NavaNIEti Problem statements

Track 1 - Disaster Management		
PS ID	**Problem statements**	**Problem statement description**
NavaNIEti_DM_01	Earthquake Detection Chip	Design a chip that analyzes vibration sensor data and generates early-warning signals.
NavaNIEti_DM_02	Flood Level Monitoring Controller	Design a chip that monitors water levels and predicts flood risk.
NavaNIEti_DM_03	Fire Detection and Alert IC	Design a chip that detects smoke and temperature rise and triggers alarms.
NavaNIEti_DM_04	Rescue Drone Navigation Controller	Design a chip that processes distance and direction data to help a rescue drone avoid obstacles.
NavaNIEti_DM_05	Landslide Warning Chip	Design a chip that monitors soil movement and rainfall data to detect landslide risk.
NavaNIEti_DM_06	Early Flood Warning Siren:	Low-lying areas near the Kaveri River need an automated siren that triggers as water levels rise. Build a device that triggers different alarm tones based on severity.
NavaNIEti_DM_07	Gas Leakage "Search" Robot:	After a factory fire, it is too dangerous for humans to check for LPG/CO leaks. Build a small wired/wireless rover that could get into the site and detect the leaks.

NavaNIEti_DM_08	Earthquake Vibration Logger:	Structural engineers need to know if a building has suffered micro-fractures after a tremor. Build a device that signals if a vibration above a certain Magnitude is detected through the buzzers/voice alerts/lights.
NavaNIEti_DM_9	Emergency Beacon with Morse "SOS":	Hikers trapped in a landslide need a way to signal helicopters at night. A high-intensity LED beacon that automatically flashes the Morse code for “SOS” or any emergency codes.
NavaNIEti_DM_10	Enhancing body detection in CSSR operations using using advanced technology	An advanced technology solutions leveraging hardware and software innovations is required to enhance deceased body detection capabilities. This solution could involve the development of specialized sensors, imaging devices, or drones equipped with thermal imaging and ground-penetrating radar (GPR) technology
NavaNIEti_DM_11	Enemy drones or UAVs pose threats to restricted airspace.	Create an autonomous detection and neutralization system to identify, track, and mitigate unauthorized drones.
NavaNIEti_DM_12	Developing a cost effective solution for detecting the breakage of Low Voltage AC Distribution Over Head conductors	During natural disasters such as cyclones, floods, and earthquakes, Low Voltage AC overhead distribution conductors are highly vulnerable to breakage, posing serious risks including electrocution, fires, and prolonged power outages. Due to the absence of affordable real-time monitoring systems, identifying such failures is often delayed. This problem statement challenges participants to develop a cost-effective, rapid detection solution that enables timely alerts and supports safer disaster response and recovery operations.

Track 2 - Healthcare		
PS ID	**Problem statements**	**Problem statement description**
NavaNIEti_HC_01	Wearable Health Monitor IC	Design a chip that measures heart rate and temperature and generates alerts if abnormal conditions occur.
NavaNIEti_HC_02	ECG Signal Processing Accelerator	Design a digital block that filters ECG data and detects abnormal heartbeats.
NavaNIEti_HC_03	Medical Image Edge-Detection Accelerator	Design a hardware module that highlights edges in medical images (useful for tumor detection).
NavaNIEti_HC_04	Hospital Patient Alert Controller	Design a chip that collects vital signs from multiple patients and raises priority-based alerts.
NavaNIEti_HC_05	Smart Medicine Dispenser Controller	Design a chip that releases medicine at correct times and raises an alert if a dose is missed.
NavaNIEti_HC_06	Post-Surgery Drip Rate Monitor:	If an IV drip is too fast or slow, it can be dangerous. Build a device to count drops per minute and sound a buzzer if the rate falls out of a safe range.
NavaNIEti_HC_07	Smart Walking Stick for the Visually Impaired:	Visually impaired students at the university need help navigating new construction zones. A stick/device that provides different vibration patterns based on the distance of the obstacle.
NavaNIEti_HC_08	Portable Heart-Rate Pulse Visualizer.	Rural health workers need a simple way to verify a pulse during triage. Build a device which could act as Pulse oximeter and signal if the oxygen level or heart rate is below or above the normal range using lights and buzzers.

NavaNIEti_HC_09	Development of an alternative technology to check blockage of blood vessels (an alternative to conventional angiography)	Development of a non-invasive, safer imaging technology to detect and assess blood vessel blockages without relying on conventional angiography.
NavaNIEti_HC_10	Innovative Gerontological Care Solutions: Designing the Future of Elderly Care Products	Designing innovative, user-centric gerontological care products that enhance the health, safety, independence, and quality of life of the elderly.
NavaNIEti_HC_11	Non-Contact Nurse-Call System:	In infectious disease wards, patients shouldn't touch physical buttons to call for help. Build a gesture-based system that triggers different colored lights at the nurse's station.
NavaNIEti_HC_12	Develop a system for continuous health monitoring and remote medical support for patients in rural areas.	A smart health monitoring solution that tracks vital signs and health indicators in real time, detects abnormalities early, and provides alerts or telemedicine support to healthcare providers, ensuring timely intervention for rural patients with limited access to routine checkups.
NavaNIEti_HC_13	Develop an assisted mobility solution for physically challenged individuals to reduce the effort of using manual wheelchairs.	A smart wheelchair system that provides motorized assistance, intuitive controls, and adaptive navigation to help physically challenged users move independently, safely, and with minimal physical strain.
NavaNIEti_HC_14	Develop a fast, safe, and automated system for mass health screening.	A smart screening solution that quickly measures vital health parameters for large populations, identifies abnormalities in real time, and provides alerts or recommendations, minimizing manual effort and ensuring safety and efficiency during mass checkups.

Track 3 - Agriculture		
PS ID	**Problem statements**	**Problem statement description**
NavaNIEti_AG_01	Smart Sluice Gate for Canal Irrigation	Farmers in rural Mysore often waste water by leaving canal gates open too long. Build a system that detects soil moisture and automatically opens/closes a water gate.
NavaNIEti_AG_02	Solar-Track Harvesting Helper:	Small-scale solar dryers for coffee beans are inefficient because they don't follow the sun. Build a dual-axis tracker to maximize light intensity on a panel.
NavaNIEti_AG_03	Automated Seed Counter and Sorter:	Sorting healthy seeds from debris manually is time-consuming for small farmers. Create a conveyor-belt system that counts seeds as they pass the device and displays the count.
NavaNIEti_AG_04	Pest-Repellent Frequency Generator:	Rodents are destroying stored grain, but chemical pesticides are harmful to the environment. Build an ultrasonic frequency generator that varies its pitch to prevent pests from getting used to the sound.
NavaNIEti_AG_05	Develop a self-sufficient irrigation system for rural farms that operates reliably without dependence on grid electricity.	A solar-powered or renewable energy-based irrigation solution with battery backup, capable of automatically watering crops based on soil moisture, ensuring uninterrupted operation even in electricity-deficient rural areas.
NavaNIEti_AG_06	Automatic regulation of valves for release of water based upon soil moisture availability in the root zone of the crop, using AI	An AI-driven irrigation system that automatically regulates water release valves based on real-time soil moisture levels in the crop root zone to optimize water use and crop health.

NavaNIEti_AG_07	Field-Deployable Crop Health Monitoring Unit	A portable, field-deployable system for real-time monitoring and analysis of crop health to enable timely, data-driven agricultural interventions.
NavaNIEti_AG_08	Develop a smart protection system to prevent crop damage by animals and birds and safeguard high-value plants from theft.	An automated monitoring and deterrent system using sensors, cameras, and AI to detect intrusions by animals or humans, trigger alarms or deterrents (like sounds or lights), and alert farmers in real time, protecting crops and valuable plants such as sandalwood.
NavaNIEti_AG_09	Smart Irrigation Controller IC	Design a chip that automatically turns a water pump on/off based on soil moisture and tempertaure inputs
NavaNIEti_AG_10	Solar-Powered Farm Sensor SoC	Design a low-power SoC controller that works in sleep mode and wakes up to collect farm data using solar power.
NavaNIEti_AG_11	Grain Storage Monitoring Chip	Design a chip that monitors temperature and humidity inside grain storage and raises spoilage alerts.
NavaNIEti_AG_12	Crop Disease Detection Accelerator	Design a simple CNN / MAC-based hardware block that classifies crop data as healthy or diseased.
NavaNIEti_AG_13	Precision Fertilizer Controller	Design a chip that decides how much fertilizer to release based on soil nutrients and moisture.
NavaNIEti_AG_14	Develop a system to automatically separate organic and non-organic waste to ensure high-quality compost production.	A smart waste segregation unit using sensors (like optical, weight, or AI vision) to distinguish between organic and inorganic materials, preventing contamination and improving compost quality, while reducing manual labor.

NavaNIEti_AG_15	Develop an automated crop disease detection and management system using hardware sensors for early intervention.	A smart field unit continuously observes plant conditions and environmental factors, using AI-based analysis to identify potential issues. Upon detection, it can trigger interventions like targeted spraying, alerting farmers, or taking other preventive actions to protect crops and maximize yield.

Track 4 - Defence		
PS ID	**Problem statements**	**Problem statement description**
NavaNIEti_DF_01	Smart Border Intrusion Detection Chip	Design a digital chip that takes inputs from motion, vibration, and sound sensors and raises an intrusion alert when abnormal activity is detected.
NavaNIEti_DF_02	Secure Military Communication Encoder	Design a hardware encryption block that encrypts outgoing data before transmission and decrypts incoming data.
NavaNIEti_DF_03	Radar Pulse Processing Accelerator	Design a digital block that processes radar pulse samples and detects the presence of an object using thresholding and filtering.
NavaNIEti_DF_04	Soldier Health Monitoring Chip	Design a chip that monitors heart rate and body temperature of a soldier and generates alerts when values go out of range.
NavaNIEti_DF_05	Weapon System Safety Controller	Design a fail-safe controller that enables weapon firing only when all safety conditions are satisfied.

NavaNIEti_DF_06	Laser-Grid Intrusion Detection System:	A remote military outpost needs a silent alarm system that detects intruders without using cameras that can be hacked. Build a laser-based grid. When the beam is broken, a central hub must display the specific sector of intrusion.
NavaNIEti_DF_07	Encrypted Morse Communicator	In a signal-jammed area, soldiers need to send basic "Yes/No" or "SOS" signals via light pulses that are encrypted to prevent enemy interception. Create a transmitter-receiver pair where the input is a button (Morse) and the output is a secure LED which could be used for communication.
NavaNIEti_DF_08	Smart Noise-Level Sentinel	Stealth is key. A unit needs a device that alerts them via a vibrating motor if their own noise levels exceed a safe threshold. Build a system to trigger the alerts.
NavaNIEti_DF_09	Automatic Terrain-Adapting Lighting	Tactical vehicles need lights that dim automatically when approaching a "light-sensitive" zone to avoid detection. Build a device which adjust Light brightness based on proximity to obstacles and ambient light.
NavaNIEti_DF_10	Develop a safe, reliable, and automated system to detect landmines without exposing soldiers to direct physical danger.	Design an automated landmine detection solution that ensures soldier safety while enabling accurate and reliable identification of hidden mines.
NavaNIEti_DF_11	Develop a system to accurately detect and localize gunfire sources in battlefield environments to enhance situational awareness	A system that detects gunfire in real time and pinpoints its location on the battlefield, improving safety and tactical decision-making.

NavaNIEti_DF_12	A secure, tamper-proof defence equipment box designed to protect sensitive military assets from unauthorized access	A robust, tamper-resistant storage box that safeguards defence equipment and alerts against any unauthorized access attempts.
NavaNIEti_DF_13	Tracking multiple moving targets in combat zones.	system that combines thermal imaging and optical (visible light) cameras to detect and track multiple moving targets simultaneously in real-time, even in challenging environments like low light, fog, or dense foliage. The data from the sensors is fed into an AI-based processing unit