolving Cyber-Physical Systems technologies.

- 11 skill development ready centres set up in engineering, arts, and science colleges.

- Emphasise the 'Study/Work-near-Home' concept.

- Students from any region of the country could benefit from the cutting-edge multidisciplinary training and capacity building programmes.

- Aims to make students the next-generation technocrats, engineers, and scientists.

### Features

- Workshops
- Certification programmes
- Weekend programmes
- Week-long programmes
- Semester programmes
- Boot camps

# Skill Development Vertical - Highlights

## Undergraduate Fellowships

- For motivated students working in the field of Intelligent Collaborative Systems.

- Ideas that address an immediate need, develop new technologies, or bridge a gap.

- Fellowship for 6 months.

- Monthly fellowship of INR 10,000 42 fellowships awarded in 2021; 11 women.

## Doctoral Fellowships

- IPTIF provides Fellowships to individuals pursuing full time PhD in CPS-ICS.

- Duration is 48 months.

- Fellowship – INR 31,000/month for the first 2 years, Thereafter INR 35,000/month for the remaining 2 years.

- Includes INR 2 lacs as a contingency fund.

- 26 fellowships awarded so far; 15 women.

## I-Skill Bootcamp on "Python for Data Science"

- Launched on Jan 18th, 2022.
- Curated and mentored by Dr. Satyajit Das, Assistant Professor, IIT Palakkad.
- 12 hour content covered over a weekend.
- Included video, audio, and reading materials.

# Testimonials

**Vimalkanth M. J.**
IPTIF UG Agni fellow
3rd Year CSE, PSNA College of Engineering and Technology

"I would like to thank IPTIF for the incredible help and support. Currently I'm working on a smartwatch prototype that focuses on telehealth and women's safety. Initially, I required a large amount of funding to continue with this project because it involves sensitive and expensive electronic modules. I would take this opportunity to express my heartfelt gratitude to the IIT Palakkad Technology IHub Foundation (IPTIF) for providing me with a fellowship as well as sufficient funds to complete this project. Their enthusiasm for innovation far exceeds expectations. So, with this message, I encourage every innovative student to apply for this fellowship, seizen this opportunity, and turn your idea into a reality."

**K. Meera**
IPTIF Ph. D. fellow
Indian Institute of Space Science and Technology

"I feel fortunate to be a part of IPTIF. I am conducting research with the IPTIF Doctoral Fellowship under the supervision of Dr. N. Selvaganesan. My research focuses on the Development of a Fractional Chaotic Observer for Secure Communication. I am currently studying Linear Systems Theory, Information Theory and Coding, Mathematical Methods for Signal Processing, and Research Methodology. In addition, I am conducting a literature review on observer design and have completed one presentation as part of that. I am grateful to IPTIF for providing me with the opportunity to interact with professionals ranging from the next generation to established leaders in my field of study. This was also useful in acquiring the necessary items to carry out the research work and reduce academic school expenses. Every innovative student to apply for this fellowship, seize this opportunity, and turn your idea into a reality."

# IPTIF Oorja Grand Challenge

IPTIF Oorja Grand Challenge envisions enabling largescale skill development in design aspects of multidisciplinary systems related to the energy domain. Undergoing such a challenge will also form/enable teams who can lead fundamental research, product development, industry development and job creation for the Indian and global energy sector. This will make India a forerunner in the solutions to mitigate climate change.

The IPTIF Oorja Grand Challenge is a pre-incubation activity that aims to pave the way for innovation in the National and Global Energy Sectors. The prize for incubation following prototype review could be up to INR 1.5 lakh for designing following shortlisting, INR 10 lakh for prototyping following design review, and INR 25 lakh for incubation following prototype review. We seeks a large number of innovators in order to facilitate large-scale skill development in the design aspects of multidisciplinary systems related to the energy domain. Students, researchers, and entrepreneurs can form groups capable of leading fundamental research, and product development.

# IPTIF in 2022

The following are some highlights of IPTIF's upcoming activities in 2022. We look forward to updating you on additional events in the coming issues.

■ There will be boot camps on 'Building Interactive Applications with MATLAB & Simulink' that will be conducted in collaboration with Mathworks.

■ IPTIF Agni PG Fellowships for post-graduate students enrolled in a 2-year M.Tech. programme at IIT Palakkad that is aligned with the CPS-ICS theme.

■ Launch of IPTIF Technology, Research, and Entrepreneurship Development (i-TREND) Centre - a techno-entrepreneurial scheme for academia. This center aims to encourage translational R&D and entrepreneurial activities at educational institutions. It focuses on developing institutional mechanisms to nurture and accelerate research, entrepreneur activities, potential internships, and jobs.

■ CPS Promotion and Acceleration of Young and Aspiring technology entrepreneurs (PRAYAS): Under the PRAYAS scheme, an early-stage start-up with a high chance of success will receive standalone funding.

■ CPS Start-ups and Spin-off Companies: Under this scheme, each start-up will be incubated for a year at a cost of INR 15 lakh. Recent graduates who have nurtured a good idea in their minds and would now like to try converting it into a prototype are likely to form teams under this scheme.

■ CPS Entrepreneurship-in-Residence(EIR): The EIR programme is similar to those offered by Entrepreneur First (EF), Start up bootcamp (SBC), and others. This will invite entrepreneurs whohave founded start-ups and have experience to participate in a training-cum-mentorship programme. Participants of this programme will discuss their ideas and attempt to form a company through partnerships.

# Conclusion

We, at the IIT Palakkad Technology IHub Foundation, aim to increase job creation, improve self-reliance in businesses, and reduce reliance on foreign technological monopolies. Our efforts are aligned to position India as a global technology enabler, in line with the Indian Government's Startup-India, Make-in-India, Design-in-India, and Atma Nirbhar Bharat ideologies.

📞 +91 9188952063    ✉ office@iptif.tech    🌐 www.iptif.tech