विज्ञान एवं प्रौद्योगिकी विभाग
DEPARTMENT OF
SCIENCE & TECHNOLOGY
सत्यमेव जयते

Technology
Innovation Hub
IITG TIDF

National Mission on
Interdisciplinary Cyber-Physical
Systems (NM-ICPS)

IIT Guwahati TI&DF Online Internship Program 2025

Our Internship Program is designed to allow students to gain practical work experience in their field of interest.

Program Benefits

Obtain practical work experience in your field of interest

Network with other interns and industry professionals

Earn a Certificate from IIT Guwahati TI&DF

Participate in training and development sessions by Experts from IIT Guwahati

Work on real projects and initiatives

Earn a paid project opportunity

Internship Fee: Rs. 2,000/-

Application Link: https://forms.gle/w2Mk9R3AQecWUZrr6

Program Requirements

- ✔ Currently registered in a program at any college or university
- ✔ Ensure to have access to a functional laptop and reliable internet connectivity
- ✔ The internship program is targeted towards students who are aspirational about emerging technologies and possess a strong urge to build, create, and innovate through hands-on learning and real-world problem-solving

PAYMENT DETAILS:
Bank: Canara Bank, IIT Guwahati
A/C Name: IIT Guwahati TIDF
A/C No: 8652101030401
IFSC: CNRB0008652

We're offering Internships in the field of Robotics, PCB Design, Sensors & Actuators, EV, Cyber-security, AI/ML, IoT, Solar, Drone Technology and 3D Printing.

EV · 3D · AI

To apply, candidates who are interested may apply through the Google Form.

More Information, Follow Us on

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MODULE FOR ONLINE INTERNSHIP PROGRAMME 2025

INTERNET OF THINGS (IoT): APPLICATIONS IN ENGINEERING

OBJECTIVES:

1. To introduce students to the core concepts of the Internet of Things (IoT) and its engineering applications.
2. To develop basic understanding of IoT hardware, sensors, microcontrollers, and communication protocols.
3. To familiarize students with IoT platforms, data transmission, and cloud integration.
4. To explore real-world use cases of IoT in various engineering disciplines (mechanical, electrical, civil, CS, etc.).
5. To provide hands-on exposure through simulation tools and project-based learning.
6. To enable students to design, simulate, and present IoT-based solutions for societal or industrial challenges.

EXPECTED OUTCOMES:

1. **Fundamental Understanding** – Understand key components of IoT systems: sensors, controllers, connectivity, and data flow.
2. **Hardware & Software Skills** – Work with Arduino, ESP32, or simulation tools like Tinkercad/Fritzing.
3. **IoT System Design** – Demonstrate ability to plan and prototype basic IoT applications.
4. **Engineering Application Awareness** – Identify domain-specific IoT use cases (smart cities, precision agriculture, industrial automation, etc.).
5. **Project Development** – Complete a guided IoT mini-project with clear objectives, design, and presentation.
6. **Analytical & Innovation Skills** – Interpret IoT-generated data, analyze trends, and propose solutions.

DURATION:

ONE MONTH (120 HOURS)

PREREQUISITES:

1. Basic electronics and programming knowledge (C/C++, Python preferred).
2. General understanding of sensors and microcontroller architecture.
3. Access to a laptop with internet and simulation tools (Tinkercad, Arduino IDE, or equivalent).
4. (Optional) IoT development boards like Arduino UNO, ESP8266/ESP32, Raspberry Pi (not mandatory – virtual tools supported).

INTERNSHIP STRUCTURE BREAKDOWN

Weeks	Topics
Week 1	**Introduction & Problem Formulation**: Basics of IoT, sensors, actuators, IoT architecture, identifying problems for IoT solutions.
Week 2	**Hardware and Tools Finalization**: Hands-on with simulation environments (Tinkercad, Arduino IDE), understanding connectivity (WiFi, Bluetooth, MQTT), selection of microcontrollers and sensors.
Week 3	**Implementation**: Students begin implementation of selected IoT-based projects using simulations or real hardware; data capture and processing; integration with cloud services (ThingSpeak, Blynk, etc.).
Week 4	**Reporting & Presentation**: Report writing, project documentation, preparation of presentations; final demo sessions, doubt clearing, and valedictory session.

SUGGESTED PROJECT TOPICS (Not Limited To):

1. **Smart Irrigation System** using soil moisture sensors and water flow control.
2. **Air Quality Monitoring System** for urban environments.
3. **Smart Traffic Light Controller** based on real-time vehicle data.
4. **Home Automation System** (lights, fans, and appliances controlled remotely).
5. **IoT-based Smart Parking System** for public or private lots.
6. **Industrial Equipment Health Monitoring** using temperature and vibration sensors.
7. **Smart Energy Meter** with usage tracking and billing alerts.
8. **IoT-based Wearable Health Monitoring Device** (pulse, temperature tracking).
9. **Smart Garbage Collection System** using ultrasonic level detection.
10. **IoT-enabled Flood or Fire Alert System** for disaster management.
11. **Real-time Vehicle Tracking System** with GPS and cloud dashboard.
12. **IoT for Smart Agriculture** – monitoring humidity, temperature, and automating irrigation.
13. **Cold Storage Monitoring System** for temperature-sensitive goods.
14. **Smart Classroom System** – environmental sensing, automated lighting and attendance.
15. **Industrial Automation Dashboard** – remote monitoring of plant parameters using MQTT.

MODULE FOR ONLINE INTERNSHIP PROGRAMME 2025

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING: APPLICATIONS IN ENGINEERING

OBJECTIVES:

1. To introduce students to the fundamental concepts of Artificial Intelligence (AI) and Machine Learning (ML).
2. To develop essential programming and analytical skills using Python for AI/ML applications.
3. To familiarize learners with key ML algorithms and real-world engineering applications.
4. To explore how AI and ML are transforming engineering disciplines such as mechanical, civil, electrical, and computer science.
5. To provide hands-on experience in developing and evaluating basic ML models.
6. To encourage research thinking through real-world use case analysis and mini-projects.

EXPECTED OUTCOMES:

1. **Conceptual Understanding** – Grasp the foundations of AI & ML, including supervised, unsupervised learning, and neural networks.
2. **Programming Proficiency** – Gain working knowledge of Python, data handling with NumPy and Pandas, and ML with scikit-learn.
3. **Model Development Skills** – Train, validate, and deploy ML models effectively.
4. **Engineering Application Awareness** – Understand AI applications in smart manufacturing, predictive maintenance, smart cities, etc.
5. **Project-Based Learning** – Develop and present a mini-project on a real-world engineering challenge.
6. **Analytical and Critical Thinking** – Apply ML algorithms to analyze structured problems and derive actionable insights.

DURATION:

ONE MONTH (120 HOURS)

PREREQUISITES:

1. Basic programming knowledge (Python preferred; C/C++ acceptable).
2. Familiarity with basic mathematics: linear algebra, probability, statistics, and calculus.
3. Access to a laptop or desktop with internet and Python development environment (Jupyter, Google Colab).

INTERNSHIP STRUCTURE BREAKDOWN

Weeks	Topics
Week 1	**Introduction & Problem Formulation**: Fundamentals of AI & ML, types of learning, applications in engineering, identifying real-world problems for project work.
Week 2	**Tools and Frameworks Finalization**: Python essentials, NumPy, Pandas, data preprocessing, visualization, understanding of ML workflow and libraries (scikit-learn, matplotlib).
Week 3	**Implementation**: Application of ML algorithms (regression, classification, clustering), model training, testing, validation, and performance evaluation on selected projects.

Weeks	Topics
Week 4	**Report Writing & Presentation**: Documentation of methodology and results, project report writing, final presentations, feedback, doubt-clearing, and valedictory session.

SUGGESTED PROJECT TOPICS (Not Limited To):

1. **Predictive Maintenance** using sensor data in mechanical systems.
2. **Traffic Flow Prediction** using regression and time-series models.
3. **Smart Energy Load Forecasting** for electrical grid management.
4. **Disease Detection System** using classification (e.g., diabetes or cancer prediction).
5. **Real Estate Price Prediction** using linear regression.
6. **Customer Churn Prediction** using logistic regression or decision trees.
7. **Sentiment Analysis** of product reviews or social media content.
8. **AI-Based Drone Detection System** using image classification.
9. **Face Recognition System** using OpenCV and CNNs.
10. **Chatbot for Student Support** using natural language processing (NLP).
11. **Water Quality Prediction** using ML regression models.
12. **Crop Yield Forecasting** using weather and soil data.
13. **Handwritten Digit Recognition** using deep learning (MNIST dataset).
14. **Vehicle Detection and Counting** from traffic surveillance videos.
15. **Spam Email Detection** using Naive Bayes and NLP techniques.

MODULE FOR ONLINE INTERNSHIP PROGRAMME 2025

ROBOTICS: DESIGN, CONTROL & INTELLIGENT SYSTEMS

OBJECTIVES:

1. To introduce students to the fundamentals of robotics, including mechanics, electronics, and control systems.
2. To provide an understanding of robotic system components—sensors, actuators, microcontrollers, and kinematics.
3. To expose learners to real-world applications of autonomous and semi-autonomous robots.
4. To integrate concepts of programming, AI, and embedded systems in robot design and control.
5. To develop problem-solving and prototyping skills through simulation and project-based learning.
6. To encourage innovation and application of robotics in industry, agriculture, healthcare, and smart infrastructure.

EXPECTED OUTCOMES:

1. **Foundational Knowledge** – Understand the structure and functioning of robotic systems.
2. **Programming & Control Skills** – Use Arduino or simulation platforms for robot motion and control.
3. **System Integration** – Combine sensors, actuators, and logic to perform desired robotic actions.
4. **Design Thinking** – Apply kinematic and dynamic principles in robot design.
5. **Project Execution** – Build and present a functional robotic system or simulation.
6. **Application Awareness** – Analyze robotics use cases across sectors like manufacturing, defense, and disaster management.

DURATION:

ONE MONTH (120 HOURS)

PREREQUISITES:

1. Basic knowledge of electronics and programming (Arduino, Python, or C/C++).
2. Familiarity with physics (mechanics, motion) and basic control systems.
3. Access to a computer with simulation tools (Tinkercad, Proteus, Webots, or CoppeliaSim).
4. (Optional) Robotics kits like Arduino, motor drivers, sensors (for those with physical access).

INTERNSHIP STRUCTURE BREAKDOWN

Weeks	Topics
Week 1	**Introduction to Robotics & Problem Formulation**: Basics of robotics, types of robots, actuators and sensors, microcontroller overview, selecting a robotic problem to solve.
Week 2	**Tools, Simulation & Hardware Concepts**: Kinematics, locomotion mechanisms, motor control, simulation tools (Tinkercad/CoppeliaSim), basic Arduino programming.

Weeks	Topics
Week 3	**Implementation**: Programming logic for robot behavior, obstacle avoidance, line following, sensor integration, real-time decision making using feedback loops.
Week 4	**Documentation & Presentation**: Final testing, report writing, preparation of video demonstrations or simulations, project presentations, Q&A, and valedictory session.

SUGGESTED PROJECT TOPICS (Not Limited To):

1. **Line Following Robot** using IR sensors and PID control.
2. **Obstacle Avoidance Robot** using ultrasonic sensors.
3. **Robotic Arm** with multiple degrees of freedom (servo-controlled).
4. **Autonomous Delivery Robot** simulation in a mapped environment.
5. **Voice-Controlled Robot** using speech-to-text API and Arduino.
6. **Maze Solver Robot** using basic pathfinding algorithms.
7. **Agricultural Robot** prototype for soil monitoring or seeding.
8. **Pick and Place Robot** using servo motors and sensor feedback.
9. **Gesture-Controlled Robot** using accelerometers or a smartphone interface.
10. **Fire-Fighting Robot** – sensor-based flame detection and response.
11. **Warehouse Sorting Robot** using RFID or color sensors.
12. **Autonomous Drone Navigation** (Simulation only).
13. **Disaster Recovery Bot** simulation for search and rescue.
14. **Surveillance Robot** with camera integration (basic streaming).
15. **IoT-Integrated Robot** for remote control and monitoring.

MODULE FOR ONLINE INTERNSHIP PROGRAMME 2025

CYBER SECURITY: CONCEPTS, TOOLS & APPLICATIONS

OBJECTIVES:

1. To introduce students to the foundational concepts of cyber security and digital threats.
2. To familiarize learners with key components of network security, cryptography, ethical hacking, and system protection.
3. To provide practical experience in identifying, preventing, and mitigating cyber attacks.
4. To build awareness of cyber laws, data privacy, and compliance frameworks.
5. To equip students with tools for secure coding, vulnerability scanning, and penetration testing.
6. To encourage critical thinking and responsible cyber behavior through real-world case studies and project-based learning.

EXPECTED OUTCOMES:

1. **Conceptual Clarity** – Understand basic terminologies, threat types, and security principles.
2. **Technical Skill Development** – Learn to use tools like Wireshark, Nmap, Kali Linux, and Burp Suite.
3. **Hands-on Defense Skills** – Implement firewalls, password policies, and data encryption techniques.
4. **Cyber Ethics & Legal Awareness** – Understand the legal and ethical aspects of cybersecurity practices.
5. **Project Implementation** – Analyze, document, and present a cybersecurity-related project.
6. **Risk Analysis & Management** – Apply security measures to protect digital assets and assess vulnerabilities.

DURATION:

ONE MONTH (120 HOURS)

PREREQUISITES:

1. Basic knowledge of computer systems, operating systems, and internet protocols.
2. Familiarity with programming (Python, C/C++, or Bash preferred).
3. Access to a laptop with a virtual environment or Linux-based tools (Kali Linux, VirtualBox, etc.).

INTERNSHIP STRUCTURE BREAKDOWN

Weeks	Topics
Week 1	**Introduction & Problem Formulation**: Overview of cyber threats, malware, phishing, DoS, network security basics, identifying real-world problems in cybersecurity.

Weeks	Topics
Week 2	**Security Tools & Practices**: Introduction to Kali Linux, ethical hacking tools, firewalls, VPNs, password management, network scanning, and cryptography basics.
Week 3	**Implementation**: Simulated attacks and defenses, secure coding practices, vulnerability assessment, Wireshark analysis, system hardening techniques.
Week 4	**Reporting & Presentation**: Project development, writing security assessment reports, final presentations, feedback, doubt clearing, and valedictory session.

SUGGESTED PROJECT TOPICS (Not Limited To):

1. **Phishing Simulation and Awareness Tool**
2. **Vulnerability Scanning of a Web Application** using OWASP ZAP
3. **Design of a Personal Firewall Policy** for Home or Office Network
4. **Secure Login System** using Multi-Factor Authentication
5. **Wi-Fi Network Penetration Testing** (Simulated using Virtual Machines)
6. **Password Strength Analyzer** using Python
7. **Web Application Security Audit** of a sample website
8. **Cryptography Project** – Encryption/Decryption using Caesar, RSA, or AES
9. **Analysis of a Real Cyber Attack Case Study** (WannaCry, SolarWinds, etc.)
10. **Social Engineering Awareness Campaign Module**
11. **Digital Forensics: Tracing a Simulated Attack Chain**
12. **Cybersecurity for IoT Devices** – Case study or prototype defense
13. **Dark Web Exploration & Threat Mapping** (Educational Purpose Only)
14. **Network Traffic Analysis** using Wireshark
15. **Implementation of Role-Based Access Control (RBAC)** for applications

MODULE FOR ONLINE INTERNSHIP PROGRAMME 2025

ELECTRIC VEHICLES (EV): DESIGN, COMPONENTS & ENERGY MANAGEMENT

OBJECTIVES:

1. To introduce students to the fundamental concepts and architecture of electric vehicles.
2. To study key components like motors, batteries, converters, and control systems.
3. To understand energy management systems, charging infrastructure, and power electronics in EVs.
4. To explore simulation tools and real-world EV applications across industries.
5. To provide exposure to modern trends in battery technologies and vehicle dynamics.
6. To promote hands-on learning through simulation-based mini-projects.

EXPECTED OUTCOMES:

1. **Fundamental Understanding** – Learn basic EV concepts, energy storage, and drivetrain configurations.
2. **System-Level Design Knowledge** – Analyze EV subsystems: motor selection, battery sizing, regenerative braking.
3. **Simulation Skills** – Use software tools like MATLAB/Simulink or Tinkercad for EV modeling.
4. **Awareness of EV Ecosystem** – Study policies, grid integration, and environmental impacts.
5. **Mini Project Development** – Simulate and present a working EV system or component analysis.
6. **Interdisciplinary Thinking** – Integrate mechanical, electrical, and software concepts in EV design.

DURATION:

ONE MONTH (120 HOURS)

PREREQUISITES:

1. Basic understanding of electrical circuits, control systems, and mechanics.
2. Familiarity with MATLAB, Python, or circuit simulation tools (preferred).
3. Access to a computer with simulation software and internet.

INTERNSHIP STRUCTURE BREAKDOWN

Weeks	Topics
Week 1	Introduction to EVs, working principles, classifications, EV architecture, powertrains.

Weeks	Topics
Week 2	Motor technologies (BLDC, PMSM, induction motors), battery types (Li-ion, NiMH), charging systems.
Week 3	Energy management strategies, regenerative braking, vehicle modeling using simulation tools.
Week 4	Final project, system design analysis, sustainability considerations, report preparation, and presentation.

SUGGESTED PROJECT TOPICS:

1. EV Powertrain Simulation in MATLAB/Simulink
2. Design of Battery Management System (BMS)
3. Comparative Study of EV Motor Types
4. EV Range Estimation Tool Development
5. Charging Station Layout for a Smart City
6. Thermal Management System Design for EV Batteries
7. DC-DC Converter Design for On-Board Charging
8. Energy Flow Modeling in Regenerative Braking System
9. EV Impact on Grid Load: A Case Study
10. Cost Analysis & ROI of EVs vs ICE Vehicles

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MODULE FOR ONLINE INTERNSHIP PROGRAMME 2025

SOLAR ENERGY SYSTEMS: DESIGN, INSTALLATION & ANALYSIS

OBJECTIVES:

1. To introduce the core principles of solar photovoltaic (PV) energy generation.
2. To explore PV system components, sizing, and performance optimization.
3. To understand grid-tied and off-grid systems with real-world application contexts.
4. To provide practical insights into solar panel design, layout planning, and installation practices.
5. To familiarize students with modeling and simulation tools for solar energy analysis.
6. To promote green thinking and energy sustainability through project-based learning.

EXPECTED OUTCOMES:

1. **Conceptual Knowledge** – Understand solar cell operation, I-V characteristics, and PV system design.
2. **System Sizing Skills** – Perform load calculations and component selection for solar projects.
3. **Simulation Skills** – Use tools like PVsyst, HelioScope, or MATLAB for solar modeling.
4. **Techno-Economic Analysis** – Assess feasibility and payback of solar energy systems.
5. **Hands-on Project Work** – Design and simulate a solar PV system.
6. **Sustainability Awareness** – Understand the environmental and policy implications of solar adoption.

DURATION:

ONE MONTH (120 HOURS)

PREREQUISITES:

1. Basic electrical and physics knowledge (voltage, current, power).
2. Familiarity with Microsoft Excel or MATLAB for calculations.
3. Internet access and a computer for simulation and documentation.

INTERNSHIP STRUCTURE BREAKDOWN

Weeks	Topics
Week 1	Fundamentals of solar radiation, photovoltaic effect, solar cell types and characteristics.

Weeks	Topics
Week 2	Components of solar PV systems – panels, inverters, batteries, charge controllers.
Week 3	Site assessment, system sizing, shading analysis, grid-tied vs off-grid systems.
Week 4	Cost-benefit analysis, simulation of PV system, project presentation and documentation.

SUGGESTED PROJECT TOPICS:

1. Design of Rooftop Solar PV System for a Home or School
2. Simulation of Off-Grid PV System Using PVsyst or MATLAB
3. Load Analysis and Panel Sizing for a Remote Location
4. Shading Effect and Optimization of Solar Panel Layout
5. Hybrid Solar-Wind Power System Model
6. Comparative Study of Monocrystalline vs Polycrystalline Panels
7. Solar Water Pumping System Design
8. Cost Analysis and ROI of a 5kW Grid-Tied Solar System
9. Development of a Solar Energy Awareness Toolkit
10. Smart Monitoring of Solar PV Output Using IoT