

MINUTES OF THE MEETING OF MEMBERS OF HUB GOVERNING BOARD OF NMICPS TECHNOLOGY INNOVATION HUB ON AUTONOMOUS NAVIGATION (TIHAN) FOUNDATION HELD ON THURSDAY 25TH APRIL 2024 AT ADMIN BLOCK, BOARD ROOM, IIT HYDERABAD, KANDI CAMPUS, SANGAREDDY, TELANGANA, INDIA - 502284 AT 12.00 P.M.

Time of commencement of the Meeting: 12.15 P.M.

Time of conclusion of the Meeting: 1.00 P.M.

1. ATTENDANCE

Sr. No.	Name	Designation	Mode of Attendance Physical/Electronic mode
Members:			
1.	Prof. B S Murty	Chairman	Physically
2.	Prof. P Rajalakshmi	Project Director	Physically
3.	Dr. Ekta Kapoor	Mission Director, DST Govt. of India	Through VC from New Delhi
4.	Mr. Rohit Kumar	Deputy Secretary, Integrated Finance Division DST, Govt. of India	Through VC from New Delhi
5.	Mr. C S Sharma	Member, Quality Council of India	Through VC from New Delhi
6.	Dr. Reji Mathai	Director, Automotive Research Association of India (ARAI)	Through VC from Pune
7.	Dr. Gopichand Katragadda	Industry Member	Through VC from Bengaluru
8.	Dr. Kumar N. Sivarajan	Industry Member	Through VC from Bengaluru
9.	Mr. Samir Kumar	Industry Member	Through VC from Bengaluru
10.	Dr. Aravind Kumar Rengan	Academic Member	Physically
11.	Prof. Bheemarjuna Reddy Tamma	Academic Member	Through VC from Hyderabad
Executive Team & Invitee:			
12.	Dr. Naga Praveen Babu Mannam	TiHAN - Hub Executive Officer	Physically
13.	Dr. Syam Narayanan	TiHAN – Technical Officer	Physically
14.	Dr. Prakash Kumar	MeitY Member	Through VC from New Delhi
15.	CA Saurabh Dashottar	Auditors	Through VC from Hyderabad
16.	CS Jayata Agarwal	Practising Company Secretary	Through VC from Jaipur

2. ELECTION OF THE CHAIRMAN:

As per article 27 of Articles of Association of the company, the Director of IIT Hyderabad (Host Institute) is deemed to be the chairman of NMICPS TiHAN Foundation, and as per Mission communications, Chairman of Host Institute will be Chairman of the HGB. Thus, **Prof. B. S. Murty** was elected as the chairman of the meeting and occupied the chair.

3. QUORUM:

At 12.15 p.m., the Chairman welcomed the Members present physically and through video conferencing. Thereafter, the Chairman announced that the requisite quorum was present and called the Meeting to order. The Chairman extended a warm and hearty welcome to all members at the Hub Governing Board Company Meeting (HGB).

4. LEAVE OF ABSENCE:

Leave of absence was granted to Mr. Krishna Bodanapu, Prof. Chandrashekhar Sharma, Mr. S. K. Marwaha, for not attending the meeting due to unavoidable circumstances and had requested the same.

5. CONFIRMATION OF MINUTES OF THE MEETING OF MEMBERS OF HGB HELD ON 23RD JANUARY 2024:

Minutes of the Hub Governing Board meeting held on 23rd January 2024 duly initialed by the Chairman placed before the Board and approved. Prof. P Rajalakshmi explained the activities and decisions taken in the previous meeting to all the members.

6. TiHAN VISION & MISSION, ACTIVITIES, RESEARCH AREAS:

Prof. P Rajalakshmi informed the members of the HUB regarding the primary focus, vision and mission of TiHAN.

She further informed the HGB Members about the research areas of TiHAN. The R&D focuses on addressing the challenges in realizing the adoption of autonomous vehicles and navigation systems (UAVs, ROVs, etc.) in real-time use cases. The hub aims at translational technology research and development along with commercialization in the areas of autonomous navigation and data acquisition systems. The broad application sectors of the hub include Autonomous Transportation Systems, Agriculture, Infrastructure, Surveillance, and Environmental.

She also informed that DST Secretary Prof. Abhay Karandikar, along with the NMICPS officials Dr. Ekta Kapoor – Mission Director, NMICPS, Dr. J B V Reddy – Scientist F, DST, visited the NMICPS Technology Innovation Hub on Autonomous Navigation (TiHAN) Foundation at IIT Hyderabad on 21st March 2024, which has a first-of-its-kind testbed for research and development of autonomous navigation technologies. TiHAN-IITH has demonstrated autonomous multimodal transportation solutions - Ground, Aerial, Surface, and

Underwater. DST secretary interacted with faculty, students, and research staff of TiHAN IITH along with R&D collaborators and startups in this technology vertical. DST secretary gave insightful suggestions to make India a global leader in this area of autonomous navigation.

DST Secretary, Prof. Abhay Karandikar commented, the India DST supported NMICPS Technology Innovation Hub on Autonomous Navigation (TiHAN) Foundation at Indian Institute of Technology Hyderabad is working on exciting technologies that will transform transportation in the country.

The hub TiHAN-IIT Hyderabad has developed several futuristic autonomous multimodal transportation solutions like ground, aerial, surface and underwater vehicles & also a first of its kind testbed for R&D of autonomous navigation technologies.

The solutions are embedded with sensors, in-house developed actuators, control systems, mapping, and AI algorithms, which enable autonomous driving navigation in different scenarios like highway merging, autonomous parking, Adaptive Cruise Control (ACC), pedestrian detection, and negotiation of obstacles.

Such technologies can help mitigate risks, ensure safety, increase efficiency, accessibility, and reduce environmental impact, paving the way for evolution of safe & convenient automated transportation in the country.

7. TIHAN TARGETS & ACCOMPLISHMENTS SO FAR:

Prof. P Rajalakshmi explained that the Research and Technology Nurture the R&D portfolio of the hub and promote commercially viable translational research. She explained the increase in CPS Research Base Hub projects - 88 collaborative R&D projects. Periodic project reviews have been done through an expert project review committee. She informed the board about the:

Technology Development: No of Technologies (IP, Licensing, Patent Etc.) – 36 (includes copyrights, patents, Software IPs- and Trademark), Technology Products - 65, Publications, PR and other Intellectual activities - 252, Increase in CPS Research Base – 88.

Entrepreneurship Development: Technology Business Incubator (TBI) - 4, Start-ups & Spin-off companies – 30, GCC - Grand Challenges & Competitions- 8, Promotion and Acceleration of Young and Aspiring technology entrepreneurs (PRAYAS)- 3, CPS-Entrepreneur in Residence (EIR)-25, Dedicated Innovation Accelerator (DIAL)- 2, CPS-Seed Support System (CPS-SSS)- 1, Job Creation – 623.

Human Resource Development: Graduate Fellowships – 309, Post Graduate Fellowships – 103, Doctoral Fellowships – 64, Faculty Fellowships – 19, Chair Professors – 4, Skill Development - 7080, Postdoctoral Fellowships – 21.

International Collaborations: International Collaborations - 23.

8. FUND STATUS:

Prof. Rajalakshmi presented the funds received from DST and utilization of the same to date. So far TiHAN-IITH was received around Rs. 89.43 crores from DST and also spent Rs. 89.52 Crores and we are negative by Rs. 9.94 lakhs. She further informed that UC, SoE & Declaration for FY 2023-24 was submitted to DST on 08-Apr-2024 & 12-Apr-2024 accordingly and an interest amount of Rs. 9,52,098/- was refunded to DST through Bharatkosh with Transaction Ref No. 0804240005436 dated 08-Apr-2024. We have requested to DST that the next Grant of 45.54 crores for Smooth functioning of the Hub on 16th of March 2024.

9. TECHNOLOGY DEVELOPMENT:

She further informed the members about the Transfer of Technology (ToT) and Commercialization: TRL less than 3 products are 36, TRL 3 – 7 products are 89, and TRL more than 7 products are 65.

Prof. P. Rajalakshmi explained about TiHAN IIT Hyderabad – ToT Procedure and Guidelines Proposed and ToT Committee Members. Prof. P Rajalakshmi informed the HGB members about the ISO standards – Testing and Validation at TiHAN Testbed and NABL Accreditation Process initiated at TiHAN for eVTOL Lab. Prof. P Rajalakshmi explained the Testbed on Autonomous Navigation (Aerial/Terrestrial) which is set up at IITH and also explained the ongoing construction activities of testbeds with long test tracks for high-speed testing of AVs, Rainfall and Fog generation testing facilities, and Autonomous Vehicles (AVs) – Driving in Adverse Weather and GPS-denied conditions. She also informed about Multi-modal sensor data collection across India which include Lidar-camera fusion, Radar-camera fusion, Lidar-based real-time object detection, and Radar-based object detection.

She mentioned Edge-Based Autonomous Vehicle (AV) navigation and Connected vehicles - C-V2X Communications, Autonomous Unmanned Aerial Vehicles (UAVs) Activities, Drone-based Traffic Data Analytics Framework Using Edge, Drone-based Traffic Data Analytics Framework, Fault detection analysis for unmanned aircraft systems, Heavy Payload Drones, GPS Denied Navigation/ Indoor Navigation, Bioinspired Unmanned Aerial Vehicles (UAVs), Fail safe mechanism on drone, Autonomous Surface Vehicles (ASVs), Subsea Pipeline/Cable Inspection & Underwater Object Identification.

She also talked about Impactful Start-Ups projects Supported by the NMICPS TiHAN Foundation - Autonomous Drug Delivery Robots for Healthcare Industry, Special People Mobility EV Wheelchairs, Autonomous Long Endurance Aerostatic Drones, Smart Electric Power Tiller for Low-Income Farmers, Powered staircase load carrier with automatic weight balancing, Mobinav (Ground Control station). She also gave TiHAN-IITH– Executive Summary, Start-Ups, EIRS, PRAYAS, Seed Support System (SSS), Faculty Fellowships, Chair Professors, Women Scientists, R&D Collaborators, Hub Review Mechanisms, Expert Committee Members, TiHAN Recognitions, Suggestions from The Members, Discussion, And Action Plan and concluded the meeting.

10. SUGGESTIONS FROM THE MEMBERS, DISCUSSION, AND ACTION PLAN:

Prof. B S Murty mentioned that the DST Secretary's visit to TiHAN IIT Hyderabad was successful and Prof. Abhay Karandikar appreciated TiHAN IITH. All HGB members complimented the TiHAN R&D activities.

Dr. Ekta Kapoor informed the TIH to engage more in the commercialization of the technologies and make the hub more self-sustainable. TiH should also be involved in scaling up the R&D activities for Phase II towards establishing Technology Research Parks (TRPs).

Mr. Gopichand Katragadda raised a question about the number of patents filed and technology products. He also mentioned the Technology Push and market pull of ToT Products. He also mentioned the collaboration project with TiHAN IITH - Drone A UAV with a Hyperspectral Imaging Sensor.

Dr. Reji Mathai suggested that research has to be translated with the support of Industry Collaboration. He also mentioned that ToT is to be carried out with appropriate consideration of ToT Costing and market intelligence.

Mr. Kumar Sivarajan mentioned that the ToT products should be discussed with industry partners and taken further and also suggested ToT should be non-exclusive.

Mr. Rohit Kumar informed about the ToT agencies such as TiFAC, BCIL, National Research Development Corporation (NRDC).

Mr. C S Sharma has extended support for the NABL Accreditation Process for TiHAN IIT Hyderabad from QCI.

VOTE OF THANKS:

Prof. Rajalakshmi announced the summary of the discussion, recommendations, and decisions taken in the meeting. Before the conclusion of the Meeting, CS Jayata Agarwal, Company Secretary, made the roll call after the meeting and ensured the presence of a quorum throughout the meeting.

With the agenda item being transacted, Jayata thanked the members for making it convenient to attend the meeting and thanked them for their active participation.

Thereafter, the members declared the meeting as concluded.

Signatures:

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Prof. B. S. Murty
Chairman of HGB

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Prof. Rajalakshmi
Project Director/Member Secretary