



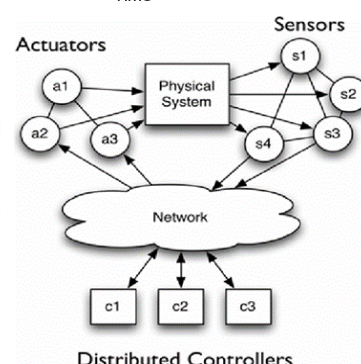
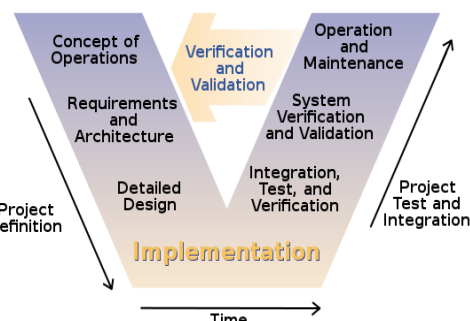
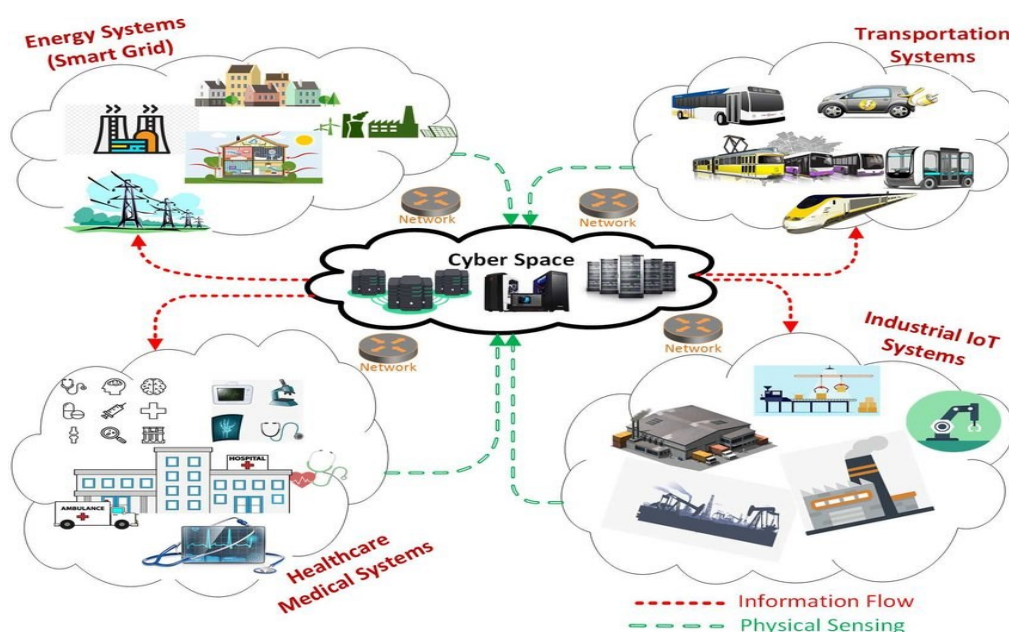
A NEW M.TECH COURSE ON: Cyber Physical Systems (CPS)

Offered by: Advanced Technology Development Centre (ATDC), IIT Kharagpur

Course Commences from: Autumn, 2025

What is Interesting about this M.Tech Course?

Automation is transforming industries through Cyber-Physical Systems (CPS), impacting fields like healthcare, transportation, security, and manufacturing. Enabled by advancements in embedded systems, controls, and software, CPS drives innovation and efficiency. The M.Tech program emphasizes key areas, including embedded system design, automation, programming, CPS communication, and sensing technologies. By fostering a comprehensive understanding of these components, the program prepares students with the skills needed to address the growing industrial demand for CPS expertise and innovation.



Offered to the following disciplines (based on GATE score):

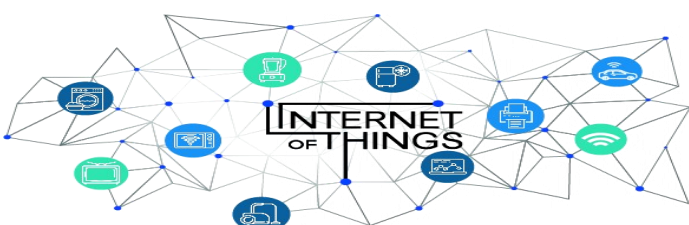
- Electrical Engineering
- Electronics & Comm. Engg.
- Computer Sc. Engineering
- Instrumentation Engg.
- Artificial Intelligence
- Sponsored candidates from reputed organizations are also encouraged to apply (Gate score is not mandatory in this case)

Benefits to Students

- Through interdisciplinary expertise, the students can satisfy the needs of smart industries, that faces a severe dearth of specialized manpower in CPS
- Exposure to cutting-edge subjects, advanced labs & use of hi-tech tools and software prepares the students for real-world challenges
- A strong foundation in CPS will enable the students to become prominent leaders in future industrial and academic research
- Students can choose electives from other areas such as AI/ML, automotive systems, VLSI, computer science etc., based on their interests
- Students from diverse backgrounds such as EE/ECE/IN/CSE, achieve and contribute to critical trans-disciplinary expertise through fruitful interactions
- Core faculty members with expertise in various verticals of CPS

Salient Facets to Note

- State-of-the-Art course contents and research facilities
- Truly Interdisciplinary
- Industrial Internships in core CPS-oriented Organizations
- Guest Lectures by Industrial Experts
- Excellent Job Prospects in core CPS-oriented Industries



Contact us:

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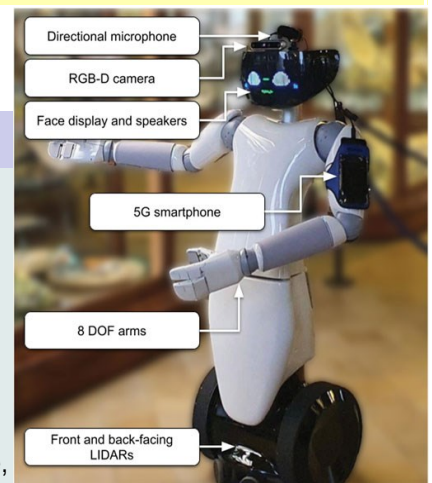
Core Theory Subjects	Core Laboratory Subjects
1. Dynamics & Control of CPSs; 2. CPS Architectures: Design & Validation; 3. CPS Sensing, Actuation and Interfacing; 4. CPS Networks	1. Embedded Control Lab; 2. CPS Design and Validation Lab; 3. CPS Applications Lab; 4. CPS Networks Lab.

List of Elective Subjects

1. Principles of Automotive Dynamics and Control; 2. Security Aware CPS and IoT Design; 3. AI for CPS; 4. Distributed Real-time Systems; 5. Embedded Machine Learning; 6. Introduction to Augmented and Virtual Reality; 7. Embedded Control of Electrical Drives: Design and Implementation; 8. Artificial Intelligence: Foundations and Applications; 9. Cryptography and Network Security; 10. Reinforcement Learning; 11. Photonic Quantum Information Technologies; 12. Digital Signal Processing and Applications; 13. Foundations of Machine Learning; 14. AI/ML for Robot Autonomy; 15. Dependable and Secure AI-ML; 16. Deep Learning Foundations and Applications; 17. AI for Manufacturing; 18. Advanced Digital Communication; 19. Communication Networks; 20. Nonlinear Systems and Control; 21. Modeling and Identification; 22. Automotive electronics; 23. Industrial Automation and Control; 24. Sensors and Measurement technology; 25. Analog Signal Processing; 26. Automotive Sensors and Instrumentation

Major Hardware and Software Setups: We have advanced laboratories equipped with state-of-the-art industry standard hardware and software:

Hardware Equipment	Software
<ul style="list-style-type: none"> TI Launchpads and AVR Microcontrollers EV Control Unit, Compact Rio, Miniature Motor Dyno Setup, Smart BMS, Charger/ Discharger for battery Robotics Kits, 3D Printer Electrodynamic Vibration Shaker and Analyzer System Standard Electrical Measuring Equipment Biomedical Control & Instrumentation setup Smart Grid Testbed, 5G MEC Testbed 6-axis motion platform Motion Systems (PS-6TM-150), VR Omnidirectional treadmill, Full Body VR Haptic Suit, VR device (Pico 3, Magic leap, Quest 2, Quest 3, Quest pro, HTC pro, HP Reverb G2), AR/MR Smart Glasses E-Motor Test Bench, Power Converter, Sensor and Controller Interface Board, Solar Emulator, High Voltage Power Supply 	<ul style="list-style-type: none"> ATMEL Studio MATLAB XILINX LABVIEW Synopsys, Mentor graphics Raptor dev. Tool AMESIM, Simulation X Altair (compose, activate, embed) Proteus PCB design and circuit simulation software COMSOL Multiphysics Software CoventorWare Software for MEMS Design Code Composer Studio



Prospective Recruiters



Structure MTech in Cyber Physical Systems (CPS)

Course Structure

Semester 1			
Name of the subject	Course Number	L-T-P	Credits
DYNAMICS AND CONTROL OF CYBER PHYSICAL SYSTEMS	AT6XXXX	4-0-0	4
CPS ARCHITECTURES: DESIGN & VALIDATION	AT6XXXX	4-0-0	4
EMBEDDED CONTROL LABORATORY	AT69001	0-0-3	2
CPS DESIGN AND VALIDATION LABORATORY	AT6XXXX	0-0-3	2
ELECTIVE I (DEPTH)	--	3-0-0	3
ELECTIVE II (DEPTH)	--	3-0-0	3
ELECTIVE III (DEPTH)	--	3-0-0	3
Seminar	AT6XXXX	0-0-3	2
Total		17-0-8	23
Semester 2			
Name of the subject	Course Number	L-T-P	Credits
CPS SENSING, ACTUATION AND INTERFACING SYSTEMS	AT6XXXX	4-0-0	4
CPS NETWORKS	AT6XXXX	3-0-0	3
CPS APPLICATIONS LABORATORY	AT6XXXX	0-0-3	2
CPS NETWORKS LABORATORY	AT6XXXX	0-0-3	2
ELECTIVE IV (DEPTH)	--	3-0-0	3
ELECTIVE V (DEPTH – IR; BREADTH - PP)	--	3-0-0	3
ELECTIVE IV (BREADTH)	--	3-0-0	3
Project-1	AT6XXXX	0-0-0	2
Total		16-0-6	22
Semester 3			
Name of the subject	Course Number	L-T-P	Credits
Summer Internship	AT6XXXX	0-0-0	4
Project-2		0-0-0	16
Total		0-0-0	20
Semester 4			
Name of the subject	Course Number	L-T-P	Credits
Project-3		0-0-0	20
Total		0-0-0	20
Total over 4 semesters		33-0-14	85

List of Electives

SL. NO.	COURSE NAME	SUBJECT CODE	L-T-P	CREDIT
1.	PRINCIPLES OF AUTOMOTIVE DYNAMICS AND CONTROL	AT60002	3-0-0	3
2.	SECURITY AWARE CPS AND IOT DESIGN	AT60004	3-0-0	3

3.	ARTIFICIAL INTELLIGENCE FOR CYBER PHYSICAL SYSTEMS	AI61006	4-0-0	4
4	PHOTONIC QUANTUM INFORMATION TECHNOLOGIES	AT60205	3-0-0	3
5.	DIGITAL SIGNAL PROCESSING AND APPLICATIONS	ET60017	3-0-0	3
7.	AUGMENTED AND VIRTUAL REALITY	AT60009	3-0-0	3
8.	EMBEDDED MACHINE LEARNING	AT60005	3-0-0	3
9.	DISTRIBUTED REAL TIME SYSTEMS	AT60010	3-0-0	3
10.	EMBEDDED CONTROL OF ELECTRICAL DRIVES: DESIGN AND IMPLEMENTATION	AT60203	3-0-0	3
11.	INTRODUCTION TO AUGMENTED REALITY AND VIRTUAL REALITY	AT62001	2-0-2	3
12.	ARTIFICIAL INTELLIGENCE	CS60045	3-0-0	3
13.	CRYPTOGRAPHY AND NETWORK SECURITY	CS60065	3-1-0	4
14.	REINFORCEMENT LEARNING	CS60077	3-0-0	3
15.	ARTIFICIAL INTELLIGENCE: FOUNDATIONS & APPLICATIONS	AI61005	3-1-0	4
16.	FOUNDATIONS OF MACHINE LEARNING	AI60203	3-0-0	3
17.	AI/ML FOR ROBOT AUTONOMY	AI60209	4-0-0	4
18.	DEEP LEARNING FOUNDATIONS AND APPLICATIONS	AI61002	3-1-0	4
19.	DEPENDABLE AND SECURE AI-ML	AI60006	3-0-0	3
20.	ARTIFICIAL INTELLIGENCE FOR MANUFACTURING	AI61009	3-1-0	4
21.	ADVANCED DIGITAL COMMUNICATION	EC61213	3-1-0	4
22.	COMMUNICATION NETWORKS	EC61205	3-1-0	4
23.	NONLINEAR SYSTEMS AND CONTROL	EE61202	3-1-0	4
24.	MODELING AND IDENTIFICATION	EE60202	3-0-0	3

25.	AUTOMOTIVE ELECTRONICS	AT61202	3-1-0	4
26.	INDUSTRIAL AUTOMATION AND CONTROL	EE60034	3-1-0	4
27	SENSORS AND MEASUREMENT TECHNOLOGY	EE61203	3-1-0	4
28	ANALOG SIGNAL PROCESSING	EE60032	3-1-0	4
29	AUTOMOTIVE SENSORS AND INSTRUMENTATION	EE61011	3-1-0	4