InnoHack2.0

Problem Statements

🧠 Track 1: Robotics & Artificial Intelligence
1. Autonomous Indoor Navigation Robot with SLAM
2. Drone-Based Parcel Delivery with Dynamic Drop Location
3. Line Follower Maze Solver (Beginner Level)
4. Voice-Controlled Home Automation Robot (Intermediate Level)
5. Autonomous Rescue Bot with Obstacle Avoidance (Intermediate–Advanced)
6. Swarm Robotics Simulation Using Python (Advanced)
7. AI-powered Drone Surveillance System (Advanced)
8. AI Assistant for Visually Impaired Navigation (Advanced)
9. Multi-Modal AI Robotic Arm (Capstone Level)
10. Autonomous Indoor Navigation Drone (GPS-Denied Environment)

🌐 Track 2: IoT & Embedded Systems
11. Smart Energy Grid with Peer-to-Peer Load Balancing
12. Industrial Plant Health Monitoring Network
13. Smart Agriculture: Multi-Zone Climate & Soil Management
14. Smart Irrigation System Using Soil Moisture Sensors (Beginner)
15. RFID-Based Smart Attendance System (Beginner–Intermediate)
16. Health Monitoring Wearable (Intermediate)
17. Digital Notice Board with IoT Updates (Intermediate)
18. Energy Consumption Tracker (Advanced)
19. Smart Helmet with Crash Detection and Alert System (Advanced)
20. Intelligent Traffic Management System with Decentralized Nodes

💻 Track 3: Web Development & AI
21. AI-Powered Resume & Career Analyzer Platform
22. Smart Document Search Engine with Semantic Ranking
23. AI-Based Code Debugger and Explanation Tool
24. Real-Time AI Video Analytics Dashboard
25. Smart Healthcare Portal with Symptom Checker & ChatGPT-like Bot
26. AI-Based Stock Market Analyzer and Pattern Predictor
27. AI Legal Assistant for Contracts & Compliance
28. Multilingual News Aggregator with Bias Detection
29. Real-Time Collaboration Platform for Learning AI Models
30. AI-Powered e-Learning Platform with Adaptive Curriculum

🔒 Track 4: Open Innovation
31. Open Innovation – Build Your Own Problem Statement

Track 1: Robotics & AI

1. **Autonomous Indoor Navigation Robot with SLAM**

   Design a robot that can autonomously explore and map an unknown indoor environment using Simultaneous Localization and Mapping (SLAM). The robot should:
   - Avoid obstacles in real time
   - Optimize its path using algorithms
   - Adapt its route dynamically when blocked

2. **Drone-Based Parcel Delivery with Dynamic Drop Location**

   Build a drone capable of detecting QR codes or AprilTags on the ground and dynamically updating its delivery point.
   - Use a downward camera and PID-controlled descent
   - Must handle environmental disturbances like wind or blocked zones

3. **Line Follower Maze Solver (Beginner Level)**

   Construct a robot that follows a black line and solves basic mazes.
   - Uses IR sensors for line tracking
   - Simple logic to solve forks and dead ends

4. **Voice-Controlled Home Automation Robot (Intermediate Level)**

   Develop a mobile robot that responds to voice commands for:
   - Turning appliances on/off
   - Navigating to rooms

5. **Autonomous Rescue Bot with Obstacle Avoidance (Intermediate–Advanced)**

   Create a robot for post-disaster zones that:
   - Navigates autonomously
   - Detects human presence (IR or thermal sensing)
   - Sends GPS location or live feed

6. **Swarm Robotics Simulation Using Python (Advanced)**

   Simulate multiple robots collaborating to:
   - Perform area mapping or search-and-rescue
   - Communicate with each other
   - Handle dynamic changes in the environment

7. **AI-powered Drone Surveillance System (Advanced)**

   Program a drone to patrol a designated area using computer vision.
   - Use OpenCV for detecting anomalies

- Integrate face or object recognition
8. **AI Assistant for Visually Impaired Navigation (Advanced)**
   Create a wearable system that:
   - Uses a camera to understand surroundings
   - Provides audio feedback for safe navigation
   - Alerts for obstacles and directions
9. **Multi-Modal AI Robotic Arm (Capstone Level)**
   Build a robotic arm that can be controlled via:
   - Hand gestures (with sensors)
   - Voice commands
   - GUI-based interface with AI command interpretation
10. **Autonomous Indoor Navigation Drone (GPS-Denied Environment)**
    Design a drone that can navigate indoor spaces using SLAM and computer vision without GPS.
    - Obstacle avoidance is mandatory
    - Bonus: object following or room mapping

Track 2: IoT & Embedded Systems

11. **Smart Energy Grid with Peer-to-Peer Load Balancing**
    Create an IoT-based decentralized power grid simulation:
    - Homes can generate, consume, or store energy (e.g., solar)
    - Communicate with each other locally
    - Sync with a cloud platform for analytics and billing
    - Optional: Use blockchain for decentralized decisions
12. **Industrial Plant Health Monitoring Network**
    Deploy sensor nodes in a factory to monitor:
    - Temperature, vibration, and pressure
    - Secure LAN communication
    - Report to a cloud dashboard
    - Alerts via SMS/email for faults
13. **Smart Agriculture: Multi-Zone Climate & Soil Management**
    Build an IoT solution for precision farming:
    - Nodes monitor soil pH, moisture, temperature
    - Each node handles a crop zone
    - AI model provides irrigation and anomaly feedback

- Add-on: automatic sprinkler/valve control

14. **Smart Irrigation System Using Soil Moisture Sensors (Beginner)**

Automate irrigation using:

- Arduino + Soil Moisture Sensor
- Relay-based water pump system

15. **RFID-Based Smart Attendance System (Beginner–Intermediate)**

Build a system where users tap RFID cards to:

- Log attendance
- Store data on SD card or send over Wi-Fi

16. **Health Monitoring Wearable (Intermediate)**

Design a wearable device that tracks:

- Heart rate and temperature
- Sends alerts via Bluetooth or GSM module

17. **Digital Notice Board with IoT Updates (Intermediate)**

Develop a digital board that:

- Connects to Wi-Fi
- Fetches and displays messages from the cloud
- Uses LCD or OLED displays

18. **Energy Consumption Tracker (Advanced)**

Create an embedded system that:

- Monitors electricity usage of devices
- Sends data to a cloud server for logging

19. **Smart Helmet with Crash Detection and Alert System (Advanced)**

Design a helmet that:

- Detects crash or fall
- Sends location via GPS
- Triggers emergency SMS via GSM

20. **Intelligent Traffic Management System with Decentralized Nodes**

Implement traffic control where each node:

- Detects traffic density using sensors
- Communicates with nearby intersections (LAN)
- Sends data to a cloud dashboard (WAN)
- Uses local AI for signal optimization

Track 3: Web Development & AI

21. **AI-Powered Resume & Career Analyzer Platform**
Build a full-stack platform to:
   o Upload and analyze resumes
   o Suggest improvements for ATS compatibility
   o Recommend jobs based on skill gaps
   o Add-on: Resume generator tool

22. **Smart Document Search Engine with Semantic Ranking**
Create a search engine for document collections:
   o Go beyond keywords using NLP
   o Highlight contextually relevant sections

23. **AI-Based Code Debugger and Explanation Tool**
Web app where users can:
   o Paste code snippets
   o AI detects bugs, suggests fixes
   o Explains each part in simple English

24. **Real-Time AI Video Analytics Dashboard**
Create a dashboard to:
   o Accept live CCTV or drone video feeds
   o Detect objects/faces in real-time
   o Show analytics visually
   o Challenge: Backend latency optimization

25. **Smart Healthcare Portal with Symptom Checker & ChatGPT-like Bot**
Build a healthcare system where:
   o Users input symptoms
   o AI suggests possible issues and specialists
   o Booking appointments and file uploads supported

26. **AI-Based Stock Market Analyzer and Pattern Predictor**
Develop a financial analysis platform:
   o Use AI to detect stock trends
   o Analyze risks and portfolio suggestions

27. **AI Legal Assistant for Contracts & Compliance**
Upload contracts to:
   o Identify risky or non-standard clauses
   o Summarize in layman's terms

28.   **Multilingual News Aggregator with Bias Detection**

News aggregator that:
- o Translates articles
- o Summarizes key points
- o Detects political or emotional bias using NLP

29.   **Real-Time Collaboration Platform for Learning AI Models**

Web platform like Jupyter + Figma:
- o Collaborate on building AI models
- o Real-time syncing of code, models, and graphs

30.   **AI-Powered e-Learning Platform with Adaptive Curriculum**

Create a learning portal that:
- o Tracks student performance and attention
- o Adjusts learning paths dynamically using AI

Track 4: Open Innovation

31.   **Open Innovation – Build Your Own Problem Statement**

Identify any real-world issue and develop a tech-based solution using hardware/software/AI/IoT. Must be impactful and creative.