Title	Description
Innovating for Sustainability: Driving Smart Resource Conservation (Energy & Water) in Home Appliances (Refrigerators, Air Conditioners, Washing Machines and Desert Air Coolers)	Innovating for Sustainability: Driving Smart Resource Conservation (Energy & Water) in Home Appliances (Refrigerators, Air Conditioners, Washing Machines and Desert Air Coolers)
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Student Innovation	Smart Education, a Concept that Describes learning in digital age.it enables learner to learn more effectively, efficently, flexibly and comfortably.
Student Innovation	Disaster Management includes ideas related to risk mitigation and Planning before, after or Duration of Disaster.
Student Innovation	Technology ideas in tertiary sectors like Hospitality, Financial Services, Entertainment and Retail.
Student Innovation	Provide ideas in a decentralized and distributed ledger technology used to store digital information that powers cryptocurrencies and NFTs and can radically change multiple sectors
Student Innovation	Innovative ideas that help manage and generate renewable /sustainable sources more efficiently.
Student Innovation	A solution/idea that can boost the current situation of the tourism industries including hotels, travel and others.
Student Innovation	Solutions could be in the form of waste segregation, disposal, and improve sanitization system.
Student Innovation	There is a need to design drones and robots that can solve some of the pressing challenges of India such as handling medical emergencies, search and rescue operations, etc.
Student Innovation	Submit your ideas to address the growing pressures on the city’s resources, transport networks, and logistic infrastructure
Student Innovation	Creating intelligent devices to improve the commutation sector
Student Innovation	Developing solutions, keeping in mind the need to enhance the primary sector of India - Agriculture and to manage and process our agriculture produce
Student Innovation	Cutting-edge technology in these sectors continues to be in demand. Recent shifts in healthcare trends, growing populations also present an array of opportunities for innovation.
Student Innovation	Ideas that showcase the rich cultural heritage and traditions of India
Student Innovation	Ideas that can boost fitness activities and assist in keeping fit.

Student Innovation	Ideas focused on the intelligent use of resources for transforming and advancements of technology with combining the artificial intelligence to explore more various sources and get valuable insights.
Student Innovation	Challenges your creative minds to conceptualize and develop unique toys & games.
Student Innovation	For use of travel or activities beyond earth's atmosphere, for purposes such as spaceflight or space exploration.
Research and redesign a conventional aerospace component commonly found in air vehicles and utilize Fusion software to reimagine its design. Students can use Fusion Features such as Generative Design, Topology Optimization, Additive Build etc. The redesigned component should showcase innovation, enhanced functionality, and improved efficiency, all while being optimized for 3D printing.	The student's focus should be on using Fusion's additive manufacturing capabilities. They should aim to learn about additive manufacturing and its applications in aerospace design. This includes studying how to design aerospace components with considerations for structural integrity, and weight reduction. They should define project objectives and design constraints, and then utilize generative design tools in Fusion to explore and generate optimized designs. The student should evaluate these designs using simulation and analysis tools within Fusion. They should refine and iterate on the designs to further enhance performance. Finally, they should prototype and test the finalized design using appropriate 3D printing technologies. Teams choosing to submit idea for Autodesk’s problem statement are required to request their faculty (SIH SPOC) to fill this mandatory form. (https://forms.gle/SwfiFUDEiK73fVrx8) Fusion combines additive manufacturing (3D printing) capabilities with generative design features. It allows users to optimize designs for 3D printing, generate support structures, and explore numerous design options using algorithms. This integration enables the creation of complex and optimized parts using 3D printing technologies. Students and educators can click here to get FREE access to Fusion. (https://www.autodesk.com/education/edu-software/overview?sorting=featured&filters=individual) For Idea Submission: Each student team should submit Fusion public link of the Design and a PowerPoint presentation (5-7 Slides). Designs should be created using only Fusion and not copied or taken from any other source. For Grand Finale: Students must use Fusion to design and 3D print final design within the given time period and present the following to the jury members: PPT explaining the final project Public link of the design Rendered images Please note that the below marking criteria is only for Autodesk's this particular problem statement only: Design complexity and workability: 20 Design Optimization for 3D Printing (DFAM): 20 Innovative Design

Students are supposed to use Fusion software to generate NC code with machine details & tool library for any industrial component. students should possess technical skills in areas such as CAD/CAM software, G-code programming, toolpath optimization, and machining fundamentals. Additionally, their project ideas should demonstrate a viable solution to a real-world problem, ensuring feasibility and practicality in implementation.	Computer-Aided Manufacturing (CAM) is the use of software and computer-controlled machinery to automate a manufacturing process. Based on that definition, you need three components for a CAM system to function: Software that tells a machine how to make a product by generating toolpaths. Machinery that can turn raw material into a finished product. Post Processing converts toolpaths into a language machines can understand. From high-efficiency roughing with Adaptive Clearing to simplified control of multi-axis machines with Tool Orientation“ Teams choosing to submit idea for Autodesk’s problem statement are required to request their faculty (SIH SPOC) to fill this mandatory form. (https://forms.gle/SwfiFUDEiK73fVrx8) Autodesk Fusion makes it easy to program your CNC machine, fast. Manufacture with 2.5, 3, and multi axis milling, probing, turning, mill-turning, and profiling operations paired with a powerful post engine all included alongside professional design tools. Students and educators can click here to get FREE access to Fusion (https://www.autodesk.com/education/edu-software/overview?sorting=featured&filters=individual) For Idea Submission: Each student team should submit Fusion public link (toolpath included for Machining) of the Design and a PowerPoint presentation (5-7 Slides). Designs should be created using only Fusion and not copied or taken from any other source. For Grand Finale: Students must use Fusion to design and generate G code for the specific component within the given time period and present the following to the jury members: PPT explaining the final project Public link of the design G-code File Marking Criteria: Please note that this marking criteria is for Autodesk's this particular Problem Statement only Complexity of product (CAD): 10 Out-of-the-Box Thinking and Practicality: 20 Selection of Machine, Tools and Machining Process: 30 Machining Simulation: 20 G-code programming for CNC machine: 20 Total marks: 100

Development of a non-electrical device for tracking the movement of the sun for movement of the solar panels, increasing their efficiency.	Background: Solar panels are most efficient when they are directly facing the sun. However, the sun's position changes throughout the day and across seasons, which can reduce the amount of sunlight that fixed solar panels receive. Description: Traditional solar tracking systems often rely on electrical components and motors, which can be costly and require maintenance. A non-electrical tracking system offers a sustainable and low-maintenance alternative to enhance the efficiency of solar panels. Expected Solution: The problem statement is to develop a cost-effective, non-electrical device that can accurately track the sun's movement and adjust the orientation of solar panels to maintain optimal exposure. This device should be reliable, easy to install, and capable of operating without external power sources.
Development of innovative design for flushing systems in western toilet sheets which can be used for deployment in public toilets.	Background: Public toilets are essential for maintaining hygiene in urban areas, but they often face challenges such as high usage, maintenance issues, and water wastage. Description and Expected Solution: An innovative public toilet design is required so that maximum usable area gets cleans during the flushing and can be automated in a mechanized form (not electronic), so that after the usage, the flushing system gets activated automatically, and the whole usable area gets cleaned.
Development of an alternative technology to check blockage of blood vessels (an alternative to conventional angiography.	Background: Angiography is a common medical imaging technique used to visualize the inside of blood vessels and detect blockages. Description: However, typically medical tests like radionuclide angiography involve the use of radioactive contrast agents, which can pose risks to patients, including radiation exposure and allergic reactions. There is a growing need for safer, non-invasive alternatives that can provide accurate diagnostics without these risks. Expected Solution: The problem statement is to develop a cost-effective, non-invasive technology that can accurately detect blockages in blood vessels without the use of radioactive materials. This technology should be suitable for widespread clinical use and provide reliable results comparable to conventional angiography.

Development of a suction based low-cost flush (with less water usage) for deployment in rural areas.	Background: Access to proper sanitation facilities is a significant challenge in many rural areas. Traditional flush toilets require a substantial amount of water, which may not be readily available in these regions. Additionally, the cost and complexity of installing conventional plumbing systems can be prohibitive. Description: A suction-based flush system offers a potential solution by reducing water usage and simplifying installation and maintenance. Expected Solution: The problem statement is to develop a cost-effective, suction-based flush system that can be easily deployed in rural areas. The system should minimize water usage, be simple to install and maintain, and provide a hygienic and effective means of waste disposal.
Development of chemical strip (non-electronic) for identification of high temperature exposure in transportation of medicines/vaccines/FMCG goods, to ensure its usability.	Background: The transportation of temperature-sensitive goods is a critical aspect of supply chain management. Medicines, vaccines, and certain FMCG products require strict temperature control to maintain their efficacy and safety. Description: Exposure to high temperatures can compromise these products, leading to potential health risks and financial losses. Traditional electronic temperature monitoring devices can be costly and may not be feasible for all types of shipments. Expected Solution: Problem statement is to develop a cost-effective, non-electronic chemical strip that changes colour or exhibits a visible change when exposed to temperatures above a certain threshold. This strip should be easy to use, reliable, and capable of providing a clear indication of temperature breaches during transportation.
Development of portable device (non-contact device) for measurement of eye pressure in glaucoma patients for usage at home.	Background: Glaucoma is a leading cause of blindness worldwide, and managing intraocular pressure (IOP) is crucial for preventing disease progression. Description: Traditional methods of measuring IOP, such as Goldmann applanation tonometry, require direct contact with the eye, topical anaesthesia, and skilled personnel, making them less accessible for regular monitoring. Non-contact methods, such as air-puff tonometry, offer a more convenient alternative but are often limited to clinical settings due to their size and cost. Expected Solution: Problem statement is to develop a cost-effective, portable, and non-contact device that can measure IOP accurately and reliably with safety. This device should be easy to use, and allowing patients to use at home.

Smart Irrigation System for Precision Farming	Background: Water scarcity is a major challenge in agriculture, leading to inefficient water use and reduced crop yields. Traditional irrigation methods often result in overuse or underuse of water. Description: Develop a smart irrigation system that utilizes sensors and IoT technology to monitor soil moisture levels and weather conditions. This system will provide real-time data to farmers, enabling them to make informed decisions on irrigation scheduling, thus optimizing water usage and enhancing crop yield. Expected Solution: A smart irrigation module integrated with moisture sensors and a mobile application to provide farmers with timely irrigation alerts and recommendations based on real-time data.

Create a Virtual Herbal Garden that provides an interactive, educational, and immersive experience to users, showcasing the diverse range of medicinal plants used in AYUSH (Ayurveda, Yoga & Naturopathy, Unani, Siddha, and Homeopathy).	Background: The AYUSH sector relies heavily on medicinal plants and herbs, which form the backbone of traditional healing practices. However, physical gardens that are not accessible to everyone. A Virtual Herbal Garden will bridge this gap by offering a digital platform where users can explore, learn, and understand the significance of various medicinal plants from the comfort of their homes. Description: Participants are tasked with developing a Virtual Herbal Garden that is engaging, informative, and user-friendly. This virtual garden should include: Interactive 3D Models: Realistic 3D models of medicinal plants that users can rotate, zoom, and explore from different angles. Detailed Information: Comprehensive details about each plant, including its botanical name, common names, habitat, medicinal uses, and methods of cultivation. Multimedia Integration: High-quality images, videos, and audio descriptions to enhance the learning experience. Search and Filter Options: Advanced search functionality to easily locate specific plants and filter them based on various criteria like medicinal uses, region, and type. Virtual Tours: Guided virtual tours highlighting specific themes, such as plants for digestive health, immunity, skin care, etc. User Interaction: Features that allow users to bookmark favourite plants, take notes, and share information on social media. Expected Outcome: The expected outcome is a comprehensive Virtual Herbal Garden that serves as a valuable educational tool for students, practitioners, and enthusiasts of the AYUSH sector. This platform should make the knowledge of medicinal plants accessible to a wider audience, promoting awareness and understanding of traditional herbal practices. It should be visually appealing, informative, and interactive, providing users with an immersive experience that combines technology with traditional knowledge.

Develop a Smart Yoga Mat integrated with Artificial Intelligence (AI) capabilities to support smart watch integration for tracking progress and provide curated yoga content by experts, while ensuring its affordability.	Background: Yoga has gained global recognition for its numerous health benefits, including physical fitness, mental well-being, and stress reduction. As part of India's ancient heritage, yoga is a key component of the AYUSH (Ayurveda, Yoga & Naturopathy, Unani, Siddha, and Homoeopathy) systems of medicine, promoting holistic health practices. In today's digital age, there is a growing demand for innovative solutions that combine traditional practices with modern technology. A smart yoga mat equipped with AI and smart watch integration presents an opportunity to enhance the yoga experience, making it more interactive, personalized, and accessible. Detailed Description: The objective of this challenge is to design and develop a Smart Yoga Mat that leverages AI capabilities to: Smart Watch Integration: Enable seamless connectivity with smart watches to track key metrics such as heart rate, calories burned, and workout duration. This integration should provide real-time feedback to users, helping them monitor their progress and adjust their practice accordingly. AI-Powered Guidance: Utilize AI algorithms to analyze user data from the smart watch and provide personalized recommendations for yoga routines. The Smart Yoga Mat should be capable of offering curated content, including instructional videos, audio guidance, and posture corrections based on individual performance metrics. Affordability: Ensure that the Smart Yoga Mat remains cost-effective without compromising on quality or functionality. This affordability factor is crucial for encouraging widespread adoption among AYUSH start-ups and yoga enthusiasts across India. Expected Outcome: Participants are expected to deliver a prototype of the Smart Yoga Mat that demonstrates: Seamless integration with smart watches for tracking yoga-related metrics. AI-driven capabilities for personalized yoga guidance and content recommendations. User-friendly interface and ergonomic design suitable for various yoga practices. Cost-effective manufacturing feasibility, suitable for AYUSH start-ups.

Development of Tyre Maintenance and Operation App, including fitment of necessary IIoT related hardware in Dumpers	Tyre cost is one of the most important O&M cost in dumpers. In high capacity dumpers of CIL, the tyres are imported ones, and cost of such tyre is more than Rs. 25.00 lakhs each. Two aspects are equally crucial for tyre management in a mine – The first is the proper assessment of TKPH, and the second is proper maintenance of tyre pressure. Besides these two aspects, proper tyre performance analysis is also important. TKPH: Tonne-Kilometer-Per-Hour It is indicative of how much average load is carried by an individual tyre, for a given average speed condition, during an entire shift of operation. TKPH = (Mean load on tyre in tonne) x (AWSS in km/hour) Where, Mean Load is the average load in empty condition and loaded condition, and AWSS is the Average Speed during the Work Shift. Assessing the correct TKPH requirement by the user for a particular mining condition is the most important task. The user has to seek a particular TKPH tyre from the manufacturer. Manufacturer accordingly manufactures and supplies the same TKPH tyre to the user, by using suitable tread pattern and tyre compound in its factory. More is the TKPH, more heat-resistance the tyre will be. But if the TKPH is increased just to ensure heat-resistance, then it adversely affects the cut-resistance properties of the tyre. If operating TKPH is very very less than the designed TKPH of tyres, there will not be heat- failures, but cut-failures will increase. So, there should be a balance between the heat-resistance and cut-resistance properties, and proper assessment of TKPH is a must. Actions required: The payload monitoring system has already been installed in CIL's dumpers, and the payload as well as operating speed per shift is being continuously recorded in the Vehicle's Productivity and Health Monitoring System. By using suitable IoT application and suitable app, the payload and speed data may be directly transferred and analysed through the suitable app, so that correct value of TKPH assessment may be made directly through the mobile app. This assessed TKPH will be very helpful in procurement of suitable tyres for a particular geo mining condition. Tyre Pressure Proper tyre

Al-based automated defective exhibit identification system placed in a gallery.	Background: In Science Museums/ Centres exhibits are mostly interactive in nature. Interactive exhibits are the lifeblood of science centers, but keeping them functioning smoothly can be a challenge. It poses the problem of regular maintenance. It has also been observed that defects remain unattended for long due to not being identified. It creates a genuine problem for the visitors' experience and sometimes they are not aware of the optimum result. Here lines the requirement for an automated defective exhibit identification system. Description: It is a real-life problem in big Museum/ Science Museum/Centres, where there is inadequacy of manpower. Following are the problems in a nutshell that arose due to unnoticed and undiagnosed defects of the exhibits. High Maintenance Needs: Unlike static displays, interactive elements have more moving parts, software, and technology that require regular upkeep to function properly these are considered as ""golden parameters of any particular Exhibits"". Theses parameters are to be kept functional to keep the exhibits in a running condition. Frustration for Visitors: Encountering a non-functional exhibit can be frustrating for visitors, especially children, who may not understand why it's not working. Missed Learning Opportunities: Broken/ non-functional exhibits prevent visitors from fully engaging with the science concepts they're designed to teach. Because of their complexity, malfunctions might not be immediately obvious to visitors or staff, leading to a broken experience. Also creates a bad impression for that particular gallery and ultimately to the science center or to Science Museums. Expected Solution: Now, with the emergence of artificial intelligence, it transpires that amalgamation of Al with automation may give efficient result to detect defective exhibits placed in the galleries and give the feedback to the concerned section for immediate repairing initiative and rectify the exhibits. Thus, aiming a flawless learning experience or edutainment in Science Museum or in Science Center.

Develop a functional solution that demonstrates the hardware enabled root of trust.	1. Background. UIDAI has implemented app-based face authentication solution. This solution uses the support of the backend service to secure the captured image using PKI technology, so that it can be used by the authentication system. UIDAI intends to avoid this network call for encryption and implement an in-device solution to enable PKI implementation. 2. Problem Description. As part of the challenge, participating teams to develop a solution that is platform agnostic i.e applicable for both Android and IOS platforms, and will derive the root of trust from the hardware of the device. The key pair so generated with the help of hardware is to identify the device uniquely and must connect it with IMEI number or any such unique number of the mobile device. The solution must meet the following requirements:- 3. The proposed solution must meet the following objectives. 3.1 Feature Requirement. The solution must use hardware to generate a key pair to uniquely identify the device. The private key of the certificate par must remain in the hardware and must not be extractable. All encryption must be performed within the hardware enclave (i.e in hardware) to protect the private key. 3.2 The solution must support key lifecycle management i.e key expiry or revocation. 3.3 The solution must be completely offline i.e. should not use any backend component for implementation of the PKI security. 3.4 The solution must enable UIDAI to use RSA PKCS or OAEP encryption protocols. 4. Expected Solution. The expected outcome of this project is a functionalsolution that demonstrates the PKI encryption of blob data in the mobile device using a key pair that is linked to the device hardware.

Rapid colorimetric and artificial intelligence-based methods for determining the microbial quality of raw milk, processed milk, and milk products	Background: Milk is perishable product, it requires immediate processing after few hours (2-4Hrs) of production, otherwise, bacterial load increases and milk gets deteriorate. At present Methytene Blue Dye Reduction Test, commonly known as MBRT test is used as a quick method to assess the microbiological quality of raw and pasteurized milk. This test is based on the fact that the blue colour of the dye solution added to the milk get decolourized when the oxygen present in the milk get exhausted due to microbial activity. The sooner the decolourization, more inferior is the bacteriological quality of milk assumed to be. This test is widely used at the dairy reception dock, processing units and milk chilling centres where it is followed as acceptance/rejection criteria for the raw and processed milk. Further, processed dairy products may also get spoiled in the supply chain for microbiological reasons. Description: The above mentioned MBRT has to be done under sterile conditions. Take 10 ml milk sample in sterile MBRT test tube. Add 1 ml MBRT dye solution (dye concentration 0.005%). Stopper the tubes with sterilized rubber stopper and carefully place them in a test tube stand dipped in a serological water bath maintained at 37t1oC. Record this time as the beginning of the incubation period. Decolourization is considered complete when only a faint blue ring (about 5mm) persists at the top. However, for processed dairy products, the enumeration of bacterial load is time-consuming and requires different methods. Expected solution: The above mentioned MBRT takes 4 to 6 Hours for completion of the test. Therefore, it is proposed to develop cost effective, rapid and portable method/Machine to deduct microbial load in Raw and Pasteurized Milk as compared to present Methylene blue reduction test (MBRT).Meanwhile, smart packaging tools such as freshness indicators could be a solution for processed dairy products.In this context, artificial intelligence, machine vision, systems, etc. could be explored.

Affordable, Sustainable, and User-friendly Solutions for Semen Dose Storage and Distribution	Background: India has emerged as leading milk producer country in the world, however productivity of dairy animals is very low. To improve the productivity of animals a major focus area is to breed these animals using semen from high genetic merit bulls through Artificial Insemination (AI). AI enables farmers to access the best bull (male) genetics. Farmers can improve the production, health traits, fertility and longevity of their dairy cattle by using a balanced approach to breeding. Animal health is also improved through the use of AI. Description: For AI, the semen is inseminated into the female by placing a portion of it either in a collected or diluted form into the cervix or uterus by mechanical methods at the proper time and under most hygienic conditions. Ensuring the integrity of the cold chain from Semen Production centres to the farmer's destination, where semen is utilized for artificial insemination, is crucial for the effective functioning of the AI delivery system in India. Semen doses are currently stored and transported using liquid nitrogen and specialized containers. However, significant losses of liquid nitrogen occur during storage and transportation, leading to escalated costs for maintaining the cold chain. The cost of liquid nitrogen itself is an issue. Mishandling of liquid nitrogen poses potential health hazards. The bulky and heavy nature of liquid nitrogen storage containers necessitates considerable resou rces for transportation. Expected solution: . There is a need to explore and promote alternative, cost-effective, and long-lasting methods for the storage and transportation of semen doses . The design, material, type of insulation of storage containers can also help in cost effectiveness, reduction in losses, compactness and ease of carrying to facilitate efficient distribution.

Solution for end-to-end tracking of dual use chemicals used in both legitimate industries and illicit drug production from point of manufacture to point of end use/export.	Background: Dual use precursor chemicals are substances that have legitimate industrial and commercial applications but can also be used in the illicit manufacture of drugs. For e.g. Opium is converted to Heroin using Acetic Anhydride and manufacturing of Methamphetamine is done using Ephedrine or Pseudoephedrine. Precursor chemicals are essential in various legal industries such as pharmaceuticals, agriculture, manufacturing etc., but their potential for misuse necessitates strict regulation and monitoring. Appreciating this, Government of India has put different levels of regulations on some of the precursor chemicals in India under the Regulation of Controlled Substances Order, 2013. 7 widely misused precursor chemicals are put under strictest of the controls, where in any firm dealing in any of these 7 chemicals are required to maintain records and file quarterly reports with jurisdictional NCB Zonal Unit. Any activity undertaken with respect to these chemicals like manufacture, possession, storage, sale, purchase, distribution, export, consumption etc are to be reported to NCB. Further, NCB also issues Unique Registration Number (URN) to the firms indulged in the said activities. If any individual or firm is found to be involved in any of the activities without a valid URN are punishable under the Narcotic Drugs and Controlled Substances Act, 1985. Description: It is observed that some of the firms with valid URN to be handling any of the 7 domestically controlled precursor chemical, divert the same from licit channel and traffic it for manufacturing of narcotic drugs or psychotropic substances. Further, the investigations conducted also reveal that the firms usually create documentation of the movement of precursor to a licit firm for a licit activity and divert the same for illicit activities. Therefore, there is a need for end-to-end tracking of the 7 domestically controlled precursor chemicals (controlled substances) Expected Solution: A hardware/software/chemical solution for end-to-end tracking of dual use chemicals used in both legitimate industries and illicit drug production from point of manufacture to point of end use/export

Automatic Change detection in Synthetic Aperture Radar satellite images	Background: Synthetic Aperture Radar satellite images have the capability for night time imaging as well as imaging without being affected by clouds. Automatic change detection on such images have wider application for various use cases. Description: Change detection between two SAR (Synthetic Aperture Radar) satellite images are straight forward if they are co-registered as the difference or ratio of corresponding pixels of the two images itself will give the change map. But such change maps will invariably have many natural changes as well like water body extent, flood extent, snow cover and forest cover changes etc. Our interest is to detect only man made changes and avoid natural changes. The solution can make use of Sentinel 1 SAR Open source satellite images and Google Earth Engine platform to access them. These images are co-registered by default. The GRD (Ground Range Detected) intensity image version of the Sentinel 1 SAR is to be used. Please note that images with same viewing geometry are better suited for change detection purposes. The solution should give the option for the user to vary the thresholds if any used for filtering change results. The change output should be in the form of polygons in a geographically referenced vector file. The solution should be scalable, means should be able to run on huge areas of interest and generate change alerts. The criteria for winning solution would be minimum false alarms with regard to man made changes. Expected Solution: A software based solution is expected that has a GUI to specify the area of interest for change detection and threshold controls to filter changes and output changes in the form of shapefiles/geojson with geographical references. It shall run above Google Earth Engine.

Automatic Road Extraction and alert generation for new roads	Background: Department of Space has made available its medium resolution satellite images through Boonidhi portal. Resourcesat satellite images (LISS IV sensor) are useful to extract roads with width of 20 feet and above due to its resolution. Description Roads: are linear features on satellite images and quite clearly visible for human interpretation because of their linearity. Automated road extraction is required in view of very large volume of imagery available nowadays. The roads extracted must be saved to a GIS database. When there is a change or new road development compared to previous image of the same area, there should be an alert generated. Expected Solution: A software based solution is expected that has a GUI to specify the area of interest for road extraction and alerts generation. Output should be in the form of shapefiles with geographical references. It should make use of ISRO's Boonidhi images. The alert should be sent to configured email ids.

Target detection by optimizing Anomaly Detection in Hyperspectral Image Processing using AI/ML	Background: Hyperspectral imaging acquires images with very narrow continuous wavelength ranging from UV to LWIR which is beyond the visible spectrum. Using this continuous spectral information classification of diverse material of interest can be done accurately. The availability of huge information due to continuous spectral information improves data information content but causing challenges in processing of hyperspectral images. An unsupervised learning mechanism for detection of targets by optimizing Anomaly Detection in Hyperspectral Image Processing using AI/ML can be used for it. Description: The above problem statement envisages, that Hyperspectral data to be processed in such a way that to find spectrally distinct and most informative pixels in the data to identify anomalies in the data. Before processing of data, data correction methods, to improve interpretation of pixel spectra and better result to analyse data can be done. Different approaches for de-noising to remove noise from data, fusion approach through sharpening or pan sharpening can be implemented. The calibration of data using radiometric and atmospheric correction methods can be implemented to optimize the result. An anomaly detection model based on deep learning with best performance to be implemented to process hyperspectral data which can provide clear identification of anomalies in the data with sufficient spectral clarity. Subsequently, the same can be created as spectral signatures of the objects. A suitable target detection methodology for identifying target of interest is also to be developed. Expected Solution: A deep learning models for processing of hyperspectral data based on anomaly detection to be optimized that can be used for target detection in that data using available open source hyperspectral data of Hyperion, AVIRIS etc. to be developed.

Enhancing body detection in CSSR Operations Using Advanced Technology	Background: During CSSR (Collapsed Structure Search and Rescue) operations, NDRF teams encounter challenges in identifying buried deceased bodies amidst rubble and debris. Traditional search methods are often time-consuming and labor-intensive, hampering the timely recovery of victims and increasing the risk of further casualties. Description: THe problem statement envisions the need for innovative technology to improve the detection and identification of buried deceased bodies during CSSR operations. Current methods such as manual probing, canine search, and acoustic sensing have limitations in accurately locating victims, especially in complex and hazardous environments. Expected Solution: 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. These tools would enable NDRF teams to scan debris piles and collapsed structures more efffectively, identifying buried bodies with greater accuracy and efficiency.
Grey Water Management (GWM) - Designing low-cost testing kits capable of detecting bacterial, faecal, and microbial contaminants in groundwater.	Background and Description: In Grey Water Management, the appropriate technology interventions should be consistent with the broad principles of Reduce (i.e. Judicious use of fresh water which will result in less generation of a minimum quantity of grey water) Reuse (i.e. reuse of grey water for Kitchen garden, and treated water for irrigating crops, toilet flushing, vehicle washing etc.) and Recharge (i.e. adoption of technologies such as soakage pit and leach pit). Greywater Management is encouraged to be implemented as close to source as possible to reduce cost and complexity. Preferably, greywater should be managed at the household level, with community-level management as a secondary option, and management at the Drain End Point considered only as a last resort.

GOBARdhan - Simple control systems and/or instrumentation for small biogas plants that will allow better process control leading to effective digestion and improved yield of biogas.	Background and Description: In Bio slurry production at village level, we witnessed few challenges and issues accociated with handling, utilization and some common issues with bio-slurry are Pathogen Contamination Accumulation, Anaerobic, Conditions, Transport and Storage. Expected Solution: a. Simple control systems and/or instrumentation for small biogas plants that will allow better process control leading to effective digestion and improved yield of biogas b. Low-cost kits to measure nutrient content of F/L OM c. Low-Cost enrichment models for F/L OM (Fermented/Liquid Organic Manure)
Personalized testing kits for testing Residual Chlorine level at delivery points	Background and Description: The Jal Jeevan Mission (JJM) is a flagship initiative of the Government of India aimed at ensuring safe and sustainable drinking water to all rural households in the country. An essential aspect of the mission's success is not only ensuring access to water but also guaranteering its quality. Residual chlorine/Silver ion levels indicate the efficacy of water disinfection, bacteriological contamination poses significant health risks. Existing methods for testing water quality at the household level often lack reliability, accessibility, and affordability. The main aim of the technology challenge is to develop three distinct personalised testing kits (For measuring Residual chlorine, residual silver ion and/or for Bacteriological contamination) that are cost-effective, easy to use, and could measure both residual chlorine levels and bacteriological contamination at the household level. Thse devices are intented to empower rural communities to conduct their own assessments of water quality, enabling prompt action to ensure safe drinking water. Expected Solutions: i. The device should be portable and accurate in detecting low levels of residual chlorine (As per BIS 10500: 2012, acceptable limit: 0.2 mg/liter), residual silver ions and/or bacteriological contamination (E. coli & Total coliform- As per BIS 10500: 2012, it shall not be detectable in any 100 ml of sample), ensuring reliable results comparable to laboratory-grade equipment. ii. The detected value indicates the level of chlorine/silver ion/bacteria (E.Coli) present in 100 ml water. The output of the test should be in digital mode; iii. The personalized testing kits should be affordable for rural households, easy to carry & use and requiring minimal training for operation by individuals. iv. The personalized testing kits should be robust and able to withstand harsh environmental conditions prevalent in rural India, suhc as temperature fulctuations and humidity. v. Quick turnaround time for obtaining results, allowing households to promptly assess water safety; vi. The personalized testing kits should easy to calibrate; vii. Low operation and maintenance; viii.

Designing and development of a pressure transducer based equipment with a well cap for measurement of heads in autoflow wells	Autoflow wells tap aquifers in which groundwater occurs in pressurised condition. As a result of this water flows from such well automatically and pumping devices are not required. Such autoflow wells are observed mostly in the Terai region of India. As shown by the aquifer mapping studies, the extents of autoflow areas are shrinking in parts of Uttarakhand and elsewhere. Many private wells in these terrains are without any cap or tap and water flows continuously leading to huge groundwater losses. Further, measurement of head (water level) in these wells is a challenge as water flows automatically from these wells. Usually an additional pipe is attached above the ground level and the water level in such a pipes is measured manually. The proposal is to develop a device that can serve two purposes- i) it will work as a safe cap for the well with a tap for regulating water flow and ii) a pressure transducer based sensor that can sense the pressure and translate it in terms of height (in m) above ground level

Drone-based Intelligent ET sensing system and irrigation water use accounting system for irrigation commands.	Background: The use of Earth Observation Satellite (EOS) technology for estimation of seasonal Actual Evapotranspiration (AET) of crops at various growth stages is well establishd. Due to low levels of water metering in irrigation, it is challenging to control theft from canals and unauthorized ground water extractions. Therefore, ET based technologies can enforce water accounting / auditing and thus enhance Water Use Efficiency (WUE). However, the EOS based ET technology has certain limitations i.e. low accuracy under cloudy conditions and low resolutions. Therefore, the drone-based ET systems can be used to bridge this data gap. Description: The idea is to estimate the actual water consumption by the crops (i.e. AET) in a targeted irrigated command area (ranging from 50 Ha to 5000 Ha) with the help of a drone based system. This system should have a portable drone control module along with an in-built Artificial Intelligence and Machine Learning (AI&ML) mechanism to work out AET and calibrate against the satellite-based ET inputs. Once integrated with cadastral maps, it should be tailored for individual farm level water control. Expected Solution: A drone fitted with suitable ET sensing system to bridge the data gaps/limitations from Satellite based ET system for calculation of Actual Evapotranspiration (AET) of different crops under survey. The AI&ML algorithm using historical data and satellite based inputs should be able to give various Key Performance Indicators (KPI) at farm level like (i) Type of Crop; (ii) Crop monitoring (seeding/sowing/harvest/ disease etc); (iii) Water Auditing/Water Accounting: (iv) Over irrigated vs under irrigated/Ground water use; etc. These KPI's can provide an insight of farmer irrigation decision-making; estimation of irrigation water use; farmer irrigation behavior heuristics and management practices, including the scheduling and efficiency of irrigation decisions. The software model can be polished over time in different irrigation commands to improve the accuracy and reliability of irrigation water use estimation. This will give a complete control of water use and agriculture productivity at field through

Design/Development of an efficient Energy Storage System (ESS) to integrate intermittent Renewable Energy sources and to support/stabilize the grid.	Background: The increasing adoption of renewable energy sources like solar and wind presents significant challenges due to their intermittent nature. This variability can strain the power grid, leading to inefficiencies and reliability issues. Traditional grid infrastructure is not designed to handle these fluctuations effectively, resulting in energy wastage and a reliance on fossil fuel-based backup power. Energy storage systems (ESS) offer a potential solution by storing excess energy generated during peak production periods and releasing it during times of high demand or low generation, ensuring a stable and reliable power supply. Description: The task is to design an innovative and efficient energy storage system to integrate intermittent renewable energy sources and stabilize the grid. This requires addressing several key challenges: high costs, technological limitations, and regulatory barriers. Current ESS technologies, such as lithium-ion batteries, pumped hydro storage, and flow batteries, each have their own strengths and weaknesses. Innovative ideas need to be explored to reduce costs, enhance storage capacities, and improve the efficiency and lifespan of these technologies. Additionally, how to navigate and potentially reform regulatory frameworks to support the widespread adoption of ESS may also be explored. Expected Solution: Develop approaches to lower the initial and operational costs of ESS, potentially through new materials, manufacturing processes, or economies of scale. Identify or create advanced ESS technologies that offer higher efficiency, greater storage capacity, and longer operational lifespans. Suggest changes to policies and regulations that facilitate ESS integration, including safety standards, performance metrics, and grid interconnection protocols. Formulate strategies to engage key stakeholders, including policymakers, utility companies, and consumers, to build support for ESS deployment. Design small-scale pilot projects to test and refine their proposed solutions in real-world settings, gathering data to demonstrate effectiveness and scalability.

Sustainable Utilization of 100% of Ash from Coal based Thermal Power Plants.	Background: Thermal power plants, that burn coal, produce a substantial amount of ash, including fly ash and bottom ash, as byproducts. The disposal of this ash presents significant environmental challenges, such as land degradation, groundwater contamination, and air pollution. Traditional disposal methods like landfilling or Ash dykes are not only unsustainable but also lead to challenges in ecological restoration. Despite the potential for beneficial use in various industries, a large portion of ash remains underutilized. Description: Current methods for managing and disposing of ash from power plants are inadequate and environmentally detrimental. The accumulation of ash in landfills poses serious environmental risks, including soil and water pollution. Additionally, these disposal methods fail to leverage the potential value of ash in other applications. There is a critical need to develop sustainable and economically viable solutions for repurposing this ash, transforming it from a waste product into a valuable resource. Expected Solutions: To address the problem of ash disposal and utilization, the following solutions can be explored: Construction Materials: Develop new type of material in which incorporating fly ash to enhance material properties and reduce the environmental footprint of construction activities. Soil Amendment and Agriculture: Investigate the use of ash as a soil conditioner to improve soil quality and support sustainable agricultural practices. Manufacturing Processes: Utilize ash in the production of ceramics, glass, and other industrial products, capitalizing on its chemical properties. Environmental Remediation: Explore the use of ash in environmental cleanup projects, such as neutralizing acidic soils or treating wastewater. Challenges to Address: Technical Feasibility: Develop processes that effectively utilize ash without compromising the quality and safety of the end products. Economic Viability: Ensure that the proposed solutions are cost-effective and competitive with traditional materials and methods. Regulatory Compliance: Navigate the regulatory landscape to ensure that

Build a detailed concept for an industrial scale green hydrogen (> 50 TPD) production facility, with a levelized cost of hydrogen (LCOH) below $2 USD per kg.	Background: Green hydrogen, produced from renewable energy sources, offers a game-changing solution for decarbonization. Unlike its fossil fuel counterpart, green hydrogen emits no greenhouse gasses at the point of use, making it ideal for hard-to-electrify sectors like heavy industry, long-distance transport, and steel production. This clean fuel can power vehicles and industrial processes, slashing emissions and combating climate change. Furthermore, green hydrogen's potential for energy storage allows for a more balanced and resilient renewable energy grid. As we strive for a net-zero future, green hydrogen is a crucial tool for a cleaner and more sustainable tomorrow. Description: Green hydrogen's potential for clean energy is undeniable. However, its widespread adoption faces a significant roadblock: high levelized cost. This cost, encompassing production, storage, and transportation, makes green hydrogen less competitive compared to traditional fossil fuels. This disparity discourages industries from switching to green alternatives. Government incentives, technological advancements, and economies of scale are all crucial to bridge this cost gap. Only then can green hydrogen fulfil its promise as a transformative force in the fight against climate change. Expected Solution: The Project details should include definitive inputs on: Sizing of production capacity. Production technology, useful life, replacement costs etc. Proposed RTC-RE model (if production is through electrolysers). Proposed sourcing of Feedstock Expected plant CUF. Entire Financial Model with detailed breakup for CAPEX & OPEX. Storage technologies used (with compliance of safety standards) and their cost. Approaches used to lower levelized cost during project modelling. Policy and Regulatory support required. Scope for further cost optimisation through economies of scale.

Developing innovative solution for efficient management of waste and conversion to valuable products, Waste to Energy- waste recycling	Background: Management of solid waste has been one of the key problem in most of the cities around the world. The failure is evident from burgeoning growth of landfill site into mountain of MSW. Waste management accounts for a comparatively very high share of national GHG emissions in several countries worldwide. Emissions of methane following the disposal of waste in landfill account for a large share of GHG emissions from waste management. Description: With increasing pressure of development and urbanization, the need for efficient municipal service delivery is also growing rapidly, which the municipal bodies are very often unable to cope with. This is true in case of solid waste disposal and management as well. The main objectives of solid waste management are to reduce the amount of waste that ends up in landfills, promote recycling, and minimize the negative effects of waste on the environment and human health Expected Solution: Developing Community based solution for collection and recycling of solid waste management for developing into Net Zero waste communities. Digital solution for tracking the waste generation to waste recycling giving the effective tracking mechanism to utilities to collect, account and manage waste. Developing local solution for recycling of waste by Torrefaction of Municipal Solid Waste (MSW) Pellets converting it into valuable product to get bioenergy Innovative solution for waste management to reduce LFG and Collecting and Treating Landfill Gas (LFG) and used as a renewable energy resource

Reducing the carbon emissions from thermal plants, developing ways of Carbon capture and utilisation through value added products	Background: Coal is the most important and abundant fossil fuel in India. It accounts for 55% of the country's energy need. The country's industrial heritage was built upon indigenous coal. Our countries major production of Electricity is achieved through coal fired thermal power plant which is around 3/4th of the total power generation and also the biggest source of Carbon emission. India updated its NDC according to which the target: To reduce emissions intensity of its GDP has been enhanced to 45% by 2030 from 2005 level. India's also creating energy transition pathway to shift from fossil fuels to renewable energy sources to reduce the effects of climate change and promote sustainability. However, owning to energy security issue the role of coal cannot be ruled out in immediate future till various storage solution gets mature and become available at affordable cost. Description: Carbon Capture, Utilization, and Storage (CCUS) is a promising technology that can help India meet its energy security and emission reduction goals. CCUS can be retrofitted to existing power and industrial plants, allowing for their continued operation. CCS was acknowledged as a solution for climate mitigation by IPCC. However, IPCC also noted that CCS has the highest cost and lowest possible contribution to net emission reduction in both energy and industry sectors. This problem is having potential opportunity for innovators, researchers and start-ups. In order to meet the 1.5°C goal, IPCC projects the need to have technical geological storage of about 1,000 GtCO2. However, the availability of geological storage is highly location dependent and there are several technological, economic, institutional, ecological-environmental and socio-cultural barriers to implementing CCS, according to IPCC. Expected Solution: Low cost solution with indigenous technology development for carbon capture and utilisation. Developing solution for storage and transport of carbon which is more sustainable ecologically and environmentally Converting CO2 into value-added products, creating economic value from waste products and contributing to the circular carbon economy,

Development of co-electrolyzer : which would synthesize organic chemicals like methanol and inorganic chemicals like ammonia in a single stage.	Background: Decarbonization of chemical manufacturing is crucial for achieving Net Zero 2050. The transition towards carbon-neutral chemical production is challenging due to the fundamental reliance of the chemical sector on petrochemical feedstock. Electrolysis- based manufacturing, powered with renewables, is a rapidly evolving technology that might be capable of drastically reducing CO2 emissions from the chemical sector. Description: Co-electrolysis, also known as syntrolysis, is an alternative technology that uses electrolysis to convert renewable electricity into syngas for the co-production of methanol and ammonia. The process involves three main steps: 1. Hydrogen production: Using water electrolysis, renewable electricity is used to produce hydrogen. 2. CO2 utilization: CO2 is used in the process. 3. Methanol synthesis and purification: Methanol is synthesized and purified Expected Solution: Design and development of the co-electrolysis process (materials, reactor, operating conditions) towards direct chemical production. Development of cell structure and design, including electrolyte products and/or new developed electrodes, constructed from materials abundant in nature, and can easily be scaled up without material-availability constraints. Validate the co-electrolysis operation for different targeted outlet for various chemical such as ammonia and methanol.

Video call intercom based on analog/IP system with vibration sensor	Background: Needs an internal communication including Deaf people. Maybe one wants to be able to communicate with one desk to another desk in office premises. Or in a case one upstairs in a bedroom doing some work and wants to know when dinner will be ready. Maybe the person is too weak to get up and shout down the stairs to find out if so, then this simple intercom will help him or her to get the information he or she needs. Deaf people are not able to hear and don't use oral language, they can see and communicate in Sign language and Sign language is a Visual language. So video call communication devices will be more accessible for the Deaf. Vibration sensors also will be help out in emergency to forward the information. It works without any charges like the telephones. Description: In an office, business organization, Shops, stores and stressful in relating/delivering information to each other within a particular building. The servants find it laborious going to the boss always whenever he/she has information to deliver or wants to carry action with respect to the master's authority. Therefore, this project work is to address this issue, looking forward to eliminating the stressful, manpower (Deaf) involved and to facilitate information delivery, making communication easier. The Intercom system formed the basis of this study and designed the HOD's office and staff's office for internal communication keeping the view of Deaf.

Developing writing pen and writing pad for children with Specific learning disability.	Background: Children with Specific Learning Disability (SLD)who faces challenge of writing during their academic life especially during examinations where they need the provisions of a scribe. The purp ose of rehabilitating people with disabilities is to reduce the dependence on other people. In order to achieve this fundamental right to be independent, it is important to develop innovative strategies and solutions to come up with some hardware tools like writing penand writing pad for children with specific learning difficulties so that their academic life does not become a hurdle in realising their full potential. The innovative technology or solution should be cost effective and easily usable so that children with all strata can afford to use this. Detailed Description: In India, the Central Board of Secondary Education (CBSE) and other educational boards provide several relaxations for students with learning disabilities (SLD) during examinations such as having a scribe during exams. A scribe writes answers as dictated by the child. The scribe must be from a lower grade than the child appearing for the exam. CBSE provides remuneration for the scribe, and you can also apply for your own scribe if needed. If a child has difficulty reading, they are entitled to a reader who reads (not explains) the questions to the child. However, a child can have either a reader or a scribe, not both. CBSE grants additional time to students with disabilities. For example: 60 extra minutes for a three-hour exam 40 extra minutes for a two-hour exam 30 extra minutes for a one-and-a-half-hour exam. Since January 2020, CBSE allows the use of calculators for children with dyscalculia. The board provides these calculators.Theseaccommodations aim to create a level playing field for students with learning disabilities, ensuring they can demonstrate their knowledge effectively during exams. However it has some disadvantages as well like some students may become overly reliant on scribes, affecting their independent writing skills.Students may feel uncomfortable dictating their answers to someone else. Availability of trained scribes can be a challenge, especially during exams. The

Wearable sensor with Artificial Intelligence for prevention of falls in elderly people	Background: As per the census 2011, Disability is more common in elderly people. One of the major reasons for disability among the elderly people is falls. Every year, one-third of community-dwelling older adults (adults aged 65 and older) experience a fall. Falls, defined as “unexpected event[s] in which the participant comes to rest on the ground, floor, or lower level,” are responsible for a wide range of negative health outcomes. Falls are the leading cause of injury-related deaths among older adults, and the age-adjusted fall death rate (64 deaths per 100,000 older adults) increased by 30%. Additionally, the psychological impact of falling can cause older adults and their caregivers significant fear about the risk of falling again. This fear of falling can have an accumulating effect whereby the fear of falling causes individuals to limit their everyday physical activities, which in turn makes them weaker and more susceptible to future falls. In fact, studies have shown that falling once doubles the chances of falling again. Many falls, however, can be prevented. One of the most effective ways to reduce fall risk is through targeted exercise that improves an individual’s strength, balance, and mobility Description: Exercise-based programs, such as the Otago Exercise Program and Tai Ji Quan: Moving for Better Balance, have been shown to reduce falls by up to 35% and 55%, respectively. Until recently, however, the vast majority of fall prevention programs were only offered in small, in-person classes hosted in local senior centres or gyms. Although this has been the standard dissemination method for decades, it comes with significant barriers to participation. Common barriers to in-person programs include a lack of programs in rural or under resourced communities; limited or no access to transportation; scheduling conflicts; cost of getting to and using facilities; interpersonal barriers, such as finding other participants’ presence intimidating; and physical environmental barriers, such as bad weather, stairs, uneven ground, difficult parking, and more The recent developments in Wearable technology with Artificial intelligence may help elderly

Development of cost-effective myoelectric prosthesis.	Background: With the loss of an upper limb, activities of daily living (ADL) become more challenging for the affected person. Functional body powered upper limb prosthesis can replace the functions of upper limb for ADL activities up to some extent. But in higher level of upper limb amputation, it becomes difficult for the patient to manage ADL activities. The requirement of externally powered prosthesis such as myoelectric prosthesis plays a vital role in this aspect. Description of Problem statement: A myoelectric prosthesis is an externally powered prosthesis which is controlled by muscle contraction (muscle action potential). In market, many variants of myoelectric prostheses are available with various features. The most important feature of these prostheses is the grasping pattern types and also it indicates about movement of different fingers in prosthesis. Because it is expensive, access to these high-end prosthesesbecomes challenging for patients with upper limb amputation living in developing nations like India. Even though few myoelectric prostheses are available in market with less cost, but the features are limited and are not working precisely. Expected Solutions: Experts from different disciplines, such as engineers for creating programs and fabrication of controlling circuits and Prosthetist for fabrication of sockets and fitment of the prostheses are required to design and develop a cost-effective myoelectric prosthesis. Most important feature of the prosthesis is the grasping pattern which is completely dependent on the prosthetic hand. Thus, design and fabrication of prosthetic hand also plays a vital role in the complete working mechanism of the prosthesis. Thus, to get a successful result, it is possible to work collaboratively with experts from different discipline.

System to check the healthiness of earthing system and alert staff in case of any malfunction;	Background: We have large numbers of Electrical pole lights installed at parking area and station area. Though these lights are equipped with earth leakage protection switch gear but in case of malfunctioning, it may prove to be dangerous for the public. Also, to check all the system earthing, huge manpower is required. Description: To address this challenge there is a need of sensor-based system which can continuously monitor the healthiness of earth leakage current, the continuity of the earthing for all electrical system and also alert the maintenance team in case of any malfunction. The sensor-based system can take feedback from the panels and transmit the same to a centralized location. This system shall also monitor the earth resistance value of earth pits/earth grid and shall give audible and visual alert in case of any deviation from the specified value. Expected Solution: This system shall monitor the healthiness of earth leakage in switchgear, the continuity of the earthing for all electrical system and generate alert in case of any malfunction in system.
Condition-based monitoring and maintenance system.	Background: There are a large number of tunnel booster fans (TBF) of different capacity installed in tunnel area at underground metro stations. These IBFs have different maintenance schedules and frequency prescribed by OEM. The TBF's are not operated regularly but are tested during mock drills. The exercise of scheduled preventive maintenance of this equipment involves a large number of manpower and risk of working at height. The Condition-based maintenance in place of scheduled preventive maintenance would be very helpful in optimizing the maintenance and manpower cost involved. Description: To optimize the maintenance and manpower cost there is a great need of developing a condition-based monitoring and maintenance system. The historical data pertaining to failures along with the symptoms, the permissible limits of different parameters. the previous maintenance records of TBF shall be fed into the Al based condition monitoring system. The Al based system shall analyze and compare this historical data with parameter obtained at the time of operation during the testing/mock drill to predict any maintenance requirement based on the condition of TBF and the system shall also alert in case of any deviation from specified values. Expected Solution: Condition-based monitoring and maintenance system which can use machine learning & behavioural analytics to predict any maintenance requirement based on the condition of a particular system.

Al based acoustic wave monitoring of rail defects like cracks, fracture and prediction for rail wear, quality along with other parameter.	Background: Rails are used for the movement of trains and if there are major defects in the track then accident may happen or riding comfort in train may be compromised. Rail defects such as cracks, fractures, and wear are critical issues in the railway industry, leading to safety hazards, operational disruptions, and increased maintenance costs. Early detection and prediction of these defects are essential for ensuring the reliability and safety of railway infrastructure. These defects are to be noticed while train is moving. Description: The problem statement aims to develop an Al-based acoustic wave monitoring system for the early detection of rail defects and prediction of wear and quality parameters. The system will utilize acoustic waves to transmit to the rail tracks and its pattern will be monitored. The system will be capable of distinguishing between normal operating conditions and the presence of defects or abnormal wear patterns. Expected Solution: The proposed solution will involve the development of a comprehensive acoustic wave monitoring system for railway tracks. This system will consist of transmission side and reception side. Reception side sensors would be capable of predicting the track structure, quality of the rail and distance from a central fixed point.

Development of Portable EMI/EMC, induction measurement Instruments.	Background: In Metro network various electronics cards and equipment are installed which have to work nearby high voltage power supply, therefore the functioning of these cards may be affected due to the EMI/EMC generated due to above power supply. Therefore, the measurement of EMI/EMC in environment is essential requirement in metro system; however, traditional measurement instruments for these parameters are often bulky, expensive, and require specialized skills to operate so need to develop portable EMI EMC meter Description: The problem statement aims to develop a series of portable meters for measuring electromagnetic interference (EMI), induction, torque, and adhesion, catering to the needs of diverse industries. These portable meters will be compact. lightweight, and user-friendly. allowing for easy deployment in various environments and applications. The EMI meter will be capable of detecting and analyzing electromagnetic emissions from electronic devices, machinery, and infrastructure to assess their compliance with electromagnetic compatibility (EMC) standards. It will feature advanced signal processing algorithms to identify and quantify EMI sources accurately. Expected Solution: The proposed solution will involve the development of a series of portable meters for measuring EMI/EMC parameters. These meters will be designed to be compact, lightweight, and rugged, suitable for use in various industrial environments. Additionally, the meters will feature wireless connectivity options for data transmission and integration with existing systems and workflows. By providing portable meters for EMI/EMC measurement, the proposed solution will enable organizations to enhance product quality, improve operational efficiency, and ensure compliance with industry standards.
Student Innovation	Smart Education, a Concept that Describes learning in digital age.it enables learner to learn more effectively,efficently,flexibly and comfortably.
Student Innovation	Disaster Management includes ideas related to risk mitigation and Planning before,after or Duration of Disaster.
Student Innovation	Technology ideas in tertiary sectors like Hospitality, Financial Services, Entertainment and Retail.
Student Innovation	Provide ideas in a decentralized and distributed ledger technology used to store digital information that powers cryptocurrencies and NFTs and can radically change multiple sectors

Student Innovation	Innovative ideas that help manage and generate renewable /sustainable sources more efficiently.
Student Innovation	A solution/idea that can boost the current situation of the tourism industries including hotels, travel and others.
Student Innovation	Solutions could be in the form of waste segregation, disposal, and improve sanitization system.
Student Innovation	There is a need to design drones and robots that can solve some of the pressing challenges of India such as handling medical emergencies, search and rescue operations, etc.
Student Innovation	Submit your ideas to address the growing pressures on the city's resources, transport networks, and logistic infrastructure
Student Innovation	Creating intelligent devices to improve the commutation sector
Student Innovation	Developing solutions, keeping in mind the need to enhance the primary sector of India - Agriculture and to manage and process our agriculture produce
Student Innovation	Cutting-edge technology in these sectors continues to be in demand. Recent shifts in healthcare trends, growing populations also present an array of opportunities for innovation.
Student Innovation	Ideas that showcase the rich cultural heritage and traditions of India
Student Innovation	Ideas that can boost fitness activities and assist in keeping fit.
Student Innovation	Ideas focused on the intelligent use of resources for transforming and advancements of technology with combining the artificial intelligence to explore more various sources and get valuable insights.
Student Innovation	Challenges your creative minds to conceptualize and develop unique toys & games.
Student Innovation	For use of travel or activities beyond earth's atmosphere, for purposes such as spaceflight or space exploration.

Research and develop a design on “ autonomous water surface cleaning robot “	Design an autonomous water surface cleaning robot, to automate the task of cleaning water surfaces. These robots are particularly useful in environmental protection efforts, as they can perform high-efficiency cleaning without human intervention. It can be autonomous or remote-controlled. The robot needs to be lightweight and flexible for easy transportation. The specifications are as follows: Length × Height × Width - 2.5 m × 1.5 m × 0.75 m Weight - 80 kg Maximum Speed - 1.5 m/s Trash Payload - 25 kg Project submission must include conceptual sketches and images in the PPT presentation. At least one component must be optimized using the generative design module. The robot should incorporate Industry 4.0 applications, such as IoT and AI, for a smart and efficient cleaning solution. Teams choosing to submit idea for Autodesk’s problem statement are required to request their faculty (SIH SPOC) to fill this mandatory form. (https://forms.gle/KfBguyYGHmv5RQ778) Autodesk Fusion is a cloud-based 3D modeling, CAD, CAM, CAE, and PCB software platform for professional product design and manufacturing. Students and educators can click here to get FREE access to Fusion. (https://www.autodesk.com/education/edu-software/overview?sorting=featured&filters=individual) Participation Guidelines: For Idea Submission: Each student team will have to submit a PowerPoint presentation (5-7 Slides) about their project with conceptual sketches and images. No design files required at this stage and design should only be created during the Grand Finale For Grand Finale: Students must use Fusion to design autonomous water surface cleaning robot within the given time period and present the following to the jury members: PPT explaining the final project Public link of the design Rendered images and animations Note: Teams coming with pre-designed files will be disqualified. Marking Criteria: Please note that this marking criteria is for Autodesk's this particular Problem Statement only Design Objective:10 Design Process:10 Creativity and Novelty:30 Software Usage:30 Manufacturability:20 Total

Conversational Image Recognition Chatbot	Background: Ever since the birth of AI and computer vision, modeling conversations remains one of the field's challenges, especially to combine both natural language processing and image recognition. Chatbots are now widely used as part of platform as applications like Apple's Siri, Google's Google Assistant or Microsoft's Cortana. Detailed Description: Generally, a conversational Chatbot is an application that is able to communicate with humans using natural language. However there exists a need for an image recognition deep learning based Chatbot is an application to recognize the images, uploaded by user and answer the questions about the image. The main problem domain of this project is building a image recognization Chatbot, which is capable of recognize the object in an image and generating the best response for any the user's query about the image. Expected Solution: Image recognition Chatbot is expected to detect the object in the image and have the related dialog of the image after training, also have understanding of the sender's messages so that it can predict which sort of response will be relevant and it must be correct lexically and grammatically while generating the reply.

Women Safety Analytics – Protecting Women from safety threats	Background: The growing concern for the safety of women and the increase in crimes against women in various cities, highlight the need for advanced surveillance and analytical solutions to protect women from various possible threats. We need a promising approach to address these issues through real-time threat detection software. Detailed Description: By leveraging advanced analytics through real-time monitoring, Women Safety Analytics should create safer environments for women and assist law enforcement in effectively addressing and preventing crimes against women. The proactive approach of detecting anomalies and generating alerts can play a crucial role in enhancing public safety and fostering a secure atmosphere for women. Women safety analytics software should continuously monitor the scene to count the number of men and women present, offering insights into gender distribution in specific locations and times. It should identify unusual patterns, such as a lone woman at night, unusual gestures and generates alerts to pre-empt potential incidents. Advantages of the system: ? By providing real-time monitoring and alerts, the system helps to create a safer environment for women. ? Early detection enables law enforcement to intervene before situations escalate. ? Continuous analysis provides valuable data to identify hotspots and trends, aiding in strategic planning for city safety Expected Solution: Women safety analytics should include the following functionalities 1. Person detection along with Gender Classification 2. Gender Distribution : Count the number of men and women present in the scene 3. Identifying a Lone Woman at Night time 4. Detection of a Woman Surrounded by Men 5. Recognizing SOS situation through gesture analytics 6. Identifying hotspots where incidents are more likely to occur, based on the past alerts

Micro-Doppler based Target Classification	Description: The world today has bought on a need to pay increased attention to safety and security issues, for example, search and rescue operations, surveillance, and protection of critical infrastructure. These tasks are often labour intensive and potentially dangerous. This provides an incentive to create systems that aid operators to gain situational awareness. In this regard, unmanned aerial vehicles, pose a significant threat to privacy and security. To understand and assess this threat, classification between different drone models and types is required. One way in which this has been demonstrated experimentally is through this use of micro-Doppler information from radars. Normally birds and drones are often confused and there is need for a method which clarifies their corresponding class. Background: Due to substantial increase in the number of affordable drones in the consumer market and their regrettable misuse, there is a need for efficient technology to detect drones in airspace. Drone and birds both include micro-Doppler signatures due to their propeller blade rotation and wing beats respectively. These distinctive features can then be used to differentiate a drone from a bird, along with studying them separately. Detailed Description: Classification of drones and non-drones using micro-Doppler signatures captured from Radar as a sensor. Moving parts of an object produce modulated Doppler components called micro-Doppler. The modulated Doppler signature is presented as added components to the Doppler signature of the drone body. Due to rotating blades, frequency modulated components, which are quite revealing, are produced. To observe the time varying micro-Doppler's, received FMCW should be processed by Joint time-frequency analysis. A Conventional air surveillance radar system(operating usually at L-Band or S-Band) can rely on the radar cross section(RCS) of an aircraft for detection, but this may not always provide reliable detection, but this may not always provide reliable detection in case of drones. Even if a dedicated system is built to be sensitive enough to detect small object like

A smart AI based solution for traffic management on routes with heavy traffic from different directions, with real-time monitoring and adaptation of traffic light timings	Background: Urban areas often face significant traffic congestion, especially at intersections where multiple routes converge. Traditional traffic management systems rely on pre-set traffic light timings, which may not adapt well to fluctuating traffic conditions. This can lead to increased waiting times, fuel consumption, and emissions. Description: An AI-based traffic management system can dynamically adjust traffic light timings based on real-time traffic data, improving traffic flow and reducing congestion. Expected Solution: Problem statement is to develop a smart, AI-based traffic management system that can monitor traffic conditions in real-time and adapt traffic light timings accordingly. The system should be capable of handling heavy traffic from multiple directions and optimizing traffic flow to minimize delays and improve overall efficiency.

Enhancing Monitoring and Management of Research, IPR, Innovation, and Start-ups in Gujarat State	Background: Gujarat has long been a leader in fostering innovation and entrepreneurship. The state is home to numerous research institutions, start-ups, and innovation hubs that drive economic growth and technological advancement. However, the current systems for monitoring and managing research activities, intellectual property rights (IPR), innovation developments, and start-up growth are fragmented and inefficient. Information is dispersed across various departments and organizations, leading to challenges in data accessibility, transparency, resource allocation, and overall management. To address these issues, there is a need for a comprehensive web application that can unify and streamline these processes, enhancing efficiency and productivity. Detailed Description: The proposed comprehensive web application aims to address the key challenges faced in monitoring and managing research, IPR, innovation, and start-ups in Gujarat. The application will serve as a centralized platform to integrate various functions and provide seamless access to information and resources. The key features of the web application include: Unified Data Repository: A centralized database where all research projects, patents, innovations, and start-up information are stored and easily accessible. Transparent Monitoring: Tools for stakeholders to track the progress and outcomes of research projects, innovation developments, and start-up growth, ensuring greater transparency. Efficient Resource Allocation: Mechanisms to optimize the allocation of resources, such as funding and mentorship, based on real-time data and insights. IPR Management: A streamlined process for managing intellectual property rights, including patent applications, status tracking, and protection of intellectual property. Support for Innovators and Start-ups: Access to resources, mentorship, and support services for innovators and entrepreneurs, facilitating their growth and success. Collaboration Tools: Features to enhance collaboration among researchers, innovators, policy makers, and other stakeholders, fostering a cohesive ecosystem. Data-Driven

Implementation of the Alumni Association platform for the University/Institute.	Background: Alumni associations play a pivotal role in fostering lifelong connections between graduates and their alma mater, facilitating networking, mentorship, and philanthropic support. However, many alumni associations face challenges in maintaining engagement, facilitating donations, and providing valuable services such as job networking and tracking alumni success stories. A comprehensive Alumni Association platform for a University/Institute, encompassing both web and mobile applications, aims to address these challenges effectively. Detailed Description: The proposed Alumni Association platform for the Government Engineering College will feature robust functionalities accessible through both web and mobile applications: Alumni Registration: User-friendly registration processes on both web and mobile platforms, allowing alumni to join the association, update their profiles, and stay connected with peers and the institution. Donation Portal: Secure mechanisms on both platforms for alumni to contribute donations easily and support various initiatives and projects undertaken by the college, fostering a culture of philanthropy. Networking Hub: Dedicated sections on both platforms to connect alumni based on shared interests, professions, and geographic locations, facilitating professional networking, mentorship, and collaboration opportunities. Job Portal: Integrated job search and posting features accessible via web and mobile apps, enabling alumni to explore career opportunities, post job openings, and connect with potential employers within the alumni network. Alumni Directory: Search functionalities available on both platforms to find alumni based on different criteria such as graduation year, field of study, industry, location, etc., promoting networking and community building. Success Story Tracking: Features on both web and mobile apps to showcase and track alumni achievements, success stories, and notable contributions to society, inspiring current students and fostering pride among alumni. Events and Reunions: Announcements, registrations, and management

Learning App for Deaf And Mute and sign language-English/Gujarati converter	Background: “Inclusivity” is the motto of Education department, Government of Gujarat. Opportunity for all is the new slogan and The Indian Government has come up with Indian Sign Language. There has been lot of work in done in American sign language and focusing on interpretation in English. Majority schools in India adopt local language. In Gujarat, the deaf and mute students would be learning Gujarati by sign language. There are two general methods of deaf education are manualism and oralism..The students learn at school but at home if they want to practice material in Digital form is in limited form especially considering Indian Sign Language and Gujarati as local language. Detailed Description: The proposed comprehensive Mobile Application aims to address the key challenges faced in learning beyond classroom by deaf and mute students. The key features of the application include: Interpretation of Alphabets and numbers in Gujarati: Explaining the alphabets and numbers in Gujarati. The students first should learn and then should get writing pad to practice the writing of alphabets and numbers. Words and Sentences: Explaining the basic words starting from each Gujarati alphabet for example ? –???. Writing Exercises based on this Mathematics : Tables. Basic calculation Sum, Subtract, Multiplication, division in Gujarati. Writing problems for assessment of learning. Science : Prepare learning of science principles to sign language tutorials and writing exercises based on this. Conversion of Gujarati sentences to Sign Language and vice versa: If some Gujarati news/ articles are fed, they should be converted to sign language Conversion of speech to sign Language and vice versa: If some Gujarati conversation/addressing is taking place, they should be converted to sign language Data Analytics : Report card of the student to assess his/her learning of Mathematics and Science The application will cater to various users, including teachers, students, parents and HR(company). By integrating all these functions into a single Application , the application will address the lack of resources and bridge of communication gap. Teachers: Get a platform

Drone-Based Intelligent System for Apple Orchard Management in Himachal Pradesh	Background: Himachal Pradesh, a northern state in India, is renowned for its apple production, contributing significantly to the local economy and livelihoods. With an annual apple production of approximately 600,000 metric tons, the region's apple orchards face challenges related to tree health monitoring, nutrient management, pest and disease control, and accurate production estimation. Traditional methods for managing these aspects are labor-intensive, time-consuming, and often lack precision. Modern technology, particularly drone-based systems, offers a promising solution to enhance efficiency, accuracy, and profitability in apple orchard management. Description: 1. Monitoring Tree Health Objective: Utilize drone technology to monitor the health of apple trees across extensive orchards efficiently. Method: • Multispectral Imaging: Drones equipped with multispectral cameras will capture detailed images of apple orchards. These images can be analyzed to assess various health parameters such as chlorophyll content, leaf moisture, and overall vitality of the trees. • Thermal Imaging: Thermal sensors can detect temperature variations in the canopy, helping identify water stress and early signs of disease or pest infestation. Implementation: • Regular drone flights over the orchards, especially during critical growth stages. • Image analysis using AI algorithms to detect anomalies and provide actionable insights to farmers. 2. Managing Nutrients, Pests, and Diseases Objective: Develop an integrated pest and nutrient management system using drones for precise application and monitoring. Method: • Precision Agriculture: Drones can apply fertilizers, pesticides, and fungicides precisely where needed, reducing wastage and environmental impact. • Real-Time Monitoring: Continuous monitoring for signs of nutrient deficiencies, pest outbreaks, or disease symptoms using advanced imaging techniques. • Data Analytics: Use of machine learning to predict pest and disease outbreaks based on historical data and current environmental conditions. Implementation: • Implementing a scheduled drone surveillance program to monitor and apply

Automated Bus Scheduling and Route Management System for Delhi Transport Corporation	Background: Efficient bus scheduling and route planning are essential for the smooth operation of public bus transport services. Currently, the Delhi Transport Corporation (DTC) relies on manual methods for scheduling and planning, which are time-consuming and resource-intensive. To improve operational efficiency, reduce errors, and enhance service reliability, DTC needs an automated software solution capable of handling both linked and unlinked duty scheduling. Additionally, the solution should facilitate route management by mapping all existing routes and highlighting overlaps with proposed new routes. This project aims to develop a comprehensive software solution to streamline bus scheduling, optimize resource utilization, and improve route planning. Detailed Description: The Automated Bus Scheduling and Route Management System will utilize lgorithms, data analytics, and geographic information system (GIS) technologies to automate various aspects of bus scheduling and route management. The system will potentially include (but not limited to) features such as: Linked Duty Scheduling: Assign a specific crew to a bus at the start of their duty, ensuring they remain with the bus throughout their shift. Provide tools to manage and monitor crew and bus assignments for better familiarity and accountability. Unlinked Duty Scheduling: Allow crews to hand over buses to other crew members after assigned completing their trips. Manage rest periods for crew menbers and after their reassign them to different buses rest period. Route Management: Map all existing routes and provide a visual representation of the bus network. Enable users to draw new routes and automatically highlight overlaps with existing routes. Optimize route planning to reduce congestion and improve service coverage. Expected Output: A fully functional prototype of the Automated Bus Scheduling and Route Management System demonstrating the above features through the integration of algorithms, data analytics, and GIS technologies. The system will offer a user-friendly interface for schedulers, planners, and managers to interact

Automated System for Career Advancements of the Faculties of Higher Education	Background: This problem requires an innovative approach to enhance the efficiency and transparency of faculty self-appraisal in the university settings. Through a robust web-based platform, the system should address the complexities associated with traditional evaluation processes. It should capture and manages intricate details of faculty activities, encompassing research publications, event participation, seminars, projects, and lectures. The project must aim to create a user-friendly environment for faculty members, optimizing the self-appraisal experience. Employing a secure registration and login system ensures data confidentiality and personalized access. The meticulous automated tracking of research outputs (as done automatically by google scholar) and academic engagements streamlines the evaluation process, providing a consolidated record for administrators. By introducing features for logging events, seminars. projects, and lectures, the system offers a holistic view of faculty contributions beyond the classroom. This comprehensive solution should aligns with the objectives of modernizing appraisal methodologies, fostering a culture of continuous improvement, and supporting Paperless India motive. Administrators, on the other hand, can leverage this data to make informed decisions about faculty development and resource allocation. University Administrators can log in to the Admin Panel and access all the form entries submitted by the faculty members. They can view all the details in the form, sort the form entries according to Name, Employee Code or Date of Submission. They can then download the form submission details in a PDF format. In contemporary academic institutions, the process of faculty self-appraisal plays a crucial role in ensuring quality education, fostering professional development, and aligning individual contributions with institutional goals. However, traditional appraisal methods often entail cumbersome paperwork, lack of transparency, and inefficiencies that can hinder comprehensive evaluation. This real-time application seeks to address these

Publications summary generator for faculty members profile building	Description: 1. Background: For a much simplified and initial solution, input (publication record) can also be provided in a consolidated single bibtex file. However, it is desirable to provide input as an excel sheet, as mentioned earlier. 2. Description: The proposed solution should be able to crawl different popular academic databases, like Google Scholar, DBLP, etc. Often it is desired to have a publication record in a specific period for submission to various accrediting agencies by HEI's; therefore solution may have a provision for such customized queries. Expected solutions: The desired solution is required for generating publication summary for faculty profile showcase. Following are the identified inputs and expected outcomes Input: 1. Faculty names as mentioned in their respective academic profile (research papers) in an excel sheet 2. Year-wise publication record in journals which is exportable in words and excel 3. Year-wise publication record in conferences which is exportable in words and excel 4. Customized publication records in a particular duration
Learning path dashboard for enhancing skills	Background: For a much simplified and initial solution, input (publication record) can also be provided in a consolidated single .bibtex file. However, it is desirable to provide input as an excel sheet, as mentioned earlier. Description: The proposed solution should be able. Instructor shall have educational resources files in different formats like pdf, word, etc. and hyper-links of relevant academic literature Expected solutions: The desired solution is required to: -Learning dashboard showing different reading statistics like reading time of a particular topic. Total finishing time of a particular skill. -The instructor should be able to easily create a learning path along with incorporating learning resources, as mentioned ""inputs."" including videos. -Progress made by the learner should be continuously updated. -The desired solution must follow UX principles

The technological solutions for capturing AQI values through mobile and other forms of stations	DPCC is using different stations at fixed sites for measurement of AQI and other pollution parameters. These fixed stations suffered from various limitations and generally do not give representative values e.g. station located near an industrial area will give higher readings due to proximity to such industrial area which may not be representative of the wider area. Similarly, a temporary construction site/activity near these fixed sites give higher pollution readings due to local reasons. The technological solutions may be required for capturing AQI values through mobile and other forms of stations. Drone would be one of the options where they can record real-time pollution parameters through on-board sensors.
Dynamic route rationalization model based on machine learning/AI would be required based on real-time traffic and road parameters.	Transport Sector - DTC is trying to work out various modules for route rationalization. The real-time monitoring of buses for effective route rationalization may be one of the challenges to prevent bunching of buses on a specific route or long delays in arrival of buses. The problem cannot be addressed by fixed time schedule owing to various factors like traffic Conditions, road conditions and other such factors. A dynamic route rationalization model based on machine learning/AI would be required based on real-time traffic and road parameters.
Online monitoring of Unauthorized construction across the city	MCD is working on monitoring of unauthorized construction across th ecity. A viable and low cost solution is required e.g. Drone based surveys of swathes of land/areas as per defined time intervals will help real-time detection of unauthorized construction
Online real-time survey and monitoring of water bodies in Delhi	Technological solution for real-time survey and monitoring of water bodies in Delhi is one of the critical areas for rejuvenation of these water bodies
Queuing models in OPDs/ availability of beds/ admission of patients. A hospital based solution is ideal which can be integrated with city wide module	Technological solution as per queuing models in OPDs/availability of beds/admission of patients would be one area. Study of dispensation of various types of medicines/consumables and Inventory management modules at hospital level are key areas requiring support. NIC has already developed some modules but their implementation in Delhi is yet to be started. A hospital based solution is ideal which can be integrated with city wide module may be required.
Online testing and monitoring of quality of medicines and consumables	Suitable technological module for testing and monitoring of quality of medicines and consumables being received in hospitals would be required so that the system ensures necessary compilance and rejection of low quality supplies without manual intervention

Online issuance of Caste and other certificates by Revenue Department need real-time monitoring	The issuance of Caste and other certificates by Revenue Department need real-time monitoring to evaluate the resource allocation and demand for such certificates. The allocation of resources at present is done without any analysis leading to huge backlogs in some Sub-divison where the application load is very high. Any effective monitoring at District and Central level with detailed evaluation shall enable providing better allocation of resources for issuanc of such certificates
real-time monitoring and evaluation software for application received in Fire Department relating to inspections, follow-ups, issue of NOCs	A real-time monitoring and evaluation software for application received in Fire Department relating to inspections, follow-ups, issue of NOCs and such licensing requirement so as to ensusre automatic system monitoring without any manual support.

To develop an Artificial Intelligence (AI) based model for electricity demand projection including peak demand projection for Delhi Power system	Background: The load profile of power requirement in NCT of Delhi is highly peculiar. We are witnessing huge load variations during the winter and summer months and also during day and night during the same 24-hour window. This causes imbalance in matching the requisite power purchase with the electricity demand. Description: The peak load in Delhi touched 8300 MW this summer while the minimum load during winters goes as low as 2000 MW. The peak during the summer months also occurs twice i.e. first during the day time at about 15:30 hrs and second time in night hours after 23:00 hrs. Further, the solar generation comes during the day time and wanes by the evening hours thereby lending a Duck-curve effect. Solar plants have been allowed +/- 15% variation by CERC. Further, there is uneven load growth in the city, the upcoming areas are witnessing huge load growth while the developed areas are having the lower organic load growth. In addition to that the load curve in Delhi is highly peaky in nature due to the fact that most of the load is domestic and commercial load while industrial load is minimal. Here it may be taken note that while in other States, industrial load which is 24 x 7 in nature lends stability to the overall load curve of the State. Further, in Delhi agricultural load is minimal. In bigger States, having considerable agricultural load, the supply on agricultural feeders is normally given when ample power is available at cheaper rates, especially during early morning hours/ night hours, which in -turn provides stability to the State' Transmission and Distribution network and also balances power purchase stipulation. Most of the Long Term power is available RTC (Round the Clock) and Slot-wise power is more expensive. Expected Solution: An Artificial Intelligence based model be developed with suitable compensation methodology to factor the weather effects (like temperature humidity, and wind speed, rains/showers), public holidays/ weekly holidays, natural load growth, and real estate development.

Smart Classroom Management Software for Enhanced Learning Environments	Background: In modern educational settings, managing classrooms efficiently while ensuring a conducive learning environment is crucial. Traditional methods of classroom management are often manual, time-consuming, and prone to human error, which can disrupt the learning process. Leveraging software-based solutions in classroom management can enhance operational efficiency, ensure safety, and create an engaging learning atmosphere for students. This project aims to develop a smart software solution to streamline classroom operations, improve resource utilization, and enhance the overall learning experience. Detailed Description: The Smart Classroom Management Software (SCMS) can utilize advanced algorithms, data analytics, and cloud-based technologies to automate various aspects of classroom management. The system can potentially include (but not limited to) features such as: 1. Attendance Automation: Use facial recognition algorithms or mobile app-based check-ins to automatically record student attendance. Generate real-time attendance reports accessible by teachers and administration. 2. Resource Management: Track the usage of classroom resources such as projectors, computers, and other teaching aids through a centralized software platform. Automate the scheduling and maintenance of these resources to minimize downtime. 3. Safety and Security Alerts: Implement software-based alerts for emergencies such as fire, unauthorized access, or other security concerns, integrated with existing security systems. Alert authorities and stakeholders through real-time notifications and reports. 4. Interactive Learning Tools: Integration with existing smart boars and interactive displays to adapt to the teaching content and student needs. Provide real-time feedback and analytics on student engagement and performance. 5. Data Analytics: Collect and analyse data on various classroom activities to provide insights into student behaviour, attendance patterns, and resource utilization. Generate predictive reports to aid in decision-making and improve educational outcomes. AI-based Chabot for helping
Health Data Information & Management System Mobile Application (HDIMS)	Hospitals/Departments shall be able to enter and Update Data in the Mobile Application which can be viewed by the Super Admin dynamically for efficient Implementation of Health and Family Welfare Schemes, other Health programmes and provide key inputs for policy formulation and appropriate programme interventions. This Mobile Application will facilitates the flow of physical performance from the Facility level to the Sub-district, District and State/Union Territory level using Health Data Information & Management System Mobile Application (HDIMS) interface

Drug Inventory and supply chain Tracking system	With the aim to provide "Right Quantity of "Right Product" on "Right Place" on "Right Time" in "Right Condition" at "Right Cost" for "Right People" and also to streamline the distribution of drugs to institutions and ensure availability of drugs at all times, a new, innovative system named Drug Inventory and supply chain Tracking system is required: To improve efficiency and effectiveness of procurement and distribution systems through robust quality controls To provide dashboard based online monitoring of all activities at each level Tracking of vendor activities like preparation of Supply Order, Shipment etc. Monitoring of Drug consumption pattern at the Hospitals/Medical Institutions Level
Smart Competency Diagnostic and Candidate Profile Score Calculator	Project Concept: Comprehensive Employment Platform/Portal The current employment portal lacks a personalized and adaptive approach to job matching and skill development. There is a need for an intelligent system that not only matches job seekers with potential employers but also identifies and suggests training courses to bridge skill gaps. We wish to design a competency diagnostic which would ask a series of questions to students to test their competence and based on their scores in the test, recommend jobs to them and also appropriate training courses to them to cover the gaps in their skill curve. Requirements: 1. AI-Powered Job/Training Recommendation System: • Implement an AI-based recommendation system trained on multiple data points (e.g., skills, experience, preferences) to analyze job seekers' profiles and recommend suitable job opportunities. • Training Course Recommendations: Suggest relevant online courses, workshops, and training programs based on the desired job roles. 2. Skill Gap Analysis and Recommendations: • Gap Identification: The recommendation System should assess job seekers' competencies against the requirements of their desired job roles to identify areas for improvement. • Personalized Suggestions: Provide tailored recommendations for online courses, workshops, and training programs to help job seekers upskill and close identified gaps. 3. Adaptive Learning Pathways: • Personalized Learning: Develop adaptive learning pathways based on the job seeker's progress and feedback. • Content Variety: Offer a mix of micro-courses, webinars, and hands-on projects relevant to the job market to enhance learning and skill development. 4. Real-Time Job Market Insights based on candidate’s skills and competencies: • Dashboard: Create a dashboard displaying real-time data on trending jobs, skills in demand, and salary benchmarks. • Data Analytics: Use data analytics to provide insights into job market trends and forecast future skill requirements. 5. Skills Verification and Certification: • Skill Assessments: Implement a system for verifying skills and certifying competencies through

Freelancing Platform	Project Concept : Freelancing Opportunities for India There is a significant gap in connecting freelancers and gig workers with short-term and project-based job opportunities. An platform like upwork is needed to seamlessly connect freelancers with employers and provide tools for managing freelance projects. Requirements: 1. Freelance Job Marketplace: • Develop a marketplace where freelancers can find short-term jobs, gig work, and project-based opportunities. • Allow employers to post projects, specify requirements, and invite freelancers to apply. 2. Freelancer Profile and Portfolio Management: • Enable freelancers to create detailed profiles showcasing their skills, experiences, and portfolio of past work. • Integrate a rating and review system for feedback on completed projects. 3. Extensive Search & Analytics • Enable Employers/Freelancers to do extensive search in the available data / generated data. • Generation of AI enabled insights into the Data and providing newer ways of information availability for job seekers / employers to engage. • AI based Recommendation Systems for seeking opportunities 4.Escrow Account Creation • Create provisions for an escrow account that can be used to hold the money until the job is fully delivered. • Integrate secure payment gateways to facilitate smooth financial transactions between employers and freelancers. Expected Outcome: The platform will connect freelancers with a wide range of job opportunities and provide them with tools to manage projects efficiently, leading to better job satisfaction and increased income opportunities. NOTE : This is an innovation opportunity and students are encouraged to think out of the box to develop solutions which can be presented in newer ways + which can address the needs in out of the box ways for a certain industry OR makes the platform generic. Above description serves as a guide to specify essential needs that can be satisfied for the developed solution and is not limited only to the scope described

Mentor Connect	Project Concept: Mentoring - The best way Mentoring during the Career/Education is a vital aspect for success of a candidate and this can achieve amazingly positive changes in the life of a mentee. Today , India is known due to its demographic advantage and career directions are infinite. However newer directions are demanding candidates to be coached and mentored for progress. This application or platform can be developed by students understanding this knowledge development need and bring together mentor and mentees. Create a platform where candidates can connect with mentors based on the availability of the mentors and mentors should be able to help candidates with their queries and concerns around careers, skill development etc. Mentors could be senior leaders from the industry or could be subject matter experts who have spent appreciable time in the industry and are aware of intricacies around jobs in a specific industry. Requirements: 1. Create an automated calendar booking system: • Booking Automation: Develop an automated calendar booking system that that could create bookings automatically with a mentor based on the mentor's availability and schedules appointments with mentors based on their availability. The system will check mentors' calendars and automatically find and book suitable time slots for meetings. • User-Friendly Interface: Provide a simple, intuitive interface for candidates to select their preferred time slots, ensuring easy and efficient scheduling. • Integration with Calendly: Consider integrating with existing tools like Calendly to leverage their robust scheduling capabilities. 2. Embedded video call feature: • Video Call Integration: Embed a video call feature within the platform to facilitate virtual meetings between mentors and candidates. • Chat Functionality: Incorporate a chat feature within the video call to allow text-based communication during the session, enabling the sharing of links, documents, and other resources. • Secure and Reliable: Ensure the video call and chat functionalities are secure, reliable, and easy to use. Expected Outcome: The platform will help connect

AI-Powered Student Assistance Chatbot for Department of Technical Education, Government of Rajasthan.	Background: There are numerous engineering and polytechnic institutes in Rajasthan running under the Department of Technical Education, Government of Rajasthan. Notably, during the admission process, there is a significant increase in enquiries from various groups, including students, their parents, and other stakeholders. These enquiries cover a wide range of queries related to admission process, eligibility criteria, information about different colleges, fee structure, curriculum , scholarship , hostel facilities, previous year's college and branch-specific allotments placement opportunities and many more. Currently, stakeholders have tocontact colleges individually through phone or email, and sometimes even visit the colleges personally. This process is not only cumbersome for the stakeholders but also demanding to pool manpower for the colleges to manage these inquiries. Detailed Description: With the continuous rise in enquiries, it is becoming increasingly difficult for the colleges to respond promptly and effectively using traditional communication methods. To address this issue more efficiently and ensure timely assistance for everyone, there is a pressing need to adopt new technological solutions. One effective approach is to develop an AI-powered chatbot at centralized level that would serve as a virtual assistant, available 24/7 to answer a wide range of questions. By automating responses to common enquiries, the chatbot would significantly enhance the accessibility to important information and allow staff to focus on handling more complex queries and other critical tasks. For example, the chatbot would provide insights into information about various engineering and polytechnic colleges that falls under the jurisdiction of Department of Technical Education, and guide users through the admission processes, explain fee structures, share curriculum updates, provide details about available scholarships, share alumni information, and share information on job placement opportunities etc This will empower the technical education department because of the ease of providing information, help and

An Interactive Job and Internship Platform for Technical Education Department, Govt. of Rajasthan	Background: In today's competitive job market, graduates are encountering enormous challenges while their transition from education to employment. Most of the existing platforms do not provide access to a wide array of job opportunities comprehensively. This limitation spans both the private and government sectors, as well as international employment avenues. Another critical shortcoming is the lack of essential resources such as counselling and guidance facilities. Additionally, there is insufficient support for students seeking internships and industrial training. Detailed Description: This platform shall offer a holistic approach to job searching and career development. It focuses on: · Advanced algorithms and AI-driven matchmaking through connecting job seekers with employers. · Extensive access to job opportunities across various sectors and regions including Private sector, Government sector and Overseas Employment · Counseling Services and Guidance Resources · Emphasis on securing internships and industrial training opportunities. · Mentorship Programs: Pairing with industry professionals for guidance Expected Solution: To address the challenges faced by graduates in the modern job market, we propose the development of a comprehensive and integrated platform that will: 1. Enhance Job Market Connectivity: · Establish a robust and interactive platform that bridges the gap between job seekers and potential employers. · Utilize advanced algorithms and AI to match candidates with suitable job opportunities based on their skills, qualifications, and preferences. 2. Expand Access to Opportunities: · Provide a centralized portal offering exhaustive listings of job opportunities private sector, government sector and overseas employment opportunities · Ensure that the platform is updated regularly with diverse and current job listings to maximize employment possibilities for job seekers. 3. Offer Comprehensive Critical Resources: · Integrate a suite of resources tailored to job seekers, including professional counseling and career guidance services. · Provide tools and resources for resume building, interview preparation, and job application

Intelligent platform to Interconnect Alumni and Student for Technical Education Department, Govt. of Rajasthan	There is a demand for comprehensive Alumni Student interaction platform for Technical Education Department, Govt. of Rajasthan that can strengthen connections between alumni and current students. Following are the issues currently faced: ? Lack of Centralized System: Technical education currently lacks a centralized system for tracking and updating alumni information, including contact details, specialization, and career paths, which resulting into lack of effective communication and engagement. ? Need for Structured Interaction: Without organized platforms, students lack opportunities on valuable real-world experiences and mentorship from alumni. ? Need for Motivation and Guidance: Many students lack motivation and guidance for clarity in career path . Alumni can be essential mentors and role models, providing insights and advice based on their experiences. Description: This problem aims to establish a platform at Technical Education Department, Govt. of Rajasthan to provide interaction and collaboration among alumni and current students, focusing on: ? Enhancing Alumni Engagement: Increase alumni involvement with the institution and its students. ? Providing Mentorship and Guidance: Inspire students with real-world insights and career guidance from alumni. ? Building a Supportive Network: Develop a robust network for lifelong connections and collaborative opportunities, creating an ecosystem where alumni and students can learn from and support each other. This innovative platform should leverage advanced technologies such as artificial intelligence, machine learning, natural language processing (NLP), etc.. By leveraging these advanced technologies, the platform can significantly enhance its functionality and user experiences such as suggest connections between students and alumni with similar interests or career paths, industry, and skills. Expected Solutions: ? Create an Alumni Database: Develop a centralized database to store and update information on alumni, including their employment status, contact details, educational and professional achievements, and areas of expertise. ? Build an
Mobile App for Direct Market Access for Farmers	Background: Farmers often face challenges in accessing markets, leading to lower income due to middlemen. This gap restricts their ability to sell produce at fair prices. Description: Create a mobile application that connects farmers directly with consumers and retailers. The app should include features for listing produce, negotiating prices, and managing transactions, thereby reducing dependence on intermediaries. Expected Solution: A user-friendly mobile platform that enables farmers to showcase their products and connect with buyers directly, enhancing their income potential.

AI-Driven Crop Disease Prediction and Management System	Background: Crop diseases can devastate yields, leading to significant financial losses for farmers. Early detection and timely intervention are crucial for effective management. Description: Develop an AI-driven system that analyzes crop images and environmental data to predict potential disease outbreaks. This system will provide farmers with actionable insights and treatment recommendations to mitigate risks. Expected Solution: A mobile and web-based application that utilizes machine learning algorithms to identify crop diseases and suggest preventive measures and treatments based on real-time data.
Sustainable Fertilizer Usage Optimizer for Higher Yield	Background: Excessive and improper use of fertilizers leads to soil degradation and reduced agricultural productivity, negatively impacting farmers' income. Description: Create a data-driven solution that recommends optimal fertilizer types and quantities based on soil health, crop type, and weather patterns, ensuring sustainable agricultural practices. Expected Solution: An application that analyzes soil data and provides tailored fertilizer recommendations, promoting sustainable farming while enhancing crop yield and farmer income.
Assured Contract Farming System for Stable Market Access	Background: Farmers often face uncertainties in market access, leading to fluctuating incomes. Contract farming can provide stability by ensuring farmers have guaranteed buyers for their produce. Description: Develop a comprehensive platform that facilitates assured contract farming agreements between farmers and buyers. This platform will enable transparent communication, secure contracts, and timely payments, ensuring farmers have a reliable market for their crops. Expected Solution: An online marketplace that connects farmers with potential buyers, offering tools for contract management, price negotiation, and secure payment processing, thereby enhancing income stability and reducing market risks

create an Annual Report Portal for institute where all the departmental reports can be integrated and customized	Description: Problem Overview Educational institutes generate vast amounts of data each year, including academic performance, research publications, financial statements, infrastructure developments, student and faculty achievements, and extracurricular activities. Preparing a comprehensive and insightful annual report that accurately reflects the institute's accomplishments and growth is a complex and time-consuming task. It requires the aggregation, organization, analysis, and presentation of diverse data sources in a coherent and visually appealing manner. Challenge Design and develop a user-friendly, efficient, and robust portal that streamlines the process of preparing the annual report for an educational institute. The portal should facilitate the collection, integration, analysis, and visualization of data from various departments and stakeholders within the institute. The goal is to create a dynamic, interactive, and automated system that minimizes manual effort, enhances accuracy, and provides valuable insights. Key Features and Requirements User Authentication and Role Management: Secure login for different user roles (administrators, faculty, students, etc.). Role-based access control to ensure data privacy and security. Data Collection and Integration: Import data from various sources (databases, spreadsheets, surveys, etc.). Integration with existing systems (student management systems, financial software, research databases, etc.). Support for manual data entry where necessary. Data Analysis and Visualization: Tools for analyzing academic performance, research output, financial data, and other metrics. Customizable dashboards for visualizing key performance indicators (KPIs). Graphs, charts, and other visual aids for presenting data trends and insights. Report Generation: Automated generation of the annual report in various formats (PDF, HTML, etc.). Customizable templates for different sections of the report. Inclusion of multimedia elements (images, videos, infographics). Collaboration and Feedback: Features for collaborative editing and review of report content. Mechanisms for collecting feedback from stakeholders. Version control to track

A comprehensive AYUSH Startup Registration Portal to streamline the registration process for startups in the AYUSH sector, enhancing efficiency, transparency, and accessibility.	Background: The AYUSH sector, encompassing Ayurveda, Yoga & Naturopathy, Unani, Siddha, and Homoeopathy, is burgeoning with innovative startups. However, these startups face challenges in registering their ventures due to cumbersome, opaque, and decentralized processes. An efficient registration portal is crucial for fostering growth, facilitating regulatory compliance, and promoting the integration of AYUSH solutions into mainstream healthcare. Description: Participants are tasked with creating an AYUSH Startup Registration Portal that simplifies and accelerates the registration process. The portal should be user-friendly, secure, and capable of handling a high volume of registrations. Key features must include: User Authentication: Secure login for startups, government officials, and other stakeholders. Application Submission: Streamlined forms for submitting registration applications, with clear instructions and guidelines. Document Upload: Easy upload and management of necessary documents, ensuring compliance with AYUSH regulations. Status Tracking: Real-time tracking of application status, notifications, and updates for applicants. Data Management: Efficient handling and storage of startup data, ensuring privacy and security. Support and Resources: Access to resources, FAQs, and support for startups during the registration process. Expected Outcome: The expected solutions should deliver a functional, scalable, and secure portal that addresses the current inefficiencies in the AYUSH startup registration process. The portal should enhance user experience, reduce processing times, and ensure compliance with regulatory requirements. Participants should demonstrate innovation in user interface design, data security measures, and integration with existing AYUSH databases. The ultimate goal is to empower AYUSH startups, enabling them to contribute more effectively to the healthcare ecosystem.

Portal for innovation Excellence Indicators	Problem Overview Innovation is a key driver of growth and success in educational institutions. Tracking and measuring innovation excellence is essential for fostering a culture of continuous improvement, recognizing achievements, and guiding strategic decisions. However, identifying, quantifying, and presenting innovation indicators can be challenging due to the diverse nature of activities, projects, and contributions across different departments. Challenge Design and develop a comprehensive and user-friendly portal that tracks, measures, and showcases innovation excellence within an educational institute. The portal should aggregate data from various sources, provide insightful analytics, and present key innovation indicators in an intuitive and visually appealing manner. The goal is to create a dynamic system that encourages participation, facilitates data-driven decision-making, and highlights the institute's innovative achievements. Key Features and Requirements User Authentication and Role Management: Secure login for different user roles (administrators, faculty, students, etc.). Role-based access control to ensure data privacy and security. Data Collection and Integration: Import data from various sources (research projects, grants, publications, patents, competitions, etc.). Integration with existing systems (research management systems, funding databases, project management tools, etc.). Support for manual data entry where necessary. Innovation Indicators: Define and track key innovation indicators (e.g., number of research papers published, patents filed, grants received, startups incubated, awards won). Customizable indicators to cater to different departments and areas of innovation. Data Analysis and Visualization: Tools for analyzing innovation data and identifying trends. Customizable dashboards for visualizing key innovation indicators. Graphs, charts, and other visual aids for presenting data trends and insights. Recognition and Incentives: Mechanisms for recognizing and rewarding outstanding innovation contributions. Highlighting top-performing individuals, teams, and departments. Generating

A web application specifically designed for Indian coal mines to quantify their carbon footprint and explore pathways to carbon neutrality.	Background: India faces a complex challenge in balancing its reliance on coal for energy with its climate change commitments. Coal mining is a major source of carbon emissions, a greenhouse gas contributing to global warming. To achieve carbon neutrality, the Indian coal sector needs to offset its emissions. This can be done through a combination of strategies like reducing emissions from mining activities, adopting cleaner technologies, and offsetting remaining emissions by planting trees that absorb carbon dioxide. A web-based application can be a powerful tool in this journey by helping quantify a mine's carbon footprint and evaluate potential pathways to carbon neutrality. Description: The web based application will have following objectives: Activity wise quantification of Carbon emission in Coal Mines Estimation of existing Carbon Sinks Gap analysis between C emission and sinks and suggesting pathways to carbon neutrality Expected Solution: A comprehensive software solution that includes: Emission estimation: The app would allow users to input data on various mining activities (e.g., excavation, transportation, equipment usage) and estimate the associated carbon emissions based on establishd emission factors. Estimation of Per Capita emissions of a Mine. Carbon Neutrality Pathways: The app could offer features for simulating different emission reduction strategies like: Clean technologies: Assessing the impact of adopting electric vehicles, methane capture systems, and renewable energy sources for mine operations. Afforestation offsets: Calculating the amount of land required for tree plantation to offset remaining emissions based on state specific afforestation plan and Carbon emission reduction. Other Renewables: explore alternative use of energy to reduce direct electricity consumption. Any other pathways: Carbon Credits: Estimation of potential Carbon credit earned as per present market rates. Data visualization: The app should present results visually, using charts and graphs to track emission trends and the effectiveness of implemented strategies. Scalability: Design the app to accommodate different

An app and web based software for Productivity and safety management of coal mines.	Background: Despite the thrust on energy transition from fossil fuel sector to a cost-competitive renewable energy sector, Coal will remain pivotal to energy security of the nation in near future. India is targeting for 1.5 Bt coal production by 2030 to cater to the burgeoning energy needs of the country. To achieve the target, improved productivity and safety in coal mining is pivotal. Description: The problem statement is divided into two parts: one is Digital shift handover log system and other is safety management plan as per DGMS guidelines. A digital shift handover log system is a valuable tool for streamlining and improving the transition of responsibilities and information from one shift to the next within an organization. The problem statement envisages that an app based and web based Shift handover log system be developed as per the Statutory and non-statutory log format currently in practice, which is presently being done manually through paper logs. This will ensure sharing of critical information and briefing of the next shift digitally. It will provide supervisors and operators with an immediate, comprehensive overview of the outgoing shift's activities. Manual Shift handover causes loss of time and thus productivity of the mining operation. Also, some important information regarding safety may get skipped in the manual system which can cause serious damage to mining operation or loss of life. Digitalised system will ensure that all red flags are properly briefed and major actions which needs to be taken in the next shift is communicated to the shift in charge of next shift beforehand so that he can mentally prepare for the same. This will save time in the forthcoming shift and ensure better productivity. It will also ensure better safety and monitoring of the mine. Every mine has to prepare a Safety Management Plan (SMP) as per DGMS guidelines. This SMP is based on Hazard identification and devising control and monitoring mechanism and fixing responsibility. This SMP implementation needs to be digitalised in the software for better management of risks. Also, this app or web based solution needs to be

App based Project monitoring of S&T/ R&D Projects of Coal Sector	Background: CMPDI is the nodal agency for assessing and monitoring of the various R&D projects funded by CIL and S&T projects funded by S&T. The monitoring of each projects is performed by checking the financial and physical progress certificates submitted in prescribed forms as per S&T guidelines. It also intervenes in case any hindrances are observed /expected which can affect the project activities and timeline. The projects are classified in two, based on its funding i.e. S&T projects funded by MoC and R&D projects funded by CIL. The progress of the S&T projects is being monitored in the various Meetings such as Technical Subcommittee meeting, and SSRC meeting for S&T projects, and that of R&D projects in Apex Committee and R&D Board. The directions/ instruction/suggestion given in the above meetings are to be updated for each projects. As per guidelines, the PI of the projects has to submit the quarterly progress reports along with fund utilisation reports or time extension or additional funds in prescribed forms. The projects wise information's/ quarterly progress reports of about more than 100 such reports in each quarter are received through mail and post and are maintained in physical files. The data in the above reports which consists of more than 1000 data fields is to be updated manually on the data sheets which consumes a lot of time, manpower and have chances of human errors. Description: The objective is to develop a web based software app suited for windows, android, and Mac, which will incorporate each and every steps/activities involved during the progress of the research projects till it official completion/ closure and maintain the whole database in a defined server for audit and scrutiny. Expected Solution: A web based software app is required to be developed which will authorise the sanctioned project's proponents to enter data and update the project's status through the app on PC and phone including all the forms, activity wise time line, schedule table, details of fund utilisation, other necessary input etc. An admin console, to be handled by CMPDI, will also be developed for the following: Creation

Development of AI-ML based models for predicting prices of agri-horticultural commodities such as pulses and vegetable (onion, potato, onion)	The Department of Consumer Affairs monitors the daily prices of 22 essential food commodities through 550 price reporting centres across the country. The Department also maintains buffer stock of pulses, viz., gram, tur, urad, moon and masur, and onion for strategic market interventions to stabilize the volatility in prices. Decisions for market interventions such as release of stocks from the buffer are taken on the basis of the price trends and outlook. At present, the analyses of prices are based on the seasonality, historical and emerging trends, market intelligence inputs, crop sowing and production estimates. ARIMA based economic models have also been used to examine and forecast prices of pulses.
Online Chatbot based ticketing system	Background: Visitors to museums often face several significant challenges due to manual ticket booking systems. One prominent issue is the inefficiency and time consumption associated with the process. Long queues are common, especially during peak hours, weekends, or special exhibitions, leading to frustration and impatience among visitors. Besides the wait times, the manual system is prone to errors, such as incorrect ticket issuance, double bookings, or lost records, which can cause further delays and inconvenience. Overall, these challenges associated with manual ticket booking systems significantly detract from the visitor experience, reducing satisfaction and potentially impacting the museum's reputation and visitor numbers. Description: The implementation of a chatbot for ticket booking in a museum addresses several critical needs, enhancing the overall visitor experience and streamlining museum operations. Here are the key reasons for adopting a chatbot ticket booking system: 1. Improved Customer Service 2. Efficient Handling of High Volumes 3. Cost-Effective Solution 4. Data Collection and Analysis 5. Accessibility 6. Reduced Human Error 7. Multilingual Support 8. Enhanced Marketing and Promotion Expected Solution: An efficient and responsive multilingual chatbot based ticketing system that can handle all kinds of bookings from gate entry to shows. Payment gateway should also be integrated to make it fully free from human intervention. It will also provide analytics to aid in more efficient decision making process.

DDoS Protection System for Cloud: Architecture and Tool	Background: Many organization are using Cloud for hosting their web applications. The attackers can try to attack these webservers for achieving Denial of Service attack. Specifically, Distributed Denial-of-Service (DDoS) attack is a malicious attempt to disrupt the normal traffic of a targeted server, service or network of Cloud infrastructure by overwhelming the target or its surrounding infrastructure with a flood of internet traffic. DDoS attacks achieve effectiveness by utilizing multiple compromised computer systems assources of attack traffic. Exploited machines can include computers and other networked resources. Therefore, it is essential to develop appropriate security tools to counter and protect against these attacks. • Description: The most obvious symptom of a DDoS attack is that a website or service suddenly becomes slow or unavailable. But since a number of causes such a legitimate spike in traffic can create similar performance issues, further investigation is usually required. Therefore, suitable analytics tools need to be developed to clearly identify an attack as DDoS. Following are some of the patterns for a DDoS attack: 1. Suspicious amounts of traffic originating from a single IP address or IP range 2. A flood of traffic from users who share a single behavioral profile, such as device type, geolocation, or web browser version 3. An unexplained surge in requests to a single page or endpoint 4. Odd traffic patterns such as spikes at odd hours of the day or patterns that appear to be unnatural (e.g. a spike every 10 minutes) There are other, more specific signs of DDoS attack that can vary depending on the type of attack. The tool developer should be creative to consider other signs also. For the above problem statements, following assumptions can be made: 1. Cloud is hosting a website and providing some services to its users. 2. The website should be always up and providing services to its users (high availability). 3. The attackers can flood the website directly or via other nodes (DDoS). 4. The attacker can also sabotage the link between a client and webserver. 5. The attack can come from outside or from within the cloud

Early Warning System for Glacial Lake Outburst Floods (GLOFs)	• Background: Glacial Lake Outburst Floods (GLOFs) occur when the dam containing a glacial lake fails, releasing large volumes of water suddenly and causing catastrophic downstream flooding. Climate change is increasing the number and size of glacial lakes, heightening the risk of GLOFs. Curent monitoring and prediction methods can be improved with advanced technologies like remote sensing, sensors installed near glacial lakes and machine learning. • Description: The aim is to develop a remote sensing and/or sensor-based Early Warning System (EWS) for GLOFs by utilizing remote sensing data, network of IoT sensors and advanced data analytics. The system will continuously monitor and identify critical changes in lake size, water level, temperature, sudden water flow, dam stability and ground movement etc. around glacial lakes. The machine learning algorithms will analyse the information to detect early signs of potential outbursts. This approach will significantly enhance the capability to predict and respond to GLOFs, improving safety, reducing economic losses, and contributing to resilient infrastructure planning in glacial regions. • Expected Solution: A Sensor which can be installed in glacial lake area, or a predictive model that significantly improves the Early Warning System ability for GLOFs, providing critical lead time for evacuation and mitigation efforts.
Microphone array-based direction of arrival for gunshot detection	• Background: The Army of many developed countries has their own gunshot detector system which would alert the troop about the direction from where gun shot has been fired so that troop can take preventive measure to safeguard their soldiers • Description: The system consists of number of omnidirectional microphones preferably six. The output of microphone will be fed to the analog to digital converter and then this signal is fed to the FPGA . Inside FPGA, each channel will be filtered using Bandpass filter so as to limit the band to approx. 3Khz. After this sound classification and localization algorithm will deduce the direction from where the bullet has been fired and display the result on a Graphical LCD. • Expected Solution: An FPGA based solution with suitable algorithm for classification and localization of sound. The final result will be displayed on Graphic LCD

Extraction and Verification of Information from semi-categorised data.	• Background: Recruitment and Assessment Centre (RAC) under DRDO, Ministry of Defence invites online biodata applications with requisite eligibility supporting documents from candidates. Verification of these documents is presently a manual process. • Description: The verification of submitted documents such as educational certificates, marksheets, GATE scorecard, experience, caste, EWS, PwD certificate, etc. by applicants, as applicable against advertised vacancies, is presently carried out manually. These documents, generally available in image or PDF form, may be in languages other than Hindi or English. In order to verify the information filled by applicants in their biodata applications can be verified using Intelligent Document Processing (IDP) techniques involving Machine Learning Deep Learning, Artificial Intelligence, Natural Language Processing, etc. • Expected Solution: The extraction of information from submitted documents can take place at the time of application form submission and alerting applicant in case of any mismatch. Thereafter, while screening of applications more robust data extraction techniques may be employed to further avoid any chances of error. The extracted information may be presented using modern business intelligence tools thus highlighting the efficiency of process. The solution should be able to process documents with Three Sigma accuracy with a speed of not more than 3 seconds per document.

Web based Selector-Applicant Simulation Software	Background: Recruitment and Assessment Centre (RAC) under DRDO, Ministry of Defence carries out interviews for applications received against advertised vacancies and for promotion to next higher grade for scientific manpower inducted within DRDO. Description: The process of interviewing is a challenging task. An unbiased objective interviewing process helps identify the right talent. The basic process of an interview involves posing a set of questions by an interviewer and thereafter evaluating responses from candidates. Thus, the questions asked should be relevant and match the area/ expertise of the applicant and the responses should also be of relevance w.r.t. the question asked. Expected Solution: The proposed solution should provide experts as well as candidates a real life Board Room experience, starting with initial ice-breaking questions leading to in-depth techno-managerial (depending on the level of candidate) questions. It shall also be able to provide a quantifiable score for experts as well as the candidate for the relevancy of questions w.r.t. the area/ expertise of the applicant. Similarly, candidate responses should also be graded for relevancy w.r.t. the question asked, finally assisting in arriving at an overall score for the subject knowledge of the candidate and thus his/ her suitability against the advertised post.
Determining expert relevance with respect to interview board subject and candidates' area of expertise	Background: Recruitment and Assessment Centre (RAC) under DRDO, Ministry of Defence conducts interview for recommending candidates under recruitment, assessment and for sponsorship to acquire higher qualification. Description: The process of conducting an interview comprises of selection of board members i.e. experts from DRDO, industry, academia, etc. It is a challenge to manually match profile of subject experts w.r.t. interview board subject and candidates' area of expertise. Expected Solution: The solution shall be able to provide a matching score for experts whose domain matches w.r.t. interview board subject and candidates area of expertise and thereafter should be able to predict suitability of expert for a particular interview board through a relevancy score. To arrive on the relevancy score for an expert the system should be able to determine a profile score for each selected expert w.r.t. profile of candidates to be interviewed.

Detecting oil spills at marine environment using Automatic Identification System (AIS) and satellite datasets	Background: The impact of oil spills at sea is multifaceted, affecting the environment, economy, public health, and society at large. Preventing spills through stringent regulations, improved technology, and better safety practices is crucial to mitigate these devastating effects. Automatic oil spill detection using Automatic Identification System (AIS) and satellite datasets is essential for environmental protection, public health and safety, economic stability, regulatory enforcement, technological advancement, and operational efficiency. This approach enables timely and effective responses to oil spills, mitigating their impact and promoting sustainable maritime practices. Integrating AIS and satellite datasets significantly enhances the early detection of oil spills at sea by combining real-time vessel tracking with advanced remote sensing capabilities. Detailed description: The automatic identification of oil leaks and spills from ships and vessels using AIS (Automatic Identification System) and satellite datasets involves integrating real-time tracking and advanced remote sensing technologies to monitor marine environments effectively. AIS provides crucial information such as the vessel's unique identifiers (IMO number, call sign), real-time positional data (latitude, longitude), speed over ground (SOG), course over ground (COG), heading, type of vessel, dimensions, draught, destination, estimated time of arrival (ETA), and cargo details. To detect a vessel in distress, AIS data have to be monitored for anomalies, such as sudden changes in speed or course, erratic movements, or unexpected stops. These irregularities can signal potential distress, prompting further investigation. Once detecting the distress, the same location/vessel have to be monitored using space borne satellite datasets for oil leaks, orientation of the vessel and its change in datum. The integration of AIS data with satellite datasets, enhances the ability to detect oil leaks early and can respond to situations efficiently. As far as study area, any of the below options may be considered. Option 1 : off Mumbai:

Development of a mobile application to provide recreational suitability information of beach locations across India.	Background: Coastal tourism is one of the priority areas highlighted in the Draft Blue economy policy of India. As such, use of technology to improve the tourism and related sectors is the need of the hour. Given the expected increase in the coastal tourism of our country, there is a need to ensure safety of the tourists. In this regard, a mobile application indicating the suitability of beaches for recreational activities (based on the current ocean state like wave heights/ocean currents, meteorological parameters like wind, water quality etc.) will be a useful value addition to the coastal tourism sector. Description: The proposed app should be able to provide tourism suitability (say suitable/not suitable based on various parameters) at a particular point of time across various beaches in India. Create locations of different beaches across the country. Different parameters to be considered to determine suitability of a coastal location for recreation activities like Ocean alerts (High Wave/Swell Surge/Ocean Currents/Storm Surge/Tsunami), Winds, Water quality assessments. These parameters will be available via INCOIS (Indian National Centre for Ocean Information Services) API. The application should devise a method/algorithm to use the above parameters and make the safety/suitability decision at the different locations. Visualization using geospatial maps and colour codes based on suitability of locations. Based on the current location of the user, alert notifications to be provided in case of any alerts in the coastal location of the user) to be provided Expected Solution: Design and development of a mobile application which identifies suitability of coastal tourism sites based on the current weather and oceanic conditions. This can help to save lives and better plan the coastal tourist/recreational activities for the user.

Integrated Geo-Referenced Fish Catch Data Repository and Access System	Background: INCOIS provides fishery advisory services to fishermen through potential fishing zone (PFZ) advisories that proven to benefit fishing communities by making fishing more economical and reducing fuel consumption, as fishermen can directly target areas with abundant fish. Current research is focused on advancing the fisheries forecasting services through developing species-specific advisory services. However, predicting species-specific abundance requires a deep understanding of the habitat suitability of commercially important species. This requires analyzing fish catch data alongside environmental variables at the locations of fish occurrence and abundance, identifying the most important variables contributing to their abundance, and ultimately fitting these data to appropriate prediction models. INCOIS is striving to collect geo-referenced fish catch data from various sources, including data from other research Institutions, industry collaborators, research cruises, and a dedicated app that captures fisheries information through images from fish catch locations. However, at present there is no systematic mechanism to aggregate and store these information from multiple channels to a single data base. As a result, the data is highly scattered and disaggregated, leading to wastage of time and confusion among scientific personnel developing species-specific habitat suitability models, since this disorganization makes it difficult to access all available datasets for analysis. Detailed Description: Considering the difficulties in collecting georeferenced fish catch data, each single dataset is highly crucial for habitat suitability models. Therefore, there is a need for a comprehensive database to store all available georeferenced fish catch information with appropriate filters and visualization tools. This would enable dedicated personnel to easily access and download all data available for a particular species. Such a dataset would also be highly beneficial for new scientists interested in working on different species, resulting in species specific advisory services for more species in future. Data input,

Development of a versatile and fast algorithm for the optimal ship routing	Background: Most of the goods are transported around the world by shipping which relies heavily on fossil fuels for powering. Given the expenditure of the shipping industry on the fuel, a main objective of a shipping company is to optimize the ship route for the least fuel consumption. Depending on the type and purpose of the voyage, it is also desirable to optimize several other parameters such as, the travel time, passenger comfort and route safety, to avoid any damage to the ship, cargo, crew and passengers. Optimization of each of these parameters serves a purpose. For instance, an energy efficient route may not be safe in terms of weather. Therefore, to avoid loss of life and property, route weather safety needs to be considered. An application suggesting the optimal route based on the chosen set of optimal parameters for any voyage between two ports in the Indian Ocean, will immensely benefit the Indian shipping industry. Description: At the heart of any optimal ship routing application lies the optimization algorithm. Although scientific literature is available on various methods of optimizing the ship routes, given the commercial potential, there are no applications available publicly which can be customized for the Indian Ocean region. The optimization methods reported in literature range in complexity, computation time, versatility, etc. Various factors, such as, the forcings (surface winds, currents and waves), design of the ship and ship drift characteristics, impact the ship's motion at sea. The optimal route must be continually evolving because the weather conditions keep changing as a ship proceeds on its voyage. Therefore, it is crucial to choose a suitable optimization method that can optimize several parameters for a range of ships (with varying type, dimensions, drift characteristics of a ship) and develop an algorithm to return an optimal route within a reasonable computational time. The algorithm can optimize for the voyage time and safety to begin with but with a scope for addition of more optimization parameters. To get an idea of the problem, please visit: https://www.youtube.com/watch?v=ct9v-mQgYqE ii)

Data download Duplication Alert System (DDAS)	Background: In an institute environment, multiple users often require access to the same datasets for various purposes. However, due to lack of communication or visibility, these users may unknowingly download duplicate copies of the same data. This leads to unnecessary consumption of resources, including bandwidth and storage, and complicates data management. The DDAS (Data download Duplication Alert System) addresses this issue by notifying users with an alert if a potential duplicate download is identified. This system helps optimize resource usage, save time, and streamline data management processes. Description: Managing data downloads efficiently is crucial for optimizing resources and maintaining order in any organization. A DDAS addresses the issue of multiple users inadvertently downloading duplicate copies of the same datasets across various fields. The DDAS operates by maintaining a repository or database that records metadata of all downloaded datasets. This metadata includes details such as file names, sizes, timestamps, and download locations. When a user initiates a download request, the system checks the database to determine if the dataset has already been downloaded by any user. To identify duplicates accurately, the system uses file history or unique identifiers, ensuring duplicates are detected even if file names differ. If a potential duplicate is detected, the system prompts the user with an alert. This alert provides comprehensive information about the existing dataset, including its location and the timestamp of the original download. By doing so, the DDAS helps users avoid unnecessary downloads, thereby optimizing resource usage, saving time, and streamlining data management processes. This system is designed to be flexible and applicable across various fields and industries, including academic institutions, research facilities, and any other domain where efficient data management is critical. By preventing duplicate downloads, the DDAS ensures that resources are used effectively, contributing to overall organizational efficiency. Expected Solution: To mitigate this issue, a robust solution is needed to

Interactive gamified approach to Ocean Literacy	Background: The 2030 Agenda for Sustainable Development, adopted by all United Nations members in 2015, created 17 world Sustainable Development Goals (SDGs). It was also accepted that these SDGs are not possible to achieve without changing humanity's relationship with the oceans. To realize that, in 2017, it was decided that the decade of 2021-30 is to be observed as UN Decade of Ocean Sciences for Sustainable Development (or UN Ocean Decade). INCOIS is identified as UN Ocean Decade Collaborative Centre for the Indian Ocean Region to help address all the ten UN Ocean Decade challenges (https://oceandecade.org/challenges/). Description: The creative solution proposed herein will address mainly (but not limited to) challenge-10. The gamified way of creating ocean related awareness is aimed for all age-groups and diverse education levels. Considering popularity of online gaming (multi-role playing to conventional games such as ludo) and affordable devices along with data plans, this approach is promising option for ocean literacy. For a starter, one such solution (but very limited/basic in nature) can be found at: https://www.outreachgames.org/OceanProtector/main.html. Expected Solution: The user will be able to chose from a variety of sea-going roles e.g. but not limited to, fishermen, captain of a ship, tourism operator etc. Based on the role, one needs to choose the correct sea conditions to be at a location (or move away) with the help of available/applicable ocean information services form INCOIS (simulated for the game). Correct decision (e.g. going for fishing to PFZ zone or moving away from the shore when tsunami is detected) will add to the points and help player achieve next level. Wrong decision may result in loosing points and add other gaming penalties (e.g. start over or wait till certain time etc etc). Users goal would be to advance and maintain gains at the daily, weekly etc leaderboards so in that way it would be competitive among the users even though their game decisions are not affecting to the others directly. The solution should be suitable for windows and

Implement Software Solutions to Reduce Student Dropout Rates at Various Educational Stages	Background: Student dropout rates in India are influenced by socio-economic and educational factors, affecting marginalized communities the most. Addressing dropout rates is essential for equitable education and socio-economic development. The National Education Policy (NEP) 2020 emphasizes the importance of reducing dropout rates and ensuring quality education up to at least the secondary level. Description: This solution focuses on creating software tools to address and reduce dropout rates. The tools will help identify at-risk students, provide personalized support, and engage communities. By leveraging technology, the aim is to improve student retention, align with NEP 2020's goals, and support a holistic approach to education. Innovative Software Solutions: a) AI-Driven Early Warning System: o Description: Develop an AI-powered software platform that analyzes student data (attendance, grades, behaviour) to predict which students are at risk of dropping out. The system will provide alerts to educators and administrators, enabling timely interventions. o Features: Predictive analytics, real-time alerts, data visualization, and intervention recommendations. b) Community Learning Hub Platform: o Description: Create an online platform that supports community learning hubs in rural and underserved areas. This platform will offer digital resources, tutoring sessions, and virtual mentoring, providing additional educational support to students. o Features: Online classes, resource library, virtual tutoring, and community forums. c) Mobile Learning Application: o Description: Develop a mobile application that delivers personalized learning experiences, including interactive lessons, quizzes, and educational games. The app will provide resources for students who have limited access to traditional education. o Features: Interactive content, offline access, progress tracking, and personalized learning paths. d) Financial Support Management System: o Description: Build a software system to manage scholarship and financial aid applications. The platform will streamline the application process, track disbursements, and provide

Develop Software Solutions to Enhance Educational Infrastructure and Connectivity in Rural Areas	Background: Rural areas in India often suffer from inadequate educational infrastructure, limited connectivity, and insufficient access to quality educational resources. This hampers the ability of students in these areas to receive a comprehensive education. Leveraging software solutions can help bridge these gaps by providing remote learning opportunities, optimizing resource management, and improving connectivity. Description: The goal is to create and implement software solutions that address the challenges faced by educational institutions in rural areas. This involves developing tools for remote learning, resource management, and connectivity enhancement. Strategies will focus on creating software that can facilitate virtual classrooms, manage educational resources efficiently, and provide support for infrastructure planning and development. Innovative Solutions: a) Virtual Classroom Platforms: o Develop cloud-based virtual classroom software that supports live streaming of lessons, interactive tools for student engagement, and recording capabilities for on-demand access. This solution can help overcome the lack of physical infrastructure by bringing quality education directly to students in remote areas. b) Educational Resource Management Systems: o Create software to manage and track educational resources such as textbooks, digital content, and teaching aids. This system can help schools inventory and distribute resources effectively, ensuring that materials are available where needed and reducing wastage. c) Internet Connectivity Optimization Tools: o Develop software that can optimize and monitor internet connectivity in rural areas. Tools can include bandwidth management systems, connectivity diagnostics, and network optimization software to ensure stable and reliable internet access for educational purposes. d) E-Learning Content Creation Platforms: o Build platforms for creating and distributing e-learning content tailored to the curriculum and local needs. These platforms can support multimedia content, quizzes, and interactive modules,

Develop Effective Career Counselling and Guidance Programs in Schools to Enhance Student Career Choices	Background: A lack of adequate career counselling and guidance in schools contributes to poor career choices among students, leading to mismatched skills, job dissatisfaction, and unemployment. In India, many students and their families are unaware of the diverse career opportunities available, often leading to choices based on limited information or societal pressure. Effective career counselling and guidance are essential for helping students make informed decisions about their futures and aligning their education with their career aspirations. The National Education Policy (NEP) 2020 emphasizes the need for holistic education, which includes providing students with the guidance necessary to make informed career choices. Description: The proposed solution focuses on implementing comprehensive career counselling and guidance programs in schools. This includes training career counsellors, developing resources and tools for career exploration, and integrating career guidance into the school curriculum. Programs should provide personalized counselling sessions, workshops, and access to information on various career paths and educational requirements. Additionally, leveraging technology to create interactive platforms for career exploration can enhance student engagement and awareness. These initiatives align with NEP 2020's vision of equipping students with the knowledge and skills to pursue their career aspirations. Innovative Solutions: a) AI-Powered Career Guidance Platforms: Develop AI-driven platforms that provide personalized career advice based on students' interests, strengths, and market trends. b) Career Mentorship Programs: Establish mentorship programs where students can receive guidance and support from professionals in their fields of interest. c) Interactive Career Exploration Tools: Create digital tools and apps that allow students to explore different careers through virtual simulations, videos, and interactive content. d) Comprehensive Career Resource Portals: Develop online portals with extensive resources on career options, required skills, educational pathways, and job market trends. By

Integrate Industry-Relevant Vocational Training into Elementary and Secondary Education Curriculum	Background: India has a tremendous opportunity to harness the potential of its youth by addressing the skills gap between education and industry requirements. While vocational education programs exist, they are often undervalued compared to traditional academic paths and need enhancement to provide students with the skills demanded by today's job market. Strengthening vocational education is essential for creating a skilled workforce that aligns with industry needs and supports sustainable economic growth. The National Education Policy (NEP) 2020 emphasizes the importance of vocational education and aims to integrate it into the mainstream education system to prepare students for various career paths. Description: The goal is to transform vocational education into a core component of the elementary and secondary education system, as envisioned in NEP 2020. By collaborating with industry experts, we can design a curriculum that is modern and industry-relevant. Investments in infrastructure will ensure schools have the necessary tools and facilities for effective training. Specialized training programs for educators will enhance the quality of vocational teaching. Partnerships with industries will offer students valuable real-world experience through internships and apprenticeships. Awareness campaigns will shift perceptions, highlighting vocational education as a respected and viable career path. Innovative Solutions: a) Virtual Reality (VR) Training Modules: Develop VR-based training modules to simulate real-world scenarios and provide hands-on experience in a virtual environment. b) AI-Powered Career Guidance: Implement AI tools to offer personalized career guidance and skill development pathways for students based on their strengths and industry trends. c) Digital Skill Badges: Introduce digital badges and certifications that students can earn upon completing various vocational training modules, making their skills easily verifiable by employers. d) Mobile Training Labs: Deploy mobile vocational training labs to reach remote and underserved areas, providing practical training and education on the go. e) Online

Creating an application to identify the presence of government issued personally identifiable information (PII) embedded in documents and data, inadvertently or otherwise.	Background: In today's digital age, a wide variety of services and processes take place online. Users of these digital facilities are required to upload government-issued containing documents or provide data for successfully availing the services. However, the uploaded documents or data which are required to facilitate these digital services and processes contain personally identifiable information (PII), i.e. any data that can be used to identify an individual uniquely. These documents can be like Aadhaar card, PAN, Credit Card, Driving License etc and can include data like names, address, phone number, email address, and financial information, among others of the user. The handling of PII is crucial as its exposure can lead to privacy breaches, identity theft, and financial fraud among other cyber related issues. Detailed Description: The above problem statement envisages that an application be developed to identify whether PII, in the form of government-issued documents such as Aadhaar, Driving license, MHA-issued ID Cards, etc. is embedded in the uploaded document or provided data. Notable, the PII may be included inadvertently as well. PII, by its nature, is sensitive data, and its exposure must be protected against in order to safeguard users' privacy. Entities and organizations handling documents or data containing users' PII must be mindful of the complex challenges that arise with it – they have to balance data storage, encryption, access controls, data retention policies, data management processes with users' knowledge and consent, notification of breaches by users, grievance redressal, etc. Such an application will aid in alerting individual users to verify whether it is necessary to upload or provide PII-containing document. Simultaneously, it will allow the personal data processing entity to check whether such PII document or data is required, and in case not necessary, help in removing, redacting or masking the PII document or data from the uploaded or provided document or alerting the individual user regarding the same. This application would be useful for the purposes of data protection compliance, risk mitigation, enhanced security,

Transformo Docs Application: Empowering Machine-Readable Document Management System.	Background: In today's digital age, the ability to efficiently manage documents is crucial for organizations. However, a significant challenge arises when dealing with non-machine-readable documents such as PDFs or Word documents. These formats hinder automation and make it difficult to extract meaningful insights from the data they contain. Therefore, there is a pressing need for a solution that can both restrict the ingestion of non-machine-readable documents and facilitate the creation of machine-readable documents seamlessly. Description: The above problem statement envisages: 1. To develop an application that can restrict software applications from ingesting any non-machine-readable document format such as PDFs, DOCs, or any other document types. 2. To create a mechanism within the application to generate machine-readable documents automatically whenever a new document is created, regardless of its source - scanned, generated through a software application, or otherwise. Expected Solution: The TransformoDocs application aims to address the challenges associated with managing non-machine-readable documents by developing a comprehensive document transformation application. It will help in realizing the benefits of search-ability, artificial intelligence, accessibility to persons with disability, machine translation and access to data across applications and data exchanges. This application may offer efficient data extraction, standardized processing, workflow automation, data quality improvement, scalability, integration with external systems, advanced analytics, and compliance with regulatory requirements ultimately unlocking the value of their data.

Develop a functional solution that incorporates the security of the ML model.	1. Background. UIDAI is exploring possibilities to enable Face authentication on the desktop in a browser context. The proposed architecture to provide Face Authentication in the browser context,requires AI on the edge to perform liveness check of the face being captured by the webcam or connected camera. UIDAI is considering the injection of ML model by using an appropriate binary code delivery mechanism. The security of these models is important for transaction integrity and therefore seeking an innovative solution that will protect the model from any tampering and reverse engineering. 2. Problem Description. As part of the challenge, participating teams to demonstrate model security in a browser context by using either obfuscation or cryptography. Models are typically 5~7Mb in size and structured as flatbuffers. These models would be downloaded, when for the first time accessed on a desktop and then cached in the browser context. For subsequent face authentication transactions, a cached model would be preferred, unless otherwise the model has changed or updated. To solve the above problem statement, teams are free to choose either ONNX web runtime or Tensor.js or any other innovative model to distribute the model in the browser context. The proposed solution must meet the following functional objectives. 1 Model Security. The solution must provide a mechanism to protect the model from any reverse engineering or tampering. 2 Model Size Optimisation. The solution must not significantly increase the size of the model post-implementation of security frameworks. Models are expected to be downloaded in 3G/4G/5G wireless networks and hence any increase in size may lead to deteriorated user experience. 3 The solution must feature backend components to prepare the ML model either using obfuscation or cryptography. The backend activity can be a one-time task during the release of the ML models or a just-in-time approach. In the just-in-time approach, the model would be obfuscated or encrypted before being downloaded to the end user’s desktop. 3. Expected Solution. The expected outcome of this

Develop a functional solution that demonstrates the face liveness detection	1. Background. UIDAI is building a browser-based face authentication platform, which will enable the aadhaar number holders to start and end the face authentication on the same device i.e desktop, mobile or tab. One of the key drivers for the success of the solution is face liveness detection in the browser context. This challenge seeks an innovative approach to implement face liveness using ML models which can be used in all forms of interfaces. 2. Problem Description. As part of the challenge, participating teams to develop passive or active liveness detection models that can be used in the browser context to prevent the use of photo-of-photo, video or any form of face spoofing mechanism. Teams may opt for passive - which would the use environment to detect the liveness of the actor or active - which engages the aadhaar number holder for some “action” to detect the liveness. The proposed solution must meet the following functional objectives. 3. The proposed solution must meet the following objectives. 3.1 Feature Requirement. Liveness detection of the Actor in the edge. Liveness detection to happen in the browser (Chrome/Firefox/Edge context using ONNX or Tensor.js framework. 3.2 Model Inference Time. Liveness detection should be completed within 500ms for enhanced user experience. 3.3 Mode. The model may use active or passive or a combination of both to detect the liveness of the actor. 3.4 Model Size. The liveness model must not be more than 5Mb, so that it can be downloaded in the narrow bandwidth (3G/4G/5G) network without impacting the page load timing. 4. Expected Solution. The expected outcome of this project is a functionalsolution that demonstrates the face liveness detection in the edge.

Develop a ML Model based solution to refine CAPTCHA.	1. Background. UIDAI has multiple portals on the Internetfor resident engagement and back office operations. These portals are protected with CAPTCHA for denial of service- related attacks. UIDAI believes that CAPTCHA is a barrier to smooth resident engagement with the aadhaar portals and therefore intends to remove it soon. Instead of active CAPTCHA, UIDAI is looking for a passive solution that can differentiate between a bot and a human operator. 2. Problem Description. As part of the challenge, participating teams to develop a solution, mostly following a passive approach through collection of environmental parameters and using AI/ML to analyze it in the backend to differentiate between bot and human-being. The passive solution may capture environmental details through the browser context and analyze the same with the help of ML models deployed in the backend. This solution, once accepted would be used by the UIDAI to protect all backend APIs from DoS/DDoS based vulnerabilities. The solution must meet the following requirements:- 3. The proposed solution must meet the following objectives. 3.1 Feature Requirements. The solution must define the list of environmental parameters that need to be captured to differentiate between a bot and a human being. If passive parameter analysis is unable to differentiate, then the user may be asked to do a few minimal interactions with the portal. User experience is important to UIDAI and hence human interaction is to be limited. 3.2 Frontend code to capture environmental or human interaction data must be compliant with the javascript framework. Participating teams may choose to use any framework like React/TypeScript/Flutter to demonstrate the solution. 3.3 As part of the solution, the required backend ML model to analyze the front- end capture of environment parameters or human interaction data must be developed to demonstrate the solution. The ML model must be pluggable so that it can be integrated with the UIDAI application stack to protect the APIs. 3.4 The solution must adhere to the core privacy policies of UIDAI. 5. Expected Solution. The

Farmers Disease Diagnostic/Reporting Portal - Mobile Portal Al Based	Background- Agricultural productivity and food security are heavily dependent on the health of crops and livestock. Farmers, especially in remote or resource-limited areas, often face challenges in diagnosing and reporting diseases that affect their livestock and crops. Early diagnosis and timely reporting are crucial for effective disease management and prevention of widespread outbreaks. Description - A mobile portal powered by Artificial lntelligence (Al) for disease diagnosis and reporting can revolutionize how farmers manage animal and plant health. This portal enables farmers to use their smartphones to access diagnostic tools, report symptoms, and receive actionable advice. Al algorithms can analyze reported data to provide accurate diagnoses and suggest appropriate treatments or interventions. This technology can empower farmers with the knowledge and tools to manage diseases more effectively, ensuring the health and productivity of their farms. lntegrate Al-based software with existing NDLM to allow farmers to submit images and descriptions of disease signs and symptoms. The Al will generate suspected disease/condition reports with preventive measures and send alerts to veterinarians for appropriate action (Al-based software, Mobile application). Expected Outcomes . Enhanced Disease Diagnosis: . Timely Reporting and lntervention: . lncreased Access to Expert Knowledge: . lmproved Farm Productivity. Data Collection and Analysis: Cost-Effective DiseaseManagement: Empowerment and Education of Farmers: lntegration with Existing Surveillance Systems . Community Engagement and Support: Sustainable Agriculture Practices

Software solutions to identify users behind Telegram, WhatsApp and Instagram based drug trafficking.	Background: Use of encrypted messaging/social media apps like Telegram, WhatsApp and Instagram for drug trafficking are on the rise. Channels operating on Telegram and WhatsApp and Instagram handles are blatantly being misused by drug traffickers for offering various narcotic drugs and Psychotropic substances for sale. Description: WhatsApp and Telegram channels and Instagram handles are created by drug traffickers to offer various drugs for sale to their subscribers. Customized Telegram bots are also created by some of the drug traffickers to sell drugs. It is most worrisome that majority of the drugs which are being offered on sale through Telegram, WhatsApp and Instagram are dangerous synthetic drugs like MDMA, LSD, Mephedrone etc. The above three apps are also used by drug traffickers for drug communication. Expected Solution: Development of a software solution to identify live Telegram and WhatsApp channels/bots and Instagram handles that are offering drugs for sale in India. Solution also should focus on triangulating identifiable parameters like IP address, mobile number, email id etc of the users behind the channel/bot/handle.
Software solution to identify the end receiver of a cryptocurrency transaction	Background: Use of cryptocurrencies like bitcoin, USDT, Monero etc. for drug trafficking activities are increasingly becoming common. The relative anonymity and speed provided by cryptocurrencies are misused by drug traffickers as a mode of transaction for drug sales and also as an asset to amass the proceeds of crime. Description: Drug traffickers operating on darknet and elsewhere on internet enabled platforms like social media apps, messaging services etc receive the value of drugs through cryptocurrencies. In a few cases, the drug traffickers save their proceeds of crime in cryptocurrencies. During the course of investigations and also through intelligence, wallet addresses and transactions hash related to drug transactions are obtained by Drug Law Enforcement Agencies, Further, it has also been observed that these finds are often passed through variety of services like tumblers, mixers, bridges etc to further anonymize the transactions. It is important to follow the trial of funds associated with drug transactions to identify the real persons behind the drug trafficking network. Expected Solution: Development of a software solution to follow the cryptocurrency transaction trial associated with a wallet id/transaction to find out the real receiver of the funds in a drug related transaction.

Web-scrapping tool to be developed to search and report Critical and High Severity Vulnerabilities of OEM equipment (IT and OT) published at respective OEM websites and other relevant web platforms.	Background: Critical Sector organisations uses a number of IT and OT equipment (e.g. Networking and hardware device, Operating Systems, Applications, Firmware etc.). These devices/application come with vulnerabilities from time to time. There should be timely information sharing mechanism by which the concerned equipment users at critical sector orgs should be altered regarding any critical / high severity vulnerabilities in their equipment within the shortest possible time. Detailed description: The ICT components (HW/SW) being used by Critical Sector Organisations become vulnerable from time to time. These vulnerabilities can be categorised as Critical, High, Medium and Low. Any exploitation of these vulnerabilities can cause havoc in multiple Critical Sector Organisations where such vulnerable equipment are being used. Keeping in view of the above, there is a need to monitor all such vulnerability information published at the equipment's OEM websites and also other relevant websites. Once a critical or high severity vulnerability information is published at OEM website or any other relevant website, the 'to be developed scrapper' will immediately take that vulnerability input along with possible mitigating strategy published in the website and send the information to predefined email id(s). Note: The NVD website publishes such OEM vulnerable information. But the same comes with a time lag. It is therefore needed to get such information directly from OEM websites and /or from other relevant websites where such vulnerable information is published almost in real time. Expected Outcome: An automatic script using open source tools to be developed for the OEM vulnerability information scrapping and reporting. Tool should know various vulnerability information published data formats/syntax at OEM websites (both for IT and OT hardware and application) and come up with optimum solution for monitoring and reporting of such vulnerability information. The output of the tool that will be emailed to pre-designated email id(s) is as per following (shared with example; all fields may not be available at the time of reporting): * Product

Developing a tool to provide for real time feeds of cyber incident pertaining to Indian Cyber Space.	Background: NCIIPC shares detail of cyber incidents to corresponding stakeholders in order to inform them about cyber activities related to their IT/OT infrastructure. This empowers them to take necessary actions to mitigate further risk. Description: In order to achieve objective of protecting Critical Information Infrastructure (CIIs) of the Nation, it is very vital to have real time information related to cyber threats and incidents specific to Indian Cyber space. This may enhance the Threat Assessment potential based on the incidents that have already happened or the ones that currently exists. Therefore, a framework to crawl/scrap/collect the cyber incident activities reported anywhere on the web related to Indian cyber space is required to be developed. Expected Solution: 1. Using Machine Learning, find platforms that publish or works as intermediate platform for sharing cyber incident activities related to cyber incidents. 2. Design a model framework for the cyber incidents feed generator which collects data from various forums, paste sites, social media, developer or any other platforms as identified by Machine learning model generated in accordance to point 1 above. 3. Creation of well-structured database of cyber incidents extracted by framework developed in accordance with point 2 above. 4. Generation of valuable insights from the data collected and its visual representation of cyber incidents specific to sectors, APTs and strategic issues. Note: Students are encouraged not to use paid APIs for solving the problem.

RE-DACT	Background: Easy to use and secure redaction tool “RE-DACT” which allows redaction/masking/anonymization on various input formats based on a gradational scale defined by the user and providing customized output. Over a time, model will learn and have the ability to generate realistic synthetic data in any sought format. Description: The proposed solution is a natural language processing (machine learning) based redaction tool. The tool will redact or obfuscate from original data leaving the output structurally/logically the same but stripped of key identifiers and other content which may in any way allow the identity, actual data, markers or issues in the input content to be revealed. The correlational logic may be appropriately obfuscated based on the degree of redaction. This will have an easy to use GUI and will be available for use on online and offline systems. The degree of the redaction will be up to the user- the higher the degree set by the user, the more the degree of redaction. This will work with all different commonly used formats for text and data sets. Security of data will be assured by ensuring that the input data is not stored or retrievable in any fashion by third party entities. User will have complete control over the input data. It is also an important aspect that sometimes data may be required to be stored or submitted, however specific sensitive details may not necessarily be required. In such a situation- anonymized data authenticated as having being redacted from original would suffice. Declassification processes are long and arduous; anonymization is largely manual or custom script driven. By providing a gradational redaction option, ordinary users can strip away the specificity to the extent of liking-from merely name removal/anonymization to completely synthetic data with only faint traces of original structure/pattern. This can allow generation of large number of databases with realistic but anonymized data that can be shared for learning, growth and commercial ventures. Expected Solution: Problem Statement: Easy to use and secure redaction tool “RE-DACT” which allows redaction/masking/anonymization

Development of Audit script for Windows 11 and Linux OS as per CIS (Centre for Internet Security) bench mark	Background: Organisations across various industries face significant challenges in maintaining robust cyber security posture. Compliance with industry standard bench marks and guidelines, such as those provided by Center for Internet Security (CIS), is crucial for ensuring the security and integrity of their IT Infrastructure. However, manually auditing and ensuring adherence to these benchmarks and guidelines can be time- consuming, error prone, and resource intensive. Current practises often involve manual checks. To address these challenges, there is a critical need to develop automated auditing scripts tailored to CIS benchmarks. Detailed description: This software solution aimed to list out the control guidelines as per CIS benchmark for the following operating systems: - Windows (Reference www.cisecurity.org/benchmark/Microsoft_winodws_desktop) i. Windows 11 (Enterprise version) ii. Windows 11 (Standalone version) Linux (Reference:www.cisecurity.org/benchmark/red_hat_linux, www.cisecurity.org/benchmark/ubuntu_linux) i. Redhat Enterprise (8 and 9) ii. Ubuntu desktop (20.04 LTS, 22.04 LTS) iii. Ubuntu server (12.04LTS and 14.04 LTS) Preferable scripting language (PowerShell for Windows, bash/python for Linux). Expected solution: i. A user-friendly GUI based solution with capability to generate a report of findings. ii. Should be customizable as per organizational needs and scale to audit large and diverse IT environments effectively. iii. Scripts should be reliable and accurate in identifying the deviations from iv. best practices outlined in CIS benchmarks. v. Should facilitate easy update and maintenance to accommodate changes in benchmarks over time.

Few Shot Language Agnostic Key Word Spotting system (FSLAKWS) for audio files.	Description: The problem statement envisages development of Few Shot Language Agnostic Key Word Spotting system (FSLAKWS) system which would be able to localize and classify the presence of keywords of Interest in a variable duration audio file. The system to be able to function at high performance when very few (Few Shot) examples per keyword are given for training. The key features of the system would be as mentioned below: - (a) The system should be language agnostic (b) The system should be able to handle audio files at various sample rates (8k-48k). (c) The system should be able to upgrade to additional keywords. Performance Criteria: For creating a system with Few Shot capabilities, the participants may need to do pre-training of their model on a large corpus. This corpus should be obtained by the participants themselves. We will provide few examples per keyword at the training time during the conduct of the hackathon. The participants will be judged on a separate test set having the same keywords as the train set. The performance would be ascertained on the following: (a) Metric (b) Latency and throughput of the responses. (c) Smaller model size.
Identification of algorithm from the given dataset using AI/ML Techniques.	Background: There are large number of cryptographic algorithms available for ensuring data confidentiality and integrity in secure communication. Identification of the algorithm is a research activity that leads to better understanding of the weakness in its implementation, in order to make the algorithm more robust and secure. Description: The above Problem Statement envisages that approach(s) be developed using AI/ML techniques for identification of the cryptographic algorithm by analyzing given data. The provided datasets are generated using modern cryptographic algorithms. The algorithm is expected to be identified by using a combination of AI/ML and innovative approaches. The successful approaches may also be automated by developing a software solution which takes the given dataset as input and gives probable cryptographic algorithms as output. Expected Solution: Logical approach be developed to successfully identify the algorithm for the given dataset. The approaches should either be implemented in software form or should be feasible to be developed as a software.

Centralized Automated Solution for Price Estimation & Reasonability.	2.1 Background: 2.1.1 Procurement is an essential component of any project. There are set rules and procedures to undertake various kinds of procurements. Each procurement methodology has several milestones, which too need careful planning and execution, to avoid time and cost over runs. 2.1.2 As such, Government procurements are driven by the General Financial Rules (GFRs) and the Manuals for Procurement of Goods and of Services. Needless to say, all procurements are made keeping in mind transparency, fair competition amongst vendors as well as cost reasonability for the product services, as public money is involved. 2.1.3 One of the important methodologies often employed in procurement processes is establishing the 'price reasonability' for a certain product/service. This methodology is generally applied at two stages, viz. while obtaining administrative approval for procuring the said product/service, and before opening the commercial bids of qualified vendors. 2.1.4 The process of ascertaining the price reasonability of any product/service of interest is commonly known as Price Benchmarking. 2.2 Detailed Description: 2.2.1 There are various strategies to benchmark the cost. Some of them are as follows: i. Sometimes, the cost of the product or the rate at which service is to be hired are already defined by the Government. For example, labor rates. ii. It may be possible that a similar product/service has been procured by the department in recent past. This can be taken as reference, known as the Last Purchase Price. iii. When none of the above is known, the most prevalent technique to gather information about the approximate value of the product/service is Market Survey. 2.2.2 Market Survey may be carried out physically by a team, as the name suggests, by actually visiting the market. However, this practice is only feasible for common goods/services such as stationery, common electrical appliances (AC, Fan, Lights etc), common services (sanitation, horticulture, maintenance etc). In case of sophisticated systems like Networking Solutions, Communication Systems, Sensors, Payloads and other

Development of AI/ML based solution for detection of face-swap based deep fake videos	Background: Synthetically-generated audios and videos i.e. deep fakes are in trends nowadays. Although these have caught imagination of computer and tech savvy generation, at the same time, these have created concerns because of their ability to disrupt nation's politics, committing frauds, create dis-information and creating non-consensual contents. Use of Deep fake has also been seen recently to purposefully defame the character of a person in specific. Due to enhancements in AI/ML and Large Language Models for Generative AI, identification and detection of deep fakes have created a huge challenge for Security Agencies. Research on multiple aspects of deep fake identification has been started. As a use case for the problem statement, a forensic technique to authenticate face-swap deep fake videos in which a person's facial identity is replaced with another's may be developed. Detailed description: Addressing the deep fake problem requires a multi-pronged approach, combining technology, regulation, education, and collaboration to mitigate the risks and protect individuals and society. However, on the technological front Detecting deep fakes involves development and testing with numerous advanced algorithms and tools. Here are some of the prominent approaches and technologies that can be used in deep fake detection: i.Convolutional Neural Networks (CNNs): CNNs can be trained to detect inconsistencies in facial features, expressions, and movements. CNNs can also analyse video frames over time to identify unnatural transitions and discrepancies. ii.Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM) Networks: RNNs and LSTMs can be used to analyse the sequence of frames in a video to detect temporal anomalies and inconsistencies indicative of deep fakes. iii.Capsule Networks: Capsule networks can identify discrepancies in facial pose and texture. iv.Adversarial Training: Adversarial training involves using Generative Adversarial Networks (GANs) to generate deep fakes and simultaneously training another model to detect them improving the robustness of detection algorithms.

Agent-less Windows System Vulnerability and Network Scanner	Background: It has been observed that most individuals are hasty when it comes to upgrade or update their Windows systems to mitigate any adversary actions. Henceforth, a system vulnerability detector and scanner should be in place to audit and verify the system and network based vulnerabilities (if exist) to rectify the misconfigurations and mitigate any prominent threats to the individual or organization. Description: The above problem statement envisions a blue team approach to identify and map potential vulnerabilities of a Windows OS subsystem to better secure and mitigate against various threats (System Level and Network Level). Expected Solution: • The problem statement should result in a solution which can provide possible vulnerabilities of the underlined Windows OS • The AV/EDR friendly solution should have an agent-less mechanism to find the vulnerabilities and must be able to search and crawl for the related available open-source exploits and their patches • Some of the key information at the system level that must be promptly identified by the proposed solution should fall under the following categories: ? System Information: ? Basic OS info ? DotNet versions ? Providers registered for AMSI ? Registered antivirus (via WMI) ? Classic and Advanced audit policy settings present in registry keys ? Auto run executable/scripts/programs ? Standard and Non-standard firewall rules ? Windows Defender settings ? User and machine personal certificate files ? Current environment PATH folders, environment variables and SDDL information ? Lists files/folders. By default, lists users' downloads, documents, and desktop folders ? Information about a file (version information, AMSIProvidersProviders registered for AMSI) ? Installed hotfixes (via WMI) ? Installed products via the registry ? Local Group Policy settings applied to the machine/local users ? Non-empty local groups, displays all groups ? Local users, whether they're active/disabled ? All Microsoft updates (via COM, WMI) ? NTLM authentication settings ? Saved RDP connections stored in the registry ? Current incoming RDP sessions ? Remote Desktop

Building Offline Parallel AV Pipeline to cater multiple AVs for CII entities.	Background: No single Antivirus is perfect, however each AV product has its own strength and weaknesses, and is more efficient at detecting some threats than others. In addition, one important requirement of Critical Information Infrastructure (CII) is that solution should be “offline and on-premise” and should be “updated with latest definition on regular basis”. Therefore, the reliable and effective solution can be developed by creating a pipeline combining multiple AV engines working parallelly offline. Description: To develop a scanning pipeline in which the data residing in “Target Folder” will be scanned automatically by multiple antiviruses and accordingly the cleaned files will be in same folder and the infected files will be segregated and transferred in a specific folder i.e. “Infected Folders” with their analysis report. In addition, the path of each infected file will also be recorded in a separate doc file in same Infected folders. The functional block diagram is depicted below: Target Folder -> Offline Parallel -> Infected Files One VM may be used for one AV which will be updated regularly (as per respective AV update policy) with latest definition of respective AV. The free/trail version of AVs can be used for building and testing the features of parallel AV pipeline. Atleast following three AVs should be included in AV pipeline: 1. Window Defender 2. Trend Micro Maximum Security 3. Eset Internet Security Expected Solution: The details of expected outcomes are given below: (a). Raw Data will be kept at “Target folder” and available multiple antiviruses should recognize the presence of data and start scanning automatically. (b). Cleaned file will be in same folders and Infected files & its Analysis Report should be move to a dedicated defined “Infected folder”. The path of each infected file will also be recorded in one doc file. (c). The scanning process shall be continued till all infected files are segregated. After successful completion by multiple AVs, a popup message of “Scanning Completed” should be displayed. The solution should have dashboard like VirusTotal where the results with each AV should be displayed. (d). The scanning shall be started

Tools and techniques for customisation of GPO as per CIS guidelines to deploy on offline / standalone windows.	Background: Group Policy Objects (GPOs) are powerful tools in Windows environments, used to centrally manage and enforce system settings, security configurations, and user preferences across a network of computers. The Center for Internet Security (CIS) provides detailed guidelines and benchmarks for securing various operating systems, including Windows 10 and 11. Implementing CIS benchmarks through customized GPOs ensures that systems adhere to industry best hardening practices, reducing vulnerabilities and enhancing overall security posture. Detailed Description : a) Deploying customized GPOs, based on CIS guidelines or user requirements is essential for hardening Windows systems. It will help in ensuring robust security and maintaining compliance with industry standards. (b) The guidelines contain multiple system configurations in terms of registry settings and group policy settings. Deploying of these settings as per user requirement is a daunting task, considering the availability of limited tools and human-intensive efforts. (c) Present problem statement is an attempt to explore the possible tools and techniques to automate the task of generating and managing the GPOs as per user requirements for various types of systems including airgapped/standalone machine. Expected Solution: Following functionalities have been envisaged for the expected solution: - (a) To create, edit and manage GPOs as per CIS guidelines and user requirements, if needed. (b) The customised GPOs generated should be deployable on airgapped / standalone system. (c) To maintain multiple group / category of system hardening settings with appropriate documentation to define the configuration details for each of the group / category. (d) Import / Export of configuration details for catering to user requirement to maintain multiple group / category of system configurations. (e) Tool should be able to import documentation from CIS guidelines available in PDF format. (f) Envisaged tool should support in deploying GPOs on the target machine. (g) Envisaged tool should support in testing and auditing of system configurations on

Real-Time Disaster Information Aggregation Software	Background: Disaster response agencies often stuggle to gather timely and specific information about emergencies from various sources. Social media platforms serve as a valuable repository of such data, but manually monitoring and sorting through the vast amount of information is inefficient and resource-intensive. Description: There is a pressing need for a software solution that can efficiently aggregate and categorize specific disaster-related data from social media, news portals, and other open sources. This software would utilize advanced algorithms to sift through the abundance of information and classify it into different categories data would then be presented on a user- friendly dashboard, allowing disaster response agencies to quickly access relevant information and plan their actions accordingly. Expected Solutions: The software solutions will streamline the process of gathering and categorizing disaster-related data from various soucres, significantly reducing the time required for response efforts. By providing real-time insights and actionable information, the software will enhance the effectiveness of disaster response operations, ultimately saving lives.

Development of handheld device/Mobile based Operation & Maintenance tool for asset & consumables inventories and finance management in context of drinking water supply scheme.	Background: The Jal Jeevan Mission (JJM) is a flagship initiative of the Government of India aimed at ensuring safe and sustainable drinking water to all rural households in the country. Develop a handheld device/Mobile based application designed to support the operation and maintenance (O&M) of drinking water supply schemes. This tool will assist the GP/PHED person to manage assets and consumable inventories, as well as finance-related tasks, enhancing the efficiency and effectiveness of water supply operations. This tool would also have capabilities of bill generation & payment interface such as UPI, Net Banking, Credit cards etc. The panchayat should be able to operate and procure the tool. The tool should enable panchayat to manage in village infrastructure. Expected Solution: a)The tool should record on GIS all assets related to the water supply infrastructure, such as pumps, pipelines, valves, and treatment plants along with attributes. b) It should store detailed information about each asset, including location, installation date, and other historical data. c) Manage inventories of consumables like chemicals, filters, spare parts, and other supplies and forecast demand and plan for replenishment. d) It should be able to record receipts from various sources credited to a/c of GP. e) Record expenditure for activities, repairs, replacements and consumable purchases. f) Manage consumer list, generate bills, prepare cash book for GP. g) User friendly and easy to use for GP level operation. h) Local language may be provided i) The payment gateway may be integrated j) Provision of online UPI payment may be provided k) It should have payment interface & bill provisioning.

Use of Digital Technology to calculate Water Footprints for different Agricultural Products	Background The water footprint measures the amount of water used to produce each of the goods and services we use. The water footprint helps us understand for what purposes our limited freshwater resources are being consumed. The impact of it depends on where the water is taken from and when, if it comes from a place where water is already scarce, the consequences can be significant and require action. Detailed Description The increase in the amount of non-available water due to pollution and scarce groundwater level has added more water footprints, at the community as well as at the personal levels. An increased · water footprint directly affects the health and future of the citizens. Preventing severe drought in water-stressed areas is only going to be possible if water is used with more care and efficiency, this can be achieved if we have readily available data of water footprints. Expected Solution Hence, by using digital technologies like AI, Big Data, Block chain etc. and computer languages, a user friendly app or website may be developed which can provide the water footprints of different items/ final products we eat by feeding little inputs like name, or just by scanning through camera like Google lens. The app should support local languages; this will ensure the pan India usage and sensitize the people about water footprints of items they use in daily life.

Use of Digital Knowledge Sharing Platform like Wikis on sharing of water efficient techniques and methods for minimizing water scarcity.	Background: The absence of a centralized knowledge-sharing platform like wikis significantly hampers the dissemination of water-efficient techniques, which could mitigate water scarcity. Despite the existence of various methods to conserve water, especially in agriculture, the lack of awareness and accessibility to this information perpetuates inefficient water use. This gap in knowledge sharing contributes to the overuse of water resources and exacerbates water stress, particularly in regions where agriculture is heavily dependent on irrigation. Establishing a comprehensive, accessible platform could catalyze the adoption of sustainable practices, crucial for addressing the global challenge of water scarcity. Detailed Description: A centralized knowledge-sharing platform akin to Wikis would facilitate the exchange of innovative methods, successful case studies, and research findings, fostering local and global collaboration. Without it, valuable insights remain siloed, hindering the adoption of practices that could conserve water resources and enhance sustainability. The creation of an accessible, comprehensive repository of water conservation strategies is thus critical for addressing the pressing challenge of water scarcity worldwide. Expected Solution: To address the lack of knowledge sharing platforms on water efficiency, creating a dedicated wiki-style database is the key. This platform would host peer-reviewed articles on water-saving techniques, community forums for sharing local knowledge, videos and interactive tools for calculating water usage and savings. Additionally, integrating social media sharing can amplify reach and engagement, while mobile app development ensures accessibility for users in remote areas, contributing significantly to the reduction of water scarcity globally.

Adaption of 'Existing Command Area in Response to Shifting of Agricultural Practices	Background Many existing Dams and Reservoirs are built several decades ago with certain intended purposes. However, due to increasing population, change in extreme climatic conditions, improvement in agricultural practices there is a necessity for re-evaluation of the current infrastructure and water management practices. Description It is likely that existing dams get silted up over time and are unable to store sufficient water. Due to which there will be a shift in the command area or the cropping pattern. It is also a known fact that changing climate issues is also posing a problem, due to which there is need to review the agricultural requirement. The existing dams and reservoirs are increasingly vulnerable to the adverse climate change and shifts in agricultural practices. These changes can lead to structural stress, altered water availability and inefficiencies in water distribution and usage. There is an urgent need to develop and implement new monitoring and water management models to ensure the safety, efficiency, and sustainability of these critical infrastructures. Expected Solution This problem will address the safety and resilience of dams and reservoirs against climate - induced risks, enhance water resources management and optimally support the agricultural needs and environmental sustainability. There will also be a long-term planning of water infrastructure in the face of climate and agricultural changes. This needs work on the Hydrological impact due to changes in the climatic conditions, which in turn effect the water demand in the command area. The changing technology, and adaption of new agricultural practices should be taken into account. It is essential to implement a decision support system along with predictive analysis that provide insights to the water managers and policy makers on real-time data.

Forecasting Future Water Requirements and Assessing Storage Capacities in Reservoirs	Background Water resources are fundamental to sustaining human life, agriculture, industry and ecosystem. Accurate forecasting of future water requirements along with the assessment of current storage capacities are crucial for effective water resources management and planning. With growing population. The domestic, Industrial, Agricultural and ecological demands increase, which in turn leads to strain on existing water Infrastructure. Description Analyzing the storage capabilities of the reservoirs in the country is essential. It is also essential for the policy makers to plan for a sustainable water resource management. The challenge involves in creating a predictive model, that can accurately forecast the future water requirements and evaluate the current and future storage capabilities. The model must integrate various data sources, including historic water usage, climate projections, population growth trends, and agricultural practices. It should also account for variability in climate conditions, demographic shifts and changes in land use. A strategic planning and decision-making support system can to provide clear insights into future water demand and storage needs, by identifying potential risks. Expected Solution It is expected to assess the existing and future storage capabilities, identify the anticipated conditions and impact on the storage capabilities. Identify the potential gaps where additional storage and infrastructure capabilities are needed. It is also required to create a scenario taking into account the extreme weather events and population demands. The Policy makers should have an insight of water management issues for providing sustainable water management. A strategy should be evolved for enhancing water storage capacities, optimizing water usage and mitigating identifying risks.

Developing a Robust Hydraulic Transient Analysis Model for Hydro Power and Pumped Storage Schemes.	Background Hydraulic transients, or water hammer phenomena, occur when there is a sudden change in water flow velocity, causing rapid pressure fluctuations within a hydraulic system. In hydropower and pumped storage schemes, these transients can lead to severe consequences such as pipe bursts, equipment damage, structural failures, and operational inefficiencies. Accurate prediction and management of these transients are essential to maintain the integrity, safety, and efficiency of these systems. Due to certain limitations in the existing models, there is a need for more precise, comprehensive and adaptable models that can simulate complex transient scenarios under varying operational conditions. Description There is a need for developing an advanced hydraulic transient analysis model that can accurately predict and manage the dynamic behavior of water within hydropower and pumped storage systems. This model should provide accurate and reliable results during tripping of units or sudden power failure. Under these conditions, the machine and water conductor system needs to be protected from damages. The time of closure of the guide vanes play an important role in avoiding adverse effects. The delay in closure of guide vanes causes speed rise on the machine and fast closure causes pressure rise issues. The goal is to enhance the resilience and performance of hydropower and pumped storage infrastructures by addressing the causes and consequences of hydraulic transients comprehensively. Expected Solution There is need to develop a sophisticated model that can incorporate computational fluid dynamics (CFD) to simulate the transient behavior of water within the water conductor system. This model should be able to handle complex scenarios such as sudden load changes, emergency shutdowns, start-up and other operational variations. Provide clear visual representations of pressure fluctuations, flow velocities and potential risk areas. This model should be adaptable to different hydropower and pumped storage systems with varying configurations and operational requirements.

Real-time Ganga river water quality forecasting using AI- enabled DSS, satellite data, IoT, and dynamic models.	Background: Namami Gange is a flagship program of the government of India for the rejuvenation of Ganga and its tributaries. NMCG Authority order of Oct 2016 States the the pollution in River Ganga and its tributaries shall also be monitored by use of satellite and other remote sensing technologies. As pupulations increase in the Ganga Basin, there are growing water demands, and hence higher levels of sewage flow into rivers of the Ganga Basin from both rural and urban areas. Excess untreated water entering the Ganga river systems transports high organic and pathogen loads. Their use generates high levels of pollution with significant organic loads, with very high Biochemical Oxygen Demand. This will inevitably lower Dissolved Oxygen (DO) concentrations in rivers, thereby threatening fisheries and biodiversity (maacroinvertebrates). At the same time, the high sewage discharges affect the suitability of the river for bathing due to the higher levels ofpathogens in rivers. With climate change increasing the frequency and intensity of rainfall events, this is becoming a significant problem, threatening the water quality and ecology of Ganga river system. The societal impact of providing forecast data that is easily and openly accessible will change how we see and value our rivers and enable citizens to make better decisions based on better data for our health and the health of the rivers of Ganga Basin. Description: An AI-enabled decision support system may be developed to Integrate data from multiple sources such as satellite data, IOT-based sensor-generated data, intrumental meteorological measurements, in-situ flow, water quality observations, and miltiple hydrological & hydrodynamic models to work together in real-time to generate historical patterns of behaviour and water quality forecasts for Ganga River. Model source code can be seamlessly incorporated into a cloud platform infrastructure. The models may receive daily inputs of current and forecasted precipitation and temperature data that drive real-time observations, may be stored in a time series database and automated workflows continually check observations against forecasts. The

A software application for analysis of DWLR data and raise alarms in respect of anomalous values, faulty DWLRs etc	Central Ground Water Board is in the process of installing Digital Water Level Recorders (DWLRs) across the country. CGWB will be monitoring 14,000 DWLRs by 2026, which will generate high-frequency water level measurements. Each DWLR will record 4 ground water level data per day, generating 1460 measurements per year. Analysing all the 14,000 wells will be an enormous task. Accordingly, a software application is proposed to analyse and flag anomalous data. Input to the application will be high frequency water level data collected through the telemetry systems. The application should be able to identify DWLRs recording no data/abnormal data or DWLRs with low battery level. The application will raise alarms and send messages to the concerned officer and vendors to initiate immediate action.
A software application - Ground Water Level Predictor	Groundwater Level is the cardinal parameter that best describes the health of an Aquifer. Long term groundwater level data acquired through regular monitoring of groundwater levels provide an opportunity to understand the behavior of the aquifers to changing stress regime. Central Ground Water Board periodically monitors ground water levels from nearly 26000 wells. CGWB is also in the process of installing Digital Water Level Recorders (DWLRs) across various parts of Indiaeach capturing and transmitting water level data four times per day. In addition to CGWB there are many other agencies measuring water levels. The software application is expected to analyse groundwater levels and factors impacting groundwater level like rainfall, hydrogeology, landuse, population, surface elevation, natural features, tidal cycles etc. Based on these factors and based on observed water level data, the software application should be able to predict and forecast groundwater levels both in space and time. The application will be accessible to all for predicting groundwater level at any place at any point on time. This will also help in filling data gaps in time-series data.
AI based chatbot for collating and dissemination of information on groundwater.	The Chatbot should be able to answer queries related to - water level scenario, hydrogeological scenario, water quality, available reports for an area. Additionally it should generate a comprehensive report of the AoI on - Ground Water Resource Assessment, Categorization of the area, GW management practices to be adopted, Conditions for obtaining NOC for ground water extraction, guidance on how to obtain NOC, definition of groundwater terms, training opportunities related to ground water etc.

Development of an educational game (web-based and mobile- based) on groundwater conservation and management	Learn while you play is considered the most effecting way of teaching. Internet/mobile based games could be one of the best ways to lure school kids, youth and water enthusiasts to learn the nuances of ground water management. With this backdrop it is proposed to develop an internet/mobile based game that teaches good practices in groundwater conservation in an interactive and fun way. The game should take into account various interventions (artificial recharge, microirrigation, crop diversification) and possible scenarios (drought, surplus rain, contamination etc). The gamer can earn points or coins based on the choices that he (or she) makes. The scores of registered gamers will be stored online and water-smart youths can be identified and certified. The game can be used for training and awareness creation.

Let’s Learn Constitution in a Simpler Manner-Institution Perspective	Objective The objective is to develop an innovative digital solution, termed the "Sansthaein Aur Samvidhan”/Institutions & Constitution," designed to spread constitutional literacy among citizens. This solution may be in a form of a gamified platform/tool which aims to simplify the language of the Constitution of India pertaining from Institutional perspective (three organs of the Constitution i.e Legislature, Executive & Judiciary) in the form of an engaging activity/ game. Parameters to Consider for integration in the Tool: 1. Simplifications of the Articles of the Constitution of India : o Comprises of Chapters of Constitution of India pertaining to Legislature, Executive & Judiciary. (Part V & Part VI) o Develop a comprehensive backend database to map the above mentioned concept of the Constitution in a simpler form. o Accessible and user-friendly design, incorporating multimedia elements and language translation features to promote inclusivity and accessibility. 2. Multiple Format o Solution may be in a diverse format of games (Product coming in the form of Spin a Wheel/Cards games/Board Games/Snake & ladder/Monopoly, etc) o Preference may be given if multiple formats are developed. o All the topics need to be covered comprehensively ,(products can cover topics separately or in combination) Deliverables: • A functional prototype of the gamified platform, demonstrating key features and functionality. • User testing and feedback data, indicating the effectiveness and usability of the platform. • A comprehensive report and presentation on the development process, including design decisions, technical challenges, and ethical considerations. Expected impact: • Increased literacy and awareness among citizens regarding the Constitution of India including children and youth in India and common citizens irrespective of their educational standards enabling them to make informed decisions about their rights and duties.

Developing an AI based interactive Chatbot or virtual assistant for the Department of Justice's Website.	Background: Department of Justice (DoJ) headed by the Secretary is a part of Ministry of Law & Justice, Government of India. Along with the functions of the Department of Justice as per the Allocation of Business (Rules), 1961, implements important schemes for Development of Infrastructure Facilities for Judiciary, setting up of Special Courts for speedy trial and disposal of cases of sensitive nature (Fast Track Special Court for cases of rape and POCSO Act), eCourts Project on computerization of various courts across the country, legal aid to poor and access to justice, financial assistance to National Judicial Academy for providing training to the Judicial Officers of the country. • Description: The above problem statement envisages a Chatbot or virtual assistant be developed to understand the user and allow them to ask questions and get information related to DoJ such as o Know about the various divisions of DoJ, o Number of Judges appointed at Supreme Court, High Courts, District & Subordinate Courts and current vacancies. o Pendency of cases through National Judicial Data Grid (NJDG) o Procedure to pay fine of traffic violation o Live Streaming of Court Cases o Steps for the eFiling and ePay o Know about working Fast track courts o Ways to download eCourts Services Mobile app o Availing Tele Law Services o Know current status of case This chatbot should be able to learn over time to add excellent value to customer interactions and should be capable for handling large data sets if scope expanded. • Expected Solution: An interactive Chatbot or virtual assistant be developed for the Department of Justice website resulting into desired information as per the command.

AI-Driven Research Engine for Commercial Courts	Background: With a view to address the issue of faster resolution of commercial disputes and for fostering a conducive environment for ease of doing business in India, the Commercial Courts Act, 2015 was enacted to provide for setting up of commercial courts. Over the years, various legislative and policy reforms have been undertaken by the Government of India with the active support of the judiciary to strengthen the commercial dispute resolution machinery in the country. However, expediting the resolution of commercial disputes without addressing the broader issue of huge pendency in courts is unlikely to be successful. Accordingly, it is proposed to leverage the use of technology for expediting the process of dispute resolution. ? Description: A solution is invited to develop an AI-Driven Research Engine exclusively for commercial courts thereby easing the legal research process for judges and judicial officers ultimately contributing to faster dispute resolution. o Role: The Research Engine must aggregate and process legal data sources, including case laws, statutory provisions, rules, etc. After aggregation and processing of data, it must extract relevant information, identify key legal principles, precedents, etc. and furnish results. o Customization: The Research Engine must provide results in a customized manner i.e. as per the needs and demands of each commercial suit. o Use of Predictive Analytics: The Research Engine must be capable of forecasting case outcomes based on historical trends and patterns. o Data Localization: The Research Engine must ensure that the results meet the diverse requirements of different High Courts of the country and that adequate emphasis is laid on local laws, rules and procedures. o Feasibility: The solution must be technically feasible as per the requirements of the Indian Judicial System. o Reliability: The Research Engine must ensure that the results are relevant and reliable. o User-Friendly: The Research Engine must be user-friendly. o Multilingual: The Research Engine must ensure that it supports multiple languages. o Ethical Concerns: Giving primacy to ethical concerns surrounding the use of

Bail Reckoner	Objective The objective is to develop an innovative digital solution, termed the "Bail Reckoner," designed to assist undertrial prisoners, legal aid providers, and judicial authorities in streamlining the bail process. The Bail Reckoner aims to simplify and expedite the bail application and evaluation process by considering various legal and procedural parameters. Parameters to Consider for integration in the Tool: 1. Nature of the Offense and Penal Provisions: o Seek the inputs for the charges framed (can be multiple charges, and if they are compoundable etc). In this regard Statutes like Indian Penal Code,1860 and the upcoming Bhartiya Nyaya Sanhita 2023; Bhartiya Suraksha Sanhita 2023; and Bhartiya Saakshya Adhiniyam 2023; should be covered. Special statutes on the following under-mentioned areas should also be covered: 1. Cyber Crimes 2. Crimes Against SCs and STs: 3. Crimes Against Women 4. Crimes Against Children 5. Offences Against the State 6. Economic Offence 7. Crimes Against Foreigners a. Develop a comprehensive backend database to map penalties with sections of various Acts/Laws. b. Link and provide detailed information on the nature of offenses and corresponding legal provisions. 2. Duration of Imprisonment Already Served: a. Track the duration of imprisonment undertrial prisoner has served. b. Highlight the eligibility timeline for bail based on the time already served. 3. Considerations of Judge's Discretion: a. Evaluate the risk of the undertrial prisoner escaping the judicial process, such as leaving the country. b. Assess the potential influence the prisoner may have on evidence or witnesses. 4. Procedural Pre-requisites: a. Outline requirements such as surety bonds, personal bonds, fines (if applicable), and identity verification. b. Ensure compliance with procedural aspects under IPC/CrPC. 5. Judicial Pronouncements on Bail Eligibility: a. Integrate key judicial pronouncements regarding bail eligibility. b. Automatically identify undertrial prisoners who are eligible for bail if they have served half the term during the undertrial stage, based on the prescribed sentence for their charges. Solution Requirements . The Bail

Let’s Learn Constitution in a Simpler Manner-Citizen Perspective	Objective The objective is to develop an innovative digital solution, termed the "Nagrik Aur Samvidhan”/Citizen & Constitution," designed to spread constitutional literacy among citizens. This solution may be in a form of a gamified platform/tool which aims to simplify the language of the Constitution of India pertaining to a Common Man in the form of an engaging activity/ game. Parameters to Consider for integration in the Tool: 1. Simplifications of the Articles of the Constitution of India : o Comprises of Preamble, Fundamental Rights (Part III), Directive Principles of State Policy (Part IV) & Fundamental Duties(Part IV A). o Develop a comprehensive backend database to map the above mentioned concept of the Constitution in a simpler form. o Accessible and user-friendly design, incorporating multimedia elements and language translation features to promote inclusivity and accessibility. 2. Multiple Format o Solution may be in a diverse format of games (Product coming in the form of Spin a Wheel/Cards games/Board Games/Snake & ladder/Monopoly, etc) o Preference may be given if multiple formats are developed. o All the topics need to be covered comprehensively ,(products can cover topics separately or in combination) Deliverables: • A functional prototype of the gamified platform, demonstrating key features and functionality. • User testing and feedback data, indicating the effectiveness and usability of the platform. • A comprehensive report and presentation on the development process, including design decisions, technical challenges, and ethical considerations. Expected impact: • Increased literacy and awareness among citizens regarding the Constitution of India including children and youth (level of minimum 8th Std) in India and common citizens irrespective of their educational standards enabling them to make informed decisions about their rights and duties.

Gamification for Rural Planning using Drone land survey maps and GIS data.	Background 1. Article 243G of the Constitution of India acknowledges Panchayats as institutions of local self-government and mandates them to prepare plans for economic development and social justice. As local government, Gram Panchayats (GPs) are responsible for delivery of basic services to local citizens and address the vulnerabilities of poor and marginalized ones. This can only be achieved through implementation of well thought out plans through efficient and responsible utilization of available resources. 2. An efficient and robust planning process as part of GP's core functioning becomes necessary. GP development plan should ideally match people's needs and priorities with the available resources. It should be prepared through a fair, inclusive, transparent, and participatory process. The focus should be on local development issues, local perception of need and priority, local analysis of problems and solutions, and local resources management all within a collective local vision. 3. Gram Panchayat Development Plans (GPDP) to be prepared for effective implementation of flagship schemes/ programmes on subjects of National importance. The formulation process of Panchayat Development Plans (PDP) must be comprehensive and based on participatory process, which inter alia involves the full convergence of the schemes of Central and State Governments related to 29 subjects listed in the Eleventh Schedule of the Constitution. 4. A need was felt to take forward the Sustainable Development Goals (SDGs) up to the last mile, i.e., up to the GP level, leveraging a wide network and strong institutional mechanism of third tier of Government including Traditional Bodies of non-part IX areas. Accordingly, the Ministry has adopted a thematic approach aggregating 17 SDGs into 9 broad themes for Localization of Sustainable Development Goals (LSDGs) at grassroot level through Panchayats adopting 'Whole of Government and Whole of Society Approach' and the PDPs will be prepared adopting thematic approach to achieve localization for SDGs in rural India. 29 Subjects defined in the Eleventh Schedule 1. Agriculture 2. Poverty all eviation

Development and Optimization of Al model for Feature identification/ Extraction from drone orthophotos.	Background 1. The Hon'ble Prime Minister launched the SVAMITVA Scheme on the National Panchayati Raj Day, 24th April 2020 with a resolve to enable the economic progress of Rural India by providing "Record of Rights" to every rural household owner. The scheme aims to demarcate inhabited (Abadi) land in rural areas through the latest surveying drone technology, Continuous Operating Reference System (CORS), and Geographic Information System (GIS) technology. The scheme covers multifarious aspects viz. facilitating monetization of properties and enabling bank loan; reducing property-related disputes; comprehensive village-level planning 2. With the use latest drone technology and CORS technology for the Abadi land survey, the high resolution and accurate image base maps of 50 cm have facilitated creation of the most durable record of property holdings in these areas with no legacy revenue records. Such accurate image-based maps provide a clear demarcation of land holdings in a very short frame of time compared to on ground physical measurement and mapping of the land parcels. Description i. Develop an AI model capable of identifying key features in orthophotos with high precision: Use of AI/ML techniques for extraction of the following features from SVAMITVA Drone Imagery using a cloud-based solution: - a. Building footprint extraction (built-up area from the drone image and classified roof-top based on observation on the imagery as RCC, Tiled, Tin, and Others. These built up area can be used for various service such as solar energy calculation, property tax calculation, etc.) b. Road feature extraction c. Waterbodies extraction, etc ii. Achieve a target accuracy of 95% in feature identification. iii. Optimize the model for efficient processing and deployment. The broad scope of work includes:- i. Data Preparation: Utilize the SVAMITVA Scheme drone-labeled datasets for 10 villages to train and validate the AI model. ii. Model Development: Employ Convolutional Neural Networks (CNNs) or other suitable AI/ML models for image segmentation and feature identification. iii. Model Training: Efficient training of the model

Intelligent Enterprise Assistant: Enhancing Organizational Efficiency through AI-driven Chatbot Integration	Description: Develop a chatbot using deep learning and natural language processing techniques to accurately understand and respond to queries from employees of a large public sector organization. The chatbot should be capable of handling diverse questions related to HR policies, IT support, company events, and other organizational matters. (Hackathon students/teams to use publicly available sample information for HR Policy, IT Support, etc. available on internet.) Develop document processing capabilities for the chatbot to analyse and extract information from documents uploaded by employees. This includes summarizing a document or extracting text (keyword information) from documents relevant to organizational needs. (Hackathon students/teams can use any 8 to 10 page document for demonstration). Ensure the chatbot architecture is scalable to handle minimum 5 users parallelly. This includes optimizing response time (Response Time should not exceed 5 seconds for any query unless there is a technical issue like connectivity, etc.) Enable 2FA (2 Factor Authentication – email id type) in the chatbot for enhancing the security level of the chatbot. Chatbot should filter bad language as per system-maintained dictionary. Youtube Link/Video Link (3 Minute video explaining the Problem Statement): https://youtu.be/Q3pP7mRk5Qk NOTE: GAIL (INDIA) LTD will not provide any hardware, software, license, data or any other resource to SIH hackathon Teams. The teams should use free and/or open-source resources, as applicable, for the entire project.

Development of a Geolocation-Based Attendance Tracking Mobile Application.	Description: A mobile application needs to be developed to streamline and automate the attendance tracking of its employees across multiple office locations. This application will leverage geolocation technology to record employee check-in and check-out times along with geo-location as they enter and leave the office premises. Aim of this App is to enhance operational efficiency, reduce manual attendance tracking errors, and provide a seamless experience for employees to manage their work-related movements. Key Requirements: 1) Geolocation-Based Check-In and Check-Out: Automatically record check-in time and geo-location when an employee enters within a 200-meter radius of his office. Record check-out time when the employee leaves the 200-meter radius. Ensure that each check-in is paired with a corresponding check-out, regardless of the frequency of entries and exits. 2) Manual Location Check-In / Check-Out for Offsite Work: Provide a manual check-in and check-out feature for employees working at locations other than his offices. Automatically suggest relevant locations based on real-time longitude and latitude data, allowing employees to confirm their check-in and check-out at these suggested locations. 3) Calculate the employees total working hours. 4) Data Accuracy and Integrity: Ensure the application maintains accurate and tamper-proof records of all check-in and check-out events. Enable real-time data synchronization and secure storage to prevent data loss and ensure reliability. Youtube Link/Video Link (3 Minute video explaining the Problem Statement): https://youtu.be/bmw8unoxA7U NOTE : GAIL (INDIA) LTD will not provide any hardware, software, license, data or any other resource to SIH hackathon Teams. The teams should use free and/or open-source resources, as applicable, for the entire project.

Tool for secure automatic network topology creation.	BACKGROUND: In a SCADA system, for a pipeline network spanning thousands of kilometres, the network devices (both layer 2 and layer 3) are spread all along the geographical area. With such a large network, it becomes crucial, from both the maintenance and security point of view, to continuously monitor the complete network topology. Automatic topology discovery provides a complete and up-to-date map of all devices, connections, and pathways within the SCADA network. This comprehensive overview is essential for network administrators to understand the network's structure and dynamics. It ensures that any changes in the network, such as new devices being added or existing ones being removed, are automatically detected and documented in real time. When issues arise, knowing the exact layout and connections within the network helps in pinpointing problems more quickly, reducing downtime and improving response times. More significantly, automatic topology discovery helps in identifying unauthorized devices or unexpected changes in the network, which could indicate security breaches or cyber-attacks and allows for better network segmentation and implementation of access controls, limiting the spread of potential threats and protecting critical assets. Conventionally, automatic topology discovery tools utilize Cisco Discovery Protocol (CDP) or Link Layer Discovery Protocol (LLDP). However, these protocols are vulnerable due to lack of authentication, broadcast of sensitive information, etc. and hence are not suitable for use in a critical pipeline SCADA network. Problem Statement Details: “Develop a tool for automatic network topology discovery, for a network using EIGRP routing protocol, that does not rely on CDP or LLDP protocols. The tool may use secure SNMPv3 polls/traps, ARP/MAC tables, NetFlow, routing protocol or syslog data for creating the automatic network topology. The challenge is accurate device identification without relying on the broadcast capabilities of CDP/LLDP and determining the physical and logical connections between devices. It must have a provision to keep the topology map

Comprehensive Automated Document Verification System for Official Documentation	Background: The current manual process of verifying documents for various official purposes is time-consuming, error-prone, and lacks efficiency. This process involves verification of numerous documents such as birth certificates, academic transcripts, identification cards, and experience certificates. There is a pressing need for an online solution that automates and secures the document verification process. Description: This problem statement addresses the urgent requirement for an online platform, empowered by artificial intelligence (AI) and blockchain technology, to automate document verification for all official purposes. The proposed solution aims to establish a user-friendly portal accessible to issuing authorities (e.g., schools, universities, employers), verifying authorities (government offices, banks, legal entities), and individuals. Issuing authorities will generate digital certificates for individuals, including birth certificates, academic transcripts, and experience certificates. These certificates will be securely stored on the blockchain for tamper-proof authenticity. Individuals will have access to the portal to view all documents issued in their name. Expected Solution: Participants are tasked with developing a comprehensive portal that facilitates the generation, verification, and accessibility of essential documents for any official purpose. The platform should utilize Al algorithms to efficiently verify the authenticity of uploaded documents. Verifying authorities will have access to a secure interface to validate submitted documents against predefined criteria. Individuals will be able to access the portal to view all documents issued to their name. The implementation of blockchain technology will ensure the immutability and integrity of the verified certificates. Ultimately, the solution aims to streamline the document verification process, reducing time and resources required for all stakeholders involved in official documentation.

Enhancing Navigation for Railway Station Facilities and Locations	Background: Railway stations are complex environments with numerous facilities and locations such as ticket counters, platforms, restrooms, food courts, and waiting areas. Passengers often face difficulties in navigating these spaces, especially in large or unfamiliar stations. Efficient and user-friendly navigation systems are crucial for improving passenger experience, reducing congestion, and ensuring timely travel connections. Description: The problem involves developing a comprehensive navigation solution for railway stations that assists passengers in locating various facilities and destinations within the station premises. This includes creating detailed maps, providing real-time directions, and integrating features such as accessibility options for individuals with disabilities. The solution should be intuitive, easy to use, and accessible via multiple platforms, including mobile devices and digital kiosks. Key challenges include updating navigation information in real-time, ensuring accuracy, and accommodating the diverse needs of all passengers. Expected Solution: The expected solution is a multi-platform navigation system that provides detailed, real-time directions to all facilities and locations within a railway station. This system should include: A mobile application with 3D interactive maps and step-by-step navigation. Digital kiosks located throughout the station with touch-screen interfaces. Voice-guided navigation for visually impaired passengers. Regular updates to reflect changes in station layout and facility locations. Integration with existing railway apps and services for seamless user experience. The solution should enhance the overall passenger experience by reducing confusion, saving time, and improving accessibility within the station

Enhancing Rail Madad with Al-powered Complaint Management	Background: Rail Madad is a vital platform for passengers to report issues and seek assistance during their train journeys. However, the current process relies heavily on manual complaint registration, leading to delays and inefficiencies. After a grievance is registered on Rail Madad, it is acknowledged with a unique ID, categorized into type of complaints, and assigned to the relevant department. Responsible officials investigate and take corrective actions, updating the system with the status. Categorizing the complaints needs some improvements and can be made to enhance the Rail Madad complaint resolution process using Artificial Intelligence (AI). especially when complainants share photos, videos and audios only. Description: According to the problem statement above, it is imperative that complaints are correctly assigned and classified, and that departmental transitions be seamless. The aforementioned problem necessitates an Al-based solution. Expected Solution: 1. Automated Categorization and Prioritization: Integrate the system with the existing Rail Madad platform to streamline the complaint management process. ? Image and Video Analysis: Use Al-powered image and video recognition to automatically categorize the nature of the complaint (e.g., coach cleanliness, damage, staff behaviour). ? Urgency Detection: Implement Al to assess the severity of the issue from visual content and prioritize complaints that need immediate attention. 2. Enhanced Data Extraction: ? Text Recognition (OCR): Utilize Optical Character Recognition (OCR) to extract textual information from images or videos, such as signage or documents, to gather more contexts about the complaint. ? Metadata Analysis: Extract metadata from images and videos (e.g., timestamp, location) to provide additional information for more accurate and quicker resolution. 3. Automated Response and Routing: ? AI Chatbots: Deploy Al chatbots to provide instant acknowledgment and preliminary responses, collecting additional necessary information from the complainant. ? Smart Routing: Use Al algorithms to route complaints to the most appropriate department or official

Interactive Skills Enhancer (ISE): A Virtual Reality-Based Learning Tool for Children with ASD and ID	Project Concept: Enhanced Education System for specially abled Background: Interpersonal skills are learned and mastered by children when they interact with the world, but for children with Autism Spectrum Disorder (ASD) and Intellectual Disabilities (ID) this is where the challenges lie. As traditional classroom settings cannot cater to their unique learning requirements, prompting a demand for innovative educational tools that enhance learning engagement and effectiveness. The Virtual Reality (VR) technology which is capable of simulating controlled and immersive environments. It supports safe, repeatable, personalized, interactive experiences with children with unique sensory and cognitive profiles. Existing research demonstrates the potential that VR has for enhancing social functioning in ASD. supporting the benefits of computer-assisted technology on learning and the quality of life for children with special development needs. Description: The Interactive Skills Enhancer (ISE)-a virtual reality software designed primarily for children with Autism Spectrum Disorder (ASD) and Intellectual Disabilities (ID) to catalyze their social skills interlaces with their personal growth. This piece of VR kit places the user into a range of virtual, socially realistic scenarios that can be customized, including classroom environments and playground social structures. It includes not just advanced Al for emotion recognition, in-the-moment feedback to steer social behavior appropriately, and opportunity for skills reinforcement. Featuring sensitivity & sensory needs specific attributes - ISE provides a fun, nurturing, & secure space that facilitates children to progressively develop, learn, and refine social cues and interactions in a personalized setting. The monitoring dashboard for parents and educators, can help to follow the progress and individualize the learning experience provided through ISE, making the latter a complete package for boosting the social skills in children with children with Autism Spectrum Disorder (ASD) and Intellectual Disabilities (ID). Expected Outcome: The proposed solution titled Interactive Skills Enhancer (ISE) is a Virtual

Software for Speech Language Therapy Clinical Services	Background: The rehabilitation institutes involved in this activity face high therapy cases load and more number of student therapists with less number of therapy supervisors. Following this system in manual mode impedes providing prompt services. Description: Clinical services with respect to speech language therapy begins with patient allocation to the therapist. The therapist then prepares therapy plan with goals and activities. The respective case supervisor needs to check the therapy plan and provide the inputs for further continuation of regular therapy sessions. At least post ten therapy sessions the therapist writes the progress report of the therapy case. Further, it is evaluated by the supervisor. This Cycle of speech language therapy clinical services in continuous until the therapy case has completely improved or discontinued due to various reasons. The supervisor based on overall handling of therapy sessions gives clinical ratings. Expected Solution: The process needs to become digitized with the use of software where in right from the allocation of cases, therapy related documentation by both therapist and supervisor, clinical evaluation of therapy, feedback and clinical rating can be performed.

AI tool/mobile app for Indian Sign language(ISL) generator from audio-visual content in English/Hindi to ISL content and vice-versa	Background: Indian Sign Language (ISL) is a visual-gestural language used by deaf and hard-of-hearing individuals across India. It encompasses a rich vocabulary of hand movements, facial expressions and body postures to convey messaging. ISL facilitates communication and fosters community among deaf individuals, enabling them to express emotions, share ideas and engage in every day interactions. Description: The need for audio to Indian Sign Language (ISL) conversion arrises from the communication barrier between the deaf community, which primarily uses ISL, and individuals who do not know sign language but communicate through spoken language. This barrier hinder effective communication in various settings, including education, healthcare and various interactions. Without a mean to convert audio into ISL, deaf individual faces challenging in accessing information and participating fully in society. Expected Solution: The expected solution entails developing technology-such as software or devices-capable of accurately converting spoken language to Indian Sign Language (ISL). This technology should use speech recognition, natural level processing, and computer vision to transcribe and interpret audio input, generating corresponding ISL gestures in real-time. It should prioritize accuracy, user-friendliness, and adaptibility to regional variation of ISL, thereby facilitating seamless communication between deaf individual and those who do not know sign language. For example: 1. Development of application by which announcement/ text display in railway platform Display Unit Converted to Indian Sign Language, so that deaf people can see it and understand the announcement. 2. Development of Mobile app through by which using Mobile Camera, normal person can understand sign language used by dead individuals.
Indian Sing Language to Text/Speech translation	Create a solution that translates Indian Sign Language (ISL) into text and speech in real-time, facilitating communication for the deaf and hard-of-hearing community with the hearing world. The application should be capable of recognizing and interpreting a comprehensive library of ISL signs and gestures, and then provide accurate text and speech output in multiple Indian languages.

Indian Version of Nagish App	Develop a mobile application that enables real-time voice-to-text and text-to-voice translation for Indian regional languages, aimed at assisting individuals with hearing and speech impairments to communicate effectively. The app should support multiple Indian languages and dialects, be user-friendly, and have a simple interface for easy navigation. Key Features to Include: Real-time voice-to-text translation for Indian regional languages. Text-to-voice feature to convert typed text into spoken words in the selected Indian language. Support for multiple Indian languages and dialects, with the ability to easily switch between them. An intuitive user interface that is accessible for individuals with hearing and speech impairments. Offline functionality for basic translations without the need for an internet connection. Integration with other communication apps to allow for seamless translation during conversations. Privacy-focused design to ensure user data is secure and not shared without consent. Challenges to Address: Ensuring high accuracy in voice recognition and translation, considering the diverse accents and dialects within Indian languages. Developing a text-to-speech engine that sounds natural and is easy to understand. Creating an interface that is inclusive and easy to use for individuals with varying levels of tech-savviness. Balancing app performance with offline capabilities to ensure it remains functional in areas with poor internet connectivity. This problem statement aligns with the need for inclusive communication tools and leverages technology to bridge the gap for those with hearing and speech impairments. It also presents an opportunity to innovate in the field of language translation and speech recognition technology.

Capturing Non-manual features of Indian Sign Language and converting it into text	Develop an advanced system capable of capturing the nuanced non-manual features (NMFs) of Indian Sign Language (ISL), such as facial expressions, head movements, and body posture, and accurately converting them into written text. This system should enhance the translation of ISL by including these essential components of sign language communication, which provide critical context and meaning beyond manual signs. Key Features to Include: High-precision recognition of NMFs using advanced image processing and machine learning techniques. Real-time conversion of recognized NMFs into contextually appropriate text. A comprehensive database of NMFs associated with ISL, including regional variations. User-friendly interface for both sign language users and those learning ISL. Capability to integrate with existing ISL to text translation systems to provide a more complete translation experience. Offline functionality to ensure accessibility and usability in various environments. Challenges to Address: Creating a recognition system sensitive enough to capture the subtleties of NMFs in ISL. Ensuring the system can operate in diverse lighting and background conditions. Developing an extensive and representative database of NMFs in ISL. Balancing system performance with the need for real-time processing and output. This problem statement addresses the need for a more holistic approach to ISL translation by incorporating NMFs, which are often overlooked in current translation technologies. It presents an opportunity for innovation in the field of sign language recognition and translation, aiming to improve communication accessibility for the deaf and hard-of-hearing community.

Monitoring System for classroom session in skill training programe	Background: In the context of the skill development training program, there is a need to establish a robust automated monitoring system to assess and enhance effectiveness of classroom training so as early detection of below average training institutions can be done. Description: The above problem requires a system capable of analyzing classroom images thus can help identify the types of activites and interactions taking place during training sessions. Undestanding these activites can shed light on the quality and relevance of the training content. A dataset consisting of classroom pictures can be provided for various job roles along with course curriculam, infra requirements etc required for the skill development training programme. Expected Solution: System should be able to analyze the images and flag cases which need enhanced monitoring or cancellation.

Education & Awareness - Effective Use of Technology for Dissemination of Anti-Doping Information	Background: Education and awareness are critical components of the National Anti-Doping Agency's mission to promote clean sport. Despite ongoing efforts, the reach and impact of current educational initiatives remain limited, particularly in remote and rural areas. The rapid advancement of technology presents an opportunity to bridge these gaps and ensure that comprehensive anti-doping education is accessible to all stakeholders in the sporting community. Description: The above problem statement envisages to design and develop innovative technological solutions to effectively disseminate anti-doping information to athletes, coaches, support staff, and the broader sporting community. The solution should utilize modern digital tools and platforms to ensure comprehensive coverage, engagement, and retention of critical anti-doping knowledge. It should cater to diverse linguistic and cultural backgrounds and be accessible across various digital devices. Key Objectives (a) Comprehensive Coverage: Ensure that anti-doping information reaches a wide audience across various sports and regions in India, including remote and underserved areas. (b) Engagement: Create interactive and engaging content that captures and retains the attention of athletes and stakeholders, making learning about anti-doping practices impactful. (c) Retention: Develop methods to ensure that the information is not only received but also retained and applied by the target audience. This includes periodic assessments and interactive elements to reinforce learning. Detailed Requirements (a) Platform Development Create a multilingual mobile application and web portal to disseminate anti-doping information. Ensure the platform is user-friendly, accessible, and compatible with various devices, including smartphones, tablets, and computers. (b) Content Creation Develop engaging multimedia content, including videos, infographics, podcasts, and interactive modules. Include real-life scenarios and case studies to provide practical insights into anti-doping practices. Regularly update the content to reflect the latest anti-doping rules, guidelines, and

Intelligence and Investigations - Enhancing Anti-Doping Efforts	Background: Effective intelligence and investigative capabilities are essential for uncovering and addressing doping violations. Current methods often lack the sophistication needed to keep up with evolving doping strategies. nhancing these capabilities through advanced technologies can significantly improve the National Anti-Doping Agency's ability to detect, investigate, and act upon doping violations. Description: The above problem statement envisages the designing of a comprehensive intelligence and investigation system to enhance NADA's ability to detect, investigate, and act upon doping violations. The solution should integrate multiple data sources and provide robust analytical tools, enabling proactive and reactive measures against doping. Key Objectives (a) Data Integration: Combine data from various sources, including testing results, athlete biological passports, and third-party information, to create a comprehensive database. (b) Advanced Analytics: Utilize advanced analytics and AI to identify patterns and anomalies indicative of doping. (c) Actionable Intelligence: Generate actionable intelligence to guide investigations and enforcement actions, ensuring timely and effective responses to doping violations. Detailed Requirements (a) Centralized Database Develop a secure and scalable database to store and manage data from diverse sources. Ensure the database supports real-time data updates and access controls. (b) Data Sources Integrate data from testing results, athlete biological passports, medical records, and other relevant sources. Include external data sources such as social media, financial transactions, and travel records to provide a holistic view. (c) Analytical Tools Implement AI and machine learning algorithms to analyze data and identify suspicious patterns. Develop predictive models to assess the risk of doping among athletes. Provide visualization tools to help investigators understand and interpret complex data. (d) Investigation Management Create a user-friendly interface for investigators to track and manage cases. Include features for case ocumentation, evidence management, and collaboration among investigators.

Gamification of Anti-Doping Information	Background: Traditional methods of disseminating anti-doping information often fail to engage younger athletes effectively. Gamification, the application of game-design elements and game principles in non-game contexts, can be a powerful tool to make learning about anti-doping rules more engaging and interactive. By incorporating gamification, the National Anti-Doping Agency can enhance its educational initiatives and foster a culture of clean sport among young athletes. Description: The above problem statement envisages the creation of a gamified platform to educate athletes on anti-doping rules and practices. The solution should be engaging, informative, and foster a culture of clean sport among young athletes. It should incorporate game elements such as points, badges, leader boards, and challenges to motivate users to learn and apply anti-doping information. Key Objectives (a) Engagement: Develop engaging and interactive content that motivates athletes to learn about anti-doping, leveraging the appeal of gaming to enhance educational outcomes. (b) Education: Ensure that the gamified content effectively conveys critical anti-doping information, covering rules, prohibited substances, testing procedures, and the importance of clean sport. (c) Behavioural Change: Encourage positive attitudes and behaviours towards clean sport, promoting a sense of responsibility and commitment among young athletes. Detailed Requirements (a) Platform Development Develop a gamified mobile app and web-based platform that is accessible to athletes across different devices. Ensure the platform is user-friendly, visually appealing, and easy to navigate. (b) Game Elements Incorporate points, badges, leader boards, and levels to incentivize participation and learning. Design challenges, quests, and mini-games that teach anti-doping concepts in an engaging way. Include social features that allow users to compete with friends, share achievements, and collaborate on challenges. (c) Educational Content Develop comprehensive educational modules covering various aspects of anti-doping. Use multimedia content, including videos,

Prediction of Aluminium wire rod physical properties through AI, ML or any modern technique for better productivity and quality control.	Background: Auminium wire rod is produced in Wire rod mills of cast house, where an aluminium cast bar of trapezoidal cross section having area 3437 sq. mm is first casted and then further rolled by 15 nos. of stand in series to gradually reduce the cross section to obtain final 9.5 mm diameter rod. Description: The casting parameters that affects the wire rod properties like UTS, Elongation and Conductivity are dependent on chemical composition, casting temp. Cooling water temp. , Casting speed, Cast bar entry temperature at rolling mill, Emulsion temperature and pressure at rolling mill, Emulsion concentration and finally rod quench water pressure. These parameters are dynamic in nature and any deviation on one of the above affects the final rod properties. Expected Solution: Use of AI, ML or any modern technique to analyze those parameters and control them to effectively obtain the final desired parameters of the Wire rod produced.

Platform for Inter-departmental cooperation (at city level) in Indian Cities, for sharing data & resources, unified phasing, planning and implementation of projects.	Background: Multiplicity of authorities and implementing agencies in Indian Urban landscape is one of the biggest challenges for urban governance. Not only does it lead to underutilization of resources available with various departments, execution of multiple projects at same site may also lead to interference and delays due to miscoordination. A digital platform for interdepartmental cooperation can potentially resolve these issues and make inter-departmental cooperation more streamlined. Example- A road developed by one agency, may get damaged due to installation of gas pipelines or utility ducts on road 2 months later. This can be resolved with preemptive collaboration between both implementing agencies. Description: The digital platform can provide solutions for- 1. Exchange of data and resources (technical expertise, machinery, technology etc.), and list of ongoing and upcoming projects between various agencies. 2. Scheduling of tasks, reports, and work distribution between agencies for projects categorized as "Inter-departmental" 3. Identification of projects in different departments which share the project site, and tools for assistance in organizing meetings of various departments, unified project phasing (to reduce costs incurred), planning and execution of projects. 4. Training and capacity building exercises, workshops & seminars. 5. Discussion forum with (Intra department, inter department, and public form sections. Expected Solution- A digital platform for interdepartmental cooperation which allows functions of- a. Registering departments, employees, officers, technical experts etc. with their accounts. b. Sharing data, ongoing projects with location, and inventory of available resources between departments/agencies. c. Creation of tasks, scheduling, reporting and work distribution across departments for inter-departmental and multi-departmental projects. d. Identification, unified phasing, planning, and implementation of projects on same site e. Discussion forum, with different forum sections allowing access to specific groups of users.

Utilization of images for monitoring of progress of construction activities for building construction projects.	Background: The monitoring of physical progress of construction activities requires a technical expert to visit and observe the site. Due to large number of projects in Indian cities, field visits by technical experts for weekly/daily monitoring becomes non-feasible. A machine learning based solution, which can identify the status of construction activities based on images, can allow the ULBs, state agencies, and central agencies to monitor physical progress daily, or even in real time. Description: The problem requires a machine learning based software solution in which images from sites of ongoing building construction projects can be processed, to identify the stage of construction. As the construction activities include multiple components, stages in construction, and interior works; the software can take inputs regarding (number of building in image, type of progress in construction activities to be assessed (foundation, super-structure, facade, interiors, etc.)), to identify the type of algorithms to be used to analyze the images. For different components of construction activities, different machine learning algorithms will need to be developed with training using images from construction site. If the selected category of construction activity and uploaded images have different activities/ components, the software should raise an error and ask for selection of appropriate category. While similar monitoring solutions are required for all types of projects, the current problem statement only includes "building construction projects" to keep scope of problem statement limited and assess the feasibility of similar solutions in future. Expected Solution: A software solution utilizing machine learning algorithm to identify stage of construction/progress of construction activities from uploaded site images. Which should be able to: A. Allow users to upload images and provide information regarding type of activity to be assessed (foundation, super structure, furnishing, interiors, etc.) B. Analyze the images and describe the construction activity and stage of construction. C. Compare status of construction with previous site images and provide data

Utilization of aerial/ drone-based images for monitoring of progress of construction activities for building construction projects	Background: The monitoring of physical progress of construction activities requires a technical expert to visit and observe the site. Due to large number of projects in Indian cities, field visits by technical experts for weekly/daily monitoring becomes non-feasible. A machine learning based solution, which can identify the status of construction activities based on images, can allow the ULBs, stage agencies, and central agencies to monitor physical progress daily, or even in real time. Description: The problem requires a machine learning based software solution in which aerial/drone-based images from sites of ongoing road construction projects can be processed, to identify the stage of construction. As the road construction activities include multiple components and stages in construction; the software can take inputs regarding (type of activity, exact road stretch (from which location to which location) etc.), to identify the type of algorithm to be used to analyze the images. For different components of construction activities, different machine learning algorithms will need to be developed with training using images from road construction site. While similar monitoring solutions are required for all types of projects, the current problem statement only includes "road construction projects", to keep scope of problem statement limited and assess the feasibility of similar solutions in future. Expected Solution: A software solution utilizing machine learning algorithm to identify stage of road construction works or progress of construction activities from uploaded site images, which should be able to: - Allow users to upload images and provide information regarding type of activity to be assessed (installation of utility ducts, macadamization, road construction, installment of pedestrian infrastructure, etc.) -Analyze the images and describe the construction activity, stage of construction, and road lengths for which different components have been completed. -Compare status of road construction with previous site images and provide data regarding progress of work. -Raise error in case of incorrect image/details have been uploaded and ask the user for necessary

Universal Switch Set with Data Encryption and Decryption for Legacy Applications without Cyber Safety Measures	Background: In metro system OEM install the switches and bind these switches with their MAC address mostly so it is difficult to install or upgrade the different switch in network without compromising the cyber security. Retrofitting these systems with modern security protocols can he challenging and costly, particularly for organizations with limited resources or technical expertise. Description: The problem statement aims to develop a universal switch set equipped with data encryption and decryption capabilities that can be seamlessly integrated into various legacy applications lacking cyber safety measures. The switch set will provide a standardized interface for encrypting sensitive data before transmission and decrypting it upon receipt, thereby enhancing the security of legacy systems. The switch set will support industry-standard encryption algorithms and protocols to ensure compatibility with a wide range of legacy applications. It will be designed to be easily configurable and customizable to accommodate different encryption requirements and data formats used by various applications. Furthermore, the switch set will include robust key management features to securely generate. store, and distribute encryption keys to authorized users. This will prevent unauthorized access to encrypted data and ensure the integrity and confidentiality of sensitive information. Expected Solution: The proposed solution will involve the development of a universal switch set with data encryption and decryption capabilities tailored for legacy applications without cyber safety measures. This switch set will consist of modular components, including encryption/decryption engines, key management systems, and integration interfaces. The switch set will seamlessly integrate with existing infrastructure and protocols. requiring minimal configuration and customization. By retrofitting legacy applications with data encryption and decryption capabilities, the proposed solution will enable organizations to safeguard their sensitive information and comply with regulatory requirements without the need for costly system upgrades or replacements

Development of a Paperless Scholarship Disbursement System for PMSSS	Background: The Prime Minister's Special Scholarship Scheme (PMSSS) aims to support the education of students across India. Traditionally, the process of disbursing scholarships involves significant paperwork, including the submission and verification of documents, which can be time-consuming and prone to delays. The SAG Bureau seeks to streamline this process by developing an online mechanism that allows students to submit their documents digitally. This initiative will facilitate quicker verification and disbursement of scholarships without the need for hard copies, promoting efficiency and reducing the environmental impact of paper usage. Description: The proposed system will allow students to upload their required documents through a secure online portal. Upon submission, the documents will be automatically sent to the SAG Bureau for verification. Once verified, the SAG Bureau will forward the approved documents to the Finance Bureau for the release of payments. The system will ensure that the entire process, from document submission to scholarship disbursement, is conducted digitally, eliminating the need for any hard copy submissions. Key features of the system should include: • A user-friendly interface for students to upload and manage their documents. • Secure authentication and verification mechanisms to ensure the authenticity of the submitted documents. • An automated workflow to route the documents from the SAG Bureau to the Finance Bureau after verification. • Real-time tracking and notification system to keep students informed about the status of their submissions and payments. • Compliance with data privacy and security standards to protect the personal information of the students. Expected Solution: The expected solution is a comprehensive, fully digital system for the submission, verification, and disbursement of PMSSS scholarships. The solution should: • Enable students to upload their documents digitally and track their submission status. • Allow the SAG Bureau to verify the uploaded documents without the need for physical copies. • Facilitate the automatic forwarding of verified documents to

AI supported AICTE Approval process portal	Background: The All India Council for Technical Education (AICTE) is the primary body responsible for the accreditation and approval of technical education institutions across India. This process, which includes application submissions, document verification, and detailed evaluations by multiple stakeholders, is currently burdened by inefficiencies. The existing system relies heavily on manual processes and paperwork, leading to delays, administrative overhead, and limited visibility into the approval process. Problem Statement: The AICTE approval process involves numerous steps and interactions among educational institutions, regulatory authorities, and evaluators. There is a need for an innovative AI-supported portal that can modernize and streamline the approval workflow, enhance transparency, and significantly reduce processing times. Description: 1. Automate and Optimize Workflow: Design an AI-driven portal that automates and refines the submission, verification, and evaluation stages, reducing manual intervention and expediting the approval process. 2. Enhance Document Verification:Deploy AI technologies to facilitate automatic verification and validation of documents, ensuring compliance with AICTE standards and improving accuracy. 3. Improve Transparency and Communication: Develop an intuitive interface that offers real-time tracking of application status, deadlines, and feedback, fostering better communication between institutions and evaluators. 4. Efficient Resource Allocation:Utilize AI to forecast and allocate resources effectively, ensuring optimal distribution of workload among evaluators and reducing process bottlenecks. 5. Strengthen Security and Compliance: Integrate advanced AI-based security features to safeguard sensitive information and ensure adherence to data privacy regulations and compliance standards. Scope: Application Processing: Automate the intake and preliminary review of applications to streamline the workflow. Document Verification: Implement AI tools for authenticating and validating documents, checking for completeness and

AI driven Inspection of Institutions	Background: Institutional inspections are crucial for maintaining educational standards and ensuring compliance with regulatory guidelines. Traditional inspection methods are manual, time-consuming, and often lack consistency. There is a need for a more efficient, consistent, and data-driven approach to institutional inspections. Detailed Description: An AI-driven Inspection System for Institutions aims to revolutionize the way inspections are conducted by incorporating AI technologies to enhance accuracy, efficiency, and consistency. This system would leverage AI algorithms to analyze various aspects of an institution, such as infrastructure, faculty qualifications, student performance, and adherence to regulations. The system can utilize image recognition for facility inspections, natural language processing for analyzing reports and documentation, and machine learning for identifying patterns and potential issues. Real-time data collection and analysis would enable inspectors to make informed decisions and provide actionable insights for institutional improvements. Expected Solution: 1. Automated Facility Inspections: Use image recognition to assess infrastructure and facilities. 2. Document Analysis: Employ natural language processing to evaluate reports, qualifications, and compliance documents. 3. Real-time Data Collection: Continuously gather and analyze data from various sources to provide up-to-date insights. 4. Pattern Recognition: Identify trends and potential issues using machine learning algorithms. 5. Actionable Insights: Generate comprehensive reports with suggestions for improvements and compliance adherence

SolarQuest: Innovate to Capture More Sunlight and Boost Energy	As the global shift towards renewable energy intensifies, solar trackers, which adjust solar panels to follow the sun's path, are crucial for maximizing solar energy efficiency. Consequently, it is essential to design controllers for solar trackers that can optimize the angle of incidence between solar panels and sunlight. This tracking of the sun's trajectory can be done accurately by managing at least one mechanical axis (azimuth, elevation, roll). As a preliminary step, a simulation-based control system, using tools such as SimscapeTM MultibodyTM and Simulink®, can be designed with a single-axis control based on location-specific solar paths. The workflow would involve integrating an electrical motor model (developed using tools like SimscapeTM ElectricalTM), designing a PID control system, developing an algorithm for optimal axis positioning, and validating the system through simulation. In the subsequent steps after validation, the motor control system can be deployed on low-cost hardware (e.g., using Simulink® Support Package for Arduino) to demonstrate a prototype of this solar tracking mechanism. References: 1. Pre- Requisite: https://matlabacademy.mathworks.com/details/control-design-onramp-with-simulink/controls?s_eid=PSM_33221 2. Optimizing Solar Array Performance Using MPPT (https://in.mathworks.com/videos/optimizing-solar-array-performance-using-mppt-1657880084126.html?s_tid=srchtitle_site_search_8_solar%20tracker) 3. Pre-Requisite: Power Systems Simulation Onramp - CHAPTER 4 (System Integration) (https://matlabacademy.mathworks.com/details/power-systems-simulation-onramp/orps?s_eid=PSM_33222) 4. Using the Worm and Gear Constraint Block - Solar Tracker (https://in.mathworks.com/help/sm/ug/using-the-worm-and-gear-constraint-block-solar-tracker.html) 5. Program the Device from Simulink | Arduino Light Meter Project, Part 2 (https://in.mathworks.com/videos/arduino-light-meter-project-part-2-program-the-device-from-simulink-106500.html) Require MATLAB® and Simulink® PRODUCT LICENSE for SIH 2024, please send an email to
Enhancement of Permanently Shadowed Regions (PSR) of Lunar Craters Captured by OHRC of Chandrayaan-2	Description: This project aims to enhance (Low Light Image Enhancement) the feeble light reflected from PSR regions of Lunar craters into a better SNR image for interpretations. Challenge: Feeble signal to better signal image generation. Low light image noise removal. Usage: For generating first of its kind PSR image map of lunar poles captured by OHRC of Chandrayaan-2. Users: Landing site selection users and geomorphological application users. Available Solutions (if Yes, reasons for not using them): Specific solution of Chandrayaan-2 needs to be developed. General techniques and algorithms are available. Desired Outcome: Software for generating low light image enhancement.

SAR Image Colorization for Comprehensive Insight using Deep Learning Model (h)	Description: Synthetic Aperture Radar (SAR) imagery is rich in structural and textural information but lacks the intuitive appeal of color, which can provide more comprehensive insights for space borne applications. SAR image colorization using Deep Learning (DL) models offers a transformative approach for enhancing the interpretability of monochromatic SAR image data. The project aims to develop an innovative solution to colorize grayscale SAR images for enhanced interpretation and analysis of feature targets. A novel DL model needs to be designed and trained using pairs of SAR and Optical images, minimizing a loss function that captures the difference between predicted and actual color images. The participants are challenged to create a DL system that can accurately predict and apply colors to SAR images, making surface features more distinguishable and interpretable. Challenge: The challenges require innovative approaches in data pre-processing, DL model design, and evaluation methodologies to develop effective and reliable SAR image colorization solutions. Usage: The goal is to improve the usability of SAR data in applications like geological studies and environmental monitoring by providing more intuitive and informative visual representations. Users: Remote Sensing Image Analysts Available Solutions (if Yes, reasons for not using them): Existing Deep Learning models have been proposed and used but their performance is not satisfactory. Desired Outcome: DL based SAR Image Colorization Software
Downscaling of Satellite based air quality map using AI/ML	Description: Develop an AI/ML (Artificial Intelligence/Machine Learning) model to generate fine spatial resolution air quality map from coarse resolution satellite data. It should utilise existing python-based ML libraries. Developed model need to be validated with unseen independent data. Challenge: To utilise large satellite data having gaps under cloudy conditions To select suitable ML algorithm and ensure optimal fitting of ML model for desired accuracy To validate model output with unseen independent data Usage: To enhance air quality knowledge, Sharpen focus at local level Users: Researchers and government bodies monitoring/working on air quality assessment Available Solutions (if Yes, reasons for not using them): Individual components are available, comprehensive and proven solution does not exist. Desired Outcome: Fine resolution air quality map of NO2

On-device semantic segmentation of WMS services with geospatial data export	Description: Develop a mobile or desktop (qgis plugin) or web application that uses on-device GPU/NPU for interactive semantic segmentation on images loaded using WMS service. Challenge: To ensure the system is user-friendly and accessible, even for non-technical users. To utilize the computational power of GPUs/NPUs to enhance the performance and responsiveness of the system and reduce reliance on server side GPU compute. Usage: Useful for assisting on-screen digitization for various remote sensing applications. Users: WebGIS application developers and the end users of these applications. Available Solutions (if Yes, reasons for not using them): Individual components are available, comprehensive and proven solution does not exist. Desired Outcome: 1. The tool should be compatible with and OGC compatible WMS service. 2. It should provide data export in geospatial format of user selected features (geojson/kml). 3. It should make maximum utilisation of on-device GPUs/NPUs available in modern desktop/mobile devices.
AI based frame interpolation, video generation and display system for WMS services	Description: Develop a system that automatically generates videos using frame interpolation techniques given a WMS service that provides satellite imagery at regular intervals (e.g. every 30 minutes) and a bounding box. The AI based video generator should interpolate frames (for e.g. at every minute between 30 minutes) for smooth visualization of moving objects. This video should be displayed on an interactive browser based map (using openlayers or leaflet). Challenge: Frame interpolation of objects such as clouds which are deformable and even appear disappear between frames. Overlaying videos on web based map visualization libraries is straightforward on commercial libraries such as mapbox. Developing the same functionality for modern open-source webgis libraries will be an added effort. Usage: Can be implemented for visualization on VEDAS/MOSDAC/BHUVAN Users: WebGIS application developers and the end users of these applications. Available Solutions (if Yes, reasons for not using them): Individual components are available, comprehensive and proven solution does not exist. Desired Outcome: The tool should be compatible with and OGC compatible WMS service. Should demonstrate video visualization overlay on an OpenLayers (> version 6) web map. Bonus points for utilisation of on-device GPUs/NPUs available in modern desktop/mobile devices. (not mandatory)

Automatic Modulation Recognition software for DVB -S2X waveforms	Description: DVB -S2X waveforms is have various types of modulation scheme like QPSK, APSK etc. The selection of modulation scheme is based upon channel. A novel AMR based soft algorithm is need to develop to detect the DVB S2X modulation waveform on ground in order to synchronized the ground receiver from satellite Challenge: 1. To develop the algorithm compliant to existing DVB S2X waveform. 2. To ensure the develop algorithm should not complex to implement and not taking much hardware resources. 3. To integrate all DVB S2X waveform together and having a single detection algorithm. Usage: To develop Automatic modulation recognition algorithm of software define radio based upon DVB S2X waveform. Users: All software define radio user who are designing the new SDR based upon DVB S2X waveform will required this algorithm. Available Solutions (if Yes, reasons for not using them): Solution exits but more versatile, less complex and more generic nature algorithms is required, which can accommodate future waveform also Desired Outcome: Develop a tool or proof-of-concept model. The solution should be able to detect and recognize DVB S2X waveform, data rate and other modulation parameter. The model should be scalable to accommodate all current DVB S2X waveform and also able to accommodate future waveform also.

Innovative applications of cloud-optimized geotiffs for INSAT satellite data	Description: Design and development of novel applications of Cloud Optimized GeoTIFFs for Efficient Streaming and On-the-Fly processing of INSAT Satellite Data. Challenge: 1. Data Acquisition and Preprocessing: Acquire Level 1 INSAT satellite data from relevant sources. Pre-process the data to ensure compatibility with the COG format. 2. COG Generation: Develop a pipeline to convert INSAT Level 1 data into Cloud Optimized GeoTIFFs. Ensure the pipeline supports multiple spectral bands and their efficient encoding. 3. Selective Streaming and Partial Download: Implement selective streaming capabilities to allow users to access specific data regions and bands without downloading entire files. Enable partial downloads for efficient data handling and reduced bandwidth usage. 4. On-the-Fly Manipulations: Develop tools for real-time manipulations of multiple spectral bands, including band arithmetic, colour adjustments, and custom visualizations. Integrate these tools into a user-friendly interface for seamless interactions. 5. System Integration and Testing: Integrate the COG generation pipeline and on-the-fly manipulation tools into a cloud-based system. Conduct thorough testing to ensure performance, reliability, and user experience. Usage: To make INSAT Data Cloud compatible Users: Meteorologist Available Solutions (if Yes, reasons for not using them): No (To be verified if existing tools exist) Desired Outcome: a. A fully functional system capable of generating and serving Cloud Optimized GeoTIFFs from INSAT data. b. Tools for real-time manipulation of multiple spectral bands. Enhanced accessibility and usability of INSAT satellite data for various applications

Building Integrated Photo-voltaic (BIPV) potential assessment and visualisation using LOD-1 3D City Model	Description: Building Integrated Photovoltaic (BIPV) systems are the solar power generating products or systems that are seamlessly integrated into the building envelop. The satellite data from Indian Satellites such as Cartosat-2/3 and Cartosat-1 are capable of generating 3D city models up to LoD-1. These LoD1 models, which are derived by extruding a footprint to a uniform height, can be used for simulating building shadows. This project aims to develop an interactive application for assessing BIPV potential using LOD-1 3D city model. It will involve simulating shadow of adjoining buildings on each face of the building and estimating incident solar energy on the vertical face of the building. The application will render the building surface according to available BIPV potential. Challenge: * 3D Visualisation of LOD-1 City Model * Simulating Building Shadows in 3D * 3D Rendering of BIPV Potential on Building Usage: Application of Space-based inputs for Renewable Energy Users: The application will be deployed on VEDAS portal's '3D City Model and Rooftop Solar Potential' application. It will be usefu for Policy-makers (State & Central Government), Solar Energy Solution Providers, Architects and citizens. Available Solutions (if Yes, reasons for not using them): Commercial Architectural Packages like Autodesk are suitable for building-level analysis and require substantial level of details. 3D GIS packages such as ESRI City Engine or Cesium provide visualisation capabilities. Software for city-wide BIPV potential estimation are currently not available in public domain. Desired Outcome: An interactive application where user provides a date (for calculating sun-position) and daily Global Horizontal Irradiation (GHI) value, and the application generates corresponding 3D city model rendered according to incident solar energy for that day. The application also provide total BIPV and rooftop PV energy potential available in the building.

Development of map-matching algorithm using AI-ML techniques to distinguish vehicular movement on highway and service road	Description: Algorithm development using AI-ML techniques to distinguish vehicular movement on highway and service road. Challenge: The algorithm shall be able to distinguish the vehicle movement on highway or service road even if intermittent GNSS position is not available or large bias is observed in GNSS coordinates. Usage: To support the applications such as GNSS-based tolling Users: Vehicles moving on highways Available Solutions (if Yes, reasons for not using them): Not available as a comprehensive solution Desired Outcome: The developed algorithm shall provide the following: 1. Use the coarse GNSS position of the moving vehicle and plot the movement on a map 2. Using map-matching techniques, identify the movement of vehicle on the highway or the service road 3. Apply AI-ML techniques to improvement map-matching performance.
Centralized application-context aware firewall	Description: Develop an application firewall for end-points that can identity and restrict access of application to external network/hosts. The application firewall should provide further granular control of restricting domains, IP addresses and protocols for each application. The firewall should be manageable through a centralized web console where policies for each end-point and application can be centrally deployed. Firewall agent should also be able to monitor network usage behaviour of each application and generate alerts on central dashboard for any traffic anomaly using AI/ML. Challenge: Applying separate firewall policies for each application running on the end-point and managing them through a central web console. Usage: End-point security, network security Users: Cyber security teams Available Solutions (if Yes, reasons for not using them): Individual components are available Desired Outcome: The solution should provide following components: 1. Solution should identify the domains and protocols that any application is trying to access. Further, it should enable allowing of any such network traffic which is not already allowed via centralized console. 2. Context-aware application firewall agent that shall manage firewall policies for each application running on end-point. The agent shall also collect network usage logs of each application and send it to central server. 3. Central web management console that shall be able to manage all end-points and applications 4. Solution should work for Windows end-points. Bonus points for Linux 5. Solution should also detect abnormal network behaviour of applications

Standardizing Odd School Structures to Improve Educational Policy Implementation and Resource Allocation	Background: ODD School Structure refers to schools that do not conform to the standard categories defined by the Ministry of Education under the UDISE+ portal. These standard categories are designed to align with the Samagra Shiksha framework, which aims to ensure uniformity and consistency in the educational structures across the country. Schools falling outside these categories, due to variations in grade configurations, are classified as having ""odd structures."" However, 145,012 schools across the country fall into the ""odd"" school structure category due to variations in grade configurations. These odd structures pose challenges for the uniform implementation of educational policies and schemes, such as Samagra Shiksha. This misalignment is particularly significant in states like Goa, Mizoram, West Bengal, and Kerala, where the majority of schools do not conform to the standard categories. Description: The problem of odd school structures affects the equitable distribution of resources, effective policy implementation, and the overall quality of education. Schools with odd structures are often excluded from the streamlined processes and benefits that come with standardization. The national average of schools with odd structures is 14.28%, but in some states, the percentage is much higher, complicating the delivery of educational initiatives. The objective is to standardize these odd school structures by aligning them with the defined categories under Samagra Shiksha, thereby improving the uniformity and effectiveness of educational policies across the country. Innovative Solutions: A. AI-Driven School Structure Analysis Tool: Develop software that uses AI to analyze school data and automatically classify schools into standard categories or identify them as odd structures. This tool can also suggest optimal restructuring options to align schools with the standard categories. B. Standardization Support Platform: Create a platform that provides guidelines, best practices, and resources for schools to transition from odd to standard structures. The platform could include modules on infrastructure planning, grade

Parsing of Social Media Feeds	During investigation when the social media accounts of accused/suspect are opened for examination or creating Panchnamas, it would be better if some tool is designed which can automatically parse the data and provide the screenshot of the posts, messages, timeline, friend list, following, followers, account info, etc and provide screenshots in a documented form. * The examiner may choose to print the screenshots as per requirements. This will omit any human error during the process and also help to thoroughly reviewing the data found for the said social media account. * Separate options for Facebook, Twitter, Instagram, Telegram, WhatsApp, Google account etc may be provided in the tool. * Many a times, the social media accounts do not open in Desktops even if we have the right credentials and the examiner have to use a dummy android phone. So, two separate versions (Android and windows) of this tool will be helpful.
Creating a cyber triage tool to streamline digital forensic investigation	To design and develop an innovative digital forensics and incident response tool with an intuitive and accessible interface for investigators, that streamlines the process of importing evidence, conducting automated analysis, and generating detailed reports. The tool should feature an interface with clear navigation & real-time data visualization and should support: 1. Automated data collection from RAW images (forensic images) and other formats using disk imaging tools 2. Automate the scanning and analysis of data, including files, system logs, registry entries, network activity etc. 3. Identify indicators of compromise (IOCs) and related suspicious activities 4. Integrate AI/ML algorithms for anomaly detection and pattern recognition. The AI/ML feature should incorporate a scoring system and recommendation engine that allow investigators to quickly focus on the important artifacts. 5. User-friendly review options should include interactive timelines and graphical summaries, while comprehensive reporting capabilities should allow exports in various formats such as PDF, JSON, and CSV.

De-anonymizing of entities on the onion sites operating on TOR Network	Background: Dark web is being used for illegal purposes and number of market places are being operated by the underground operators which facilitate illegal buying/selling of drugs/weapons/data leaks/counterfeit moneys/documents etc. Platforms, being anonymise to the LEA, make it difficult to identify the market place running on dark web mainly TOR Network. Description: Running the illegal sites on dark web network only requires the access of TOR Browser and TORRC file to run the market from local system. For hosting the services, people may utilise the paid or freely available hosting servers. Being on TOR network (V3), it is very difficult to identify the underground operator running the market. Amid running market on TOR network, the underground operator provides the access of his portal though his ISP/VPN services which has been taken from the respective ISP of his country and the VPN service provider. Expected Solution: It is expected that any solution like tool or technique may be developed the underground operator running the market may be identified. The participants may target finding the actual IP/VPN IP being used by the players of the onion sites. The participants may also try to find out other personally identifiable information (PII) regarding the underground operators active on the onion sites.

Improving open source software security using Fuzzing	Background: Fuzzing is an automated process of identifying software vulnerabilities by supplying unexpected and faulty inputs to the software. The main aim of fuzzing is to identify the crucial edge cases where a software might fail. Therefore, fuzzing provides a crucial insight into the stability and security of the software. The process of fuzzing can be divided into following broad steps – 1. Identification of Target Function(s) – Target function(s) are typically those functions that act as entry points for processing input data. They use various APIs to perform operation on the input data. 2. Developing harness – Harnesses are small code stubs whose sole purpose is to invoke the target function by using mutated data inputs. A harness bridges the gap between how the fuzzer generates input and how the target application receives and processes the input. 3. Fuzzing - In this step, a fuzzer is used to generate numerous data inputs which are then passed to the target function using the harness. The fuzzer checks whether the application crashes by processing a certain input. If a crash occurs, then it saves the input and the memory state of the crash to file for later analysis. Description: Fuzzing has proven its effectiveness in discovering thousands of vulnerabilities in file-processing and stateless applications. In fuzzing, and automated testing in general, designing test oracles is crucial. In this challenge the team is supposed to fuzz an open source software namely the Windows variant of Sumatra PDF Reader software (version 3.5.2 or later). Sumatra PDF Reader is a very popular open source and widely used PDF viewing software. In this challenge, teams are required to develop a working harness for fuzzing of the latest version (version 3.5.2 or later) of Windows Sumatra PDF Reader software solution, fuzzed on any fuzzer of their choice. The submission will be evaluated on the following criteria – 1. Target functions identified 2. Live demonstration of fuzzing harness developed 3. Code Coverage achieved 4. Technical report submitted by the team. Expected Solution: Each team must provide a fuzzing harness that is capable of fuzzing the windows software

Improving Android security: Application security for mobile app on Android 14 or higher	Background: It is a requirement for some organizations to add features by modifying an existing android application. The current security scenario requires a secure mobile operating environment and applications, allowing organizations to quickly modify the apps being used and also test their working on the latest versions of Android. Description: A framework for adding new security features in an existing application is a valuable tool in the toolkit of android application developers. The challenge is to add new features and functionalities in the existing android applications for Android 14 or higher. This framework is required for adding layers of security to the app, known only to the user organization and catering to its specific requirements. Expected Solution: Web based framework for adding security layers in given APKs while maintaining their original functionalities is required. Modified APK should be able to function on Android 14 having access to all the system resources which the original APK has. Solutions will be evaluated based on the capabilities like feature addition without application crash, retaining functionality of the original app and quality of implementation of the framework

Creating a Framework for Static Analysis of Vulnerabilities in Android Applications	Background: Android applications are increasingly becoming an integral part of daily life, offering various services and functionalities. However, their widespread use also makes them prime targets for security vulnerabilities. Identifying and mitigating these vulnerabilities during the development phase is crucial for ensuring the security and integrity of these applications. Static analysis provides a method to examine code for vulnerabilities without executing it, allowing developers to catch and fix security issues early. Detailed Description: This report outlines a comprehensive framework for conducting static analysis to detect vulnerabilities in Android applications. The framework covers the following key aspects: 1.Preparation â€¢ Gather Requirements: Define the scope and objectives of the static analysis process. Determine which parts of the application will be analyzed and the specific types of vulnerabilities to look for. â€¢ Select Tools: Choose appropriate static analysis tools tailored for Android development such as MobSF, SonarQube, Android Lint, FindBugs, and PMD. 2. Code Review â€¢ Manual Code Review: Perform a thorough review of the source code to identify obvious security flaws. This step involves examining the code for insecure coding practices, such as hardcoded credentials, improper exception handling, and insecure data storage. â€¢ Automated Static Analysis: Use automated tools to scan the codebase for vulnerabilities. These tools can quickly identify issues such as insecure API usage, improper permissions, and potential injection points. 3. Configuration Analysis â€¢ Manifest File Review: Analyze the AndroidManifest.xml file for insecure configurations, such as exported components that should be private, overly broad permissions, and improper use of intents. â€¢ Build Configuration Review: Examine build.gradle files to ensure secure configurations and identify potential issues related to dependency management and build settings. 4. Dependency Analysis â€¢ Third-Party Libraries: Identify and evaluate third-party libraries for known vulnerabilities. Ensure that all dependencies are up-to-date and

Recovery of Deleted Data and Associated Metadata from XFS and Btrfs Filesystems	Background : Digital evidence has become increasingly crucial in forensic investigations. The recovery of deleted data from storage devices is essential for reconstructing timelines, identifying suspects, and uncovering critical information. Traditional file systems like FAT and NTFS have been extensively studied, and tools for recovering deleted data from them are relatively mature. However, modern file systems like XFS and Btrfs, designed for performance and reliability, employ complex data structures that pose signifycant challenges for data recovery. Forensic investigations often involve recovering various file types, including documents files, log files, and system files. These files contain valuable information about system activities, user behaviour, and potential criminal activities. The ability to recover deleted files along with their complete metadata, such as creation, access, modification, and deletion timestamps, is crucial for establishing timelines and corroborating evidence. Detailed Description :XFS and Btrfs file systems offer advanced features like journaling, copy-on-write, and efficient data allocation. While these features enhance system performance and data integrity, they also complicate the process of recovering deleted data. When a file is deleted in these file systems, the data itself is not immediately erased; instead, the file system marks the allocated blocks as free for reuse. This delayed overwriting of data presents an opportunity for recovery, but it also requires specialized techniques to extract and analyse the deleted data. Moreover, recovering accurate metadata associated with deleted files is equally challenging. Metadata is critical for establishing the context of the recovered data and determining its relevance to the investigation. Extracting metadata from XFS and Btrfs file systems requires a deep understanding of their internal structures and data allocation mechanisms. Expected Solution: An ideal solution would be a comprehensive data recovery technique specifically designed for XFS and Btrfs file systems. These techniques should able to: 1. Efficiently recover deleted data: Develop algorithms and

Creating a Comprehensive Web Application Fuzzer	Background: Web applications are ubiquitous and serve as the backbone for a myriad of online services. However, their complexity and extensive use make them prime targets for cyber-attacks. Hidden directories, virtual hosts, API endpoints, URL parameters, and subdomains can all harbour vulnerabilities that attackers might exploit. Identifying these vulnerabilities through comprehensive fuzzing can significantly enhance the security of web applications. A versatile fuzzer that automates the discovery and testing of these components is essential for proactive security measures. Detailed Description: This documentation outlines the development of a comprehensive web application fuzzer, detailing its functionalities and usage across various web application components: 1. Preparation o Gather Requirements: Define the objectives and scope of the fuzzing process. Identify the web application components to be tested and the types of vulnerabilities to target. o Select Tools: Choose the appropriate fuzzing tools and libraries that support testing of directories, virtual hosts, API endpoints, URL parameters, custom test cases, and subdomains. 2. Directories and Files o Enumeration: Perform a systematic enumeration of directories and files to uncover hidden content. This involves brute-forcing directory names and file extensions to identify unlinked or forgotten resources. o Testing: Test the discovered directories and files for common vulnerabilities such as directory traversal and insecure file uploads. 3. Virtual Hosts (VHosts) o Discovery: Identify virtual hosts configured on the server by fuzzing the Host header with various subdomain values. o Assessment: Evaluate the discovered virtual hosts for configuration issues and vulnerabilities that might arise from improper isolation of web applications. 4. API Endpoints o Identification: Detect API endpoints by analyzing common patterns and URL structures used in the application. o Vulnerability Testing: Test API endpoints for security flaws such as insecure data transmission, improper authentication, and authorization, as well as injection vulnerabilities. 5. Parameters

Dashboard for Swachhta and LiFE. Develop a dashboard aimed at maintaining cleanliness and LiFE practices, integrating AI-powered image processing technology for effective monitoring of Swachhta and green practices adopted in post offices. The dashboard needs to be accessible from the Divisional Office offering surveillance capabilities and triggering alerts for deviation from prescribed Swachhta and Green Growth standards to prompt on ground intervention to guide the post office concerned to make necessary changes to conform to set expectations.	Background: The Department of Posts has implemented Swachhta Abhiyaan in its entire network with intense and focused efforts in the last 10 years. In 2023-24 it has introduced more systematic efforts towards institutionalization of Swachhta Protocols in its entire network and also introduced Lifestyle for Environment Practices through an introductory course on the iGOT portal of GOI and Mission Karmayogi portal of the Department. In the year 2024, the Department has prescribed a Swachhta Action Plan (SAP) 2024 template and provided a toolkit to the field units to adopt fit to local context activities under Swachhta Abhiyaan from the menu of activities prescribed for the entire network to choose from. Through the SAP 2024, the Department aims to institutionalize Swachhta protocols across the network with local ownership and adherence to basic standards. To ensure the outcome the solution to the Problem Statement may be useful for the Department to meet its objectives across the network. In addition to the Swachhta Action Plan and related behaviours and practices, the Department is also committed to adopt Lifestyle for Environment Practices for each of its administrative and operative units. Monitoring system for LiFE with modern and emerging technologies is also welcome to make the Swachhta focused solution above even more useful and powerful for the Department. Description: This is a problem statement seeking monitoring and data analytics solution using modern and emerging Industry 4.0 technologies. While the use of AI and pictorial data based automated monitoring is at the heart of the problem, the team working on this problem can choose any combination of available technologies and tools to devise a simple to use and adopt solution to enable its mass adoption across the post office network. Expected Solution: The expected solution is pictorial data and analytics based on AI. Cameras to capture pictorial data are available in various locations in the DoP and actual or dummy data for the solution will be provided. The geolocation and timestamp on the pictorial data is also to be taken as a fundamental data point to

Measurement and Monitoring of Counter Services "Develop a simple to use application for measurement and monitoring of counter services offered by Post Offices for their customers while providing ease of access to mail, parcel, financial, payment, insurance and citizen centric services from each Post Office. The solution suggested should integrate traditional and modern Industry 4.0 Technology based solution to this fundamental challenge faced by the DoP across its vast network. Integrating AI-powered image processing technology for effective monitoring of smooth, hassle free and efficient counter services based on live feed of customer service areas for a delightful customer experience are expected as a solution. Ease of application of the solution in the practical setting is key to the assessment criteria for this problem. The dashboard needs to be accessible at the Post Office and to its higher offices in the chain upto Divisional and Regional Office".	Background: The Department of Posts has well laid down norm for services to customers in its Citizens' Charter. These service standards include provision of hassle free counter services with defined time norms for all basic transactions. The waiting time for customers in bigger offices is managed with a Dynamic Queue Management System. A system of quick response on the service experience based on manual feedback forms has been in vogue in the Department in the past. The Department has also tried adopting the SMS and link based "Rapid Assessment System" with a proof of concept being provided through the pilot project. CCTV is also installed in various post offices across the country for better monitoring and timely intervention. Even with the progressive adoption of the emerging and available technology based solutions for measuring and improving customer experience, the Department of Posts needs a solution that is easy to implement in a large number of offices. In this context, a comprehensive solution to fill the gap in measurement and analysis about the quality of service at each Post Office in the network is being sought as part of the problem statement here. Description: The problem statement can be understood better by studying the Citizen's Charter of the Department at https://www.indiapost.gov.in/VAS/Pages/AboutUs/CitizenCharter.aspx The list of services being provided at the Post Office Counters are available in this link. The list of offices with CCTV and raw data available will be provided by the Department so that interested teams can work on actual data available to devise the pictorial data based part of the solution. Other available tools for monitoring this aspect of the service may be explored. A simple design for wider adoption by the interested teams would gain more marks. This is a problem statement seeking monitoring and data analytics solution using modern and emerging Industry 4.0 technologies. While the use of AI and pictorial data based automated monitoring is at the heart of the problem, the team working on this problem can choose any combination of

Road Transport Network Telematics Develop a telematics solution to enable efficient trucking operations for the long haul to connect the country through route optimization, live tracking and monitoring, optimal capacity utilization analysis and to enable appropriate response.	Background: The Department of Posts operates 76 national routes under All India Road Transport Network (RTN). Commercial trucks of 5-14 tonnes capacity ply on these routes carrying parcels and mail. There are also state or intra-circle routes operated through a combination of commercial and departmental trucks for carrying parcels and mail. Description: The RTN trucks, operating on various routes, touch intermediate points, where parcels and mail are off-loaded and loaded. The capacity utilization of the trucks fluctuates depending upon the volume of parcels/mail being carried by it [illustration: On the Ahmedabad-Ajmer-Jaipur route, Ahmedabad loads the truck up to 80% capacity for Ajmer. At Ajmer, 20 % of the volume is offloaded, and 30% loaded, bringing total loading to 90% capacity (80-20+30 = 90). Similarly, at Jaipur, 40% volume is offloaded and 50 % loaded, bringing total loading to 100% (90-40+50= 100)]. Real time data is required for optimal utilization of truck capacity and adequate planning. In order to monetize spare capacity, integration with 3PL partners for capacity sharing through API (as described in the previous point) is also required. RTN trucks traverse a fixed route with specific touch points. The trucks may be delayed due to various factors, such as vehicle breakdown, poor traffic conditions, detours, detention at one or more touch points etc. GPS, geofenced locking should be enabled for any detours or delays so that alerts may immediately be triggered for verification and corrective action in time. Live tracking of trucks, with points of delay is required for efficient and timely movement of parcels and mail in the value chain. There should be a system for dispatch and schedule management as per live data automatically populated and analyzed in real time. Any changes or deviations should automatically flow into the system so that schedules, which are downstream, automatically get updated and adjusted to the delay in real time. All data should be captured and populated automatically, and relevant MIS reports generated automatically with visualization where relevant. Expected Solution: As described

A Digital BRSR Platform for India Post Network "The Department of Posts (DoP) in India requires a cutting-edge, digital solution to implement a Business Responsibility & Sustainability Reporting (BRSR) framework. This platform aims to transform DoP into a leader in environmental and social sustainability while fostering transparency and accountability towards stakeholders."	Background: The Department of Posts (DoP) plays a vital role in India's social and economic fabric. Its vast network also has a significant ecological impact. Good intentions and individual efforts for sustainability, LiFE and environment friendly practices are visible throughout the network of India Post. Even with these all pervasive sustainability practices, a standardized reporting framework to measure and improve environmental and social performance and impact is missing across the DoP network. By leveraging digital technologies, the BRSR platform can enable and empower the DoP to become a sustainability role model across all socio geographic communities around each post office. It would also help optimize resource use, minimize negative environmental impact, and help socio-economic development across the country with adequate fit to local context in each geography. Description: This challenge seeks a cutting-edge digital solution to implement a Business Responsibility & Sustainability Reporting (BRSR) framework specifically designed for the muti-dimensional network and the service suite of the DoP which has a huge social and ecologocal impact. This BRSR system should: Capture Data Seamlessly: Integrate with existing DoP infrastructure to collect data on energy consumption, fuel usage, waste generation, water usage, and community engagement initiatives across all India Post establishments and installations. Standardize Reporting: Develop a user-friendly interface for DoP staff, employees and partners to easily report on social and environmental parameters aligned with BRSR guidelines. Generate Actionable Insights: Employ data analytics to generate reports with insights on DoP's sustainability performance, identify areas for improvement, and track progress over time. Promote Transparency and Accountability: Facilitate a platform for the DoP to publicly communicate its BRSR report, fostering transparency and accountability towards stakeholders. Cover reports from a mobile workforce working from diverse locations: DoP's extensive network includes post offices in remote locations with varying levels of

Data Insights and Strategic Unit (DISU) at the Divisional Level for DoP "The Divisional Office as the nerve centre of administration, governance and control over the widespread national postal network requires a robust monitoring, analytics, visualisation and feedback mechanism to take advantage of digitisation and data driven governance."	Background: The Department of Posts (DoP) runs a vast network of over 1.65 lakh post offices to deliver a wide range of services in mail and parcel, payments, financial and banking services and retailing of citizen centric services for ease of access and improving the quality of life around each post office. This vast country wide network is managed through the Divisional Offices which are the fulcrum of all activities in post offices within their jurisdiction. With IT Modernization and digitization of processes across its network, there is a wealth of data to govern the DoP in its current context. However, adequate capacity in this direction at the Divisional level has not been developed and the oversight on the postal units in each division is a combination of inspections, visits and web-based reporting in various priority project areas taken up by the Department during the course of the year (financial inclusion drives, Ghar Ghar Tiranga, Swachhta Abhiyaan etc). As it works towards a mature digital and data driven governance model with the Division as the focal point for continuous oversight over priority parameters of network health and performance, DoP seeks a capable Data Insights and Strategic Unit (DISU) at Divisional and higher levels. This DISU, as recommended by the Government of India for all departments under the Data Governance Quality Index and related initiatives, can leverage data to improve service delivery and achieve strategic goals. A well-designed DISU will empower DoP to become a data-driven organization. This will lead to: · Improve service delivery: Optimize mail delivery routes, predict potential delays, and proactively address customer concerns. · Reduce operational costs: Identify areas for resource optimization and cost reduction through data-driven insights. · Enhance strategic decision-making: Gain data-backed insights into customer behavior and market trends to develop targeted strategies. By scaling up the solution developed for one Division, DoP can establish a DISU in each of its Divisions as well as higher formations at the Regional, Circle and Headquarters level. This is a key building block of the new governance

Bridging the Measurability Gap - A Digital Solution for validated Citizens Charter norms' adherence across public interfaces and customer touchpoints of DoP	Background: The Department of Posts (DoP) prioritizes citizen satisfaction with its "Citizens' Charter" outlining service delivery standards. However, ensuring consistent service quality across a vast network of operative offices remains a challenge. Real-time measurability and transparent communication are crucial for building trust and accountability. This innovative solution can transform DoP's Citizens' Charter monitoring system, leading to: Increased Accountability and Transparency: Enhanced citizen trust through readily available data on service delivery performance. Data-Driven Decision Making: Identifying areas for improvement based on real-time insights. Improved Service Delivery: Proactive measures to address delays and bottlenecks, leading to faster delivery times and higher citizen satisfaction. By fostering a culture of data-driven decision making and citizen engagement, this solution can solidify DoP's commitment to its Citizens' Charter and elevate its service delivery to new heights. Description:The challenge lies in developing a digital platform that streamlines and enhances the measurability of Citizens' Charter compliance in DoP offices. This platform should enable DoP to: Track Service Delivery Standards: Capture data on key performance indicators (KPIs) defined in the Citizens' Charter, such as delivery timelines, customer wait times, and complaint resolution rates. Standardize data collection procedures across all operative offices for accurate and reliable information. Real-time Performance Monitoring: Implement a real-time dashboard accessible to DoP officials and citizens. This dashboard should provide a dynamic view of KPI performance across different regions and offices. Utilize data visualization tools to present complex information in easy-to-understand formats like charts and graphs. Enhanced Transparency and Communication: Allow citizens to track the status of their postal services (e.g., mail delivery, money order processing) using a unique tracking ID through the dashboard. Enable DoP to proactively communicate with citizens regarding any potential delays or service disruptions through the

India Post A Bridge for Indian Diaspora to access things Indian " Building a community of Indian Diaspora for meeting their needs of Indian Products (traditional/ ethnic / handicrafts) through India Post by connecting PIOs with local sellers / MSME / Artisans"	Background: Department of Posts (DoP) covers around 219 countries where a large diaspora of India in different economic capacities exists. PIOs still take/use Indian Products such as Puja Samagri/Traditional Attires/ Handicrafts. Most of them are dependent on e-commerce platform. Through this they cannot be assured of the quality of the products they get and transportation cost may also be very high. Secondly local sellers/small handicrafts artisans who are the actual manufacturers are not able to ship high quality products because of limited resources and information at their disposal. Hence there is a need to connect the Indian Community abroad with the local artisans. Description: In order to overcome this issue an application is required through which one can go to a particular local seller as per their preference and should be able to onboard the seller as well. The following data points may be required to be integrated in the said Application. 1. Global Indian Diaspora Data on the basis of their needs namely – Income/ Financial data, Consumption pattern and buying behavior pattern. 2. There should be Buyer and Seller Registration so that Quality Assurance and standard Transit Cost can be ensured. 3. Product and customer segments identification of target population, this includes utilizing Artificial Intelligence (AI) and Machine Learning (ML) so that specific needs can be assessed like Puja Samagri of Kumartuli, Handicrafts of Santiniketan, Moya of Joynagar (famous sweets), Terracotta Arts of Bishnupur, etc. 4. Special preference should be given on keeping in the mind of Seasonal needs, Traditional Attires for Wedding ceremony, Festival needs as this varies geographically depending upon Special Socio Economic Culture. 5. A range of products which are prepared (by MSME and others) in the different parts of India , which can match the buying needs of global diaspora. So that a global link through Postal Export may be created towards fulfillment of needs. Therefore, it is about bringing the Diaspora close to India and remains emotionally connected to their roots.

AI-Powered Delivery Post Office Identification System " The wide, evolving delivery network of the Post Office makes it difficult for customers to write the correct pin code on the postal items for delivery. The Post Office also merges Pincodes together to mechanise and streamline delivery in the emerging volume and mix of mail handled at different stages, including the point of delivery. An intelligent solution, powered by AI is needed to meet the dynamic design of the supply chain both for customers as well as operators within India Post.	Background: The Department of Post in India boasts the world's largest postal network, with over 165,000 post offices. Through nearly 19,000 pin codes across the country the postal network manages the delivery of postal items across its network. One common issue is the mismatch between the specified Delivery Post Office name and the area PIN code on mail items, leading to delays and customer dissatisfaction.The delivery network design keeps on evolving as Nodal Delivery Centres and Delivery Hubs are introduced to bring in more efficiency in operations. From the perspective of the customer, the challenge is two fold: (a) to know the correct Pin Code, which is itself a challeng; (b) the dynamic nature of operations inside with merged pin codes etc for all or certain categories of mail is also a challenge. Though the customer does not need to bother about (b), the internal system of India Post needs to take care of both issues (a) and (b) for efficient and correct delivery at all times. Description: Postal services are essential for various government, financial, educational, corporate, and public entities, both in urban and rural areas. Despite the widespread use of postal services, inaccurate addressing persists, hampering efficient delivery. Each mail item must clearly indicate the recipient's Delivery Post Office name and area Pin Code. However, inconsistencies in this information often result in misrouted mail, with approximately 5% of articles handled daily at distribution hubs containing incorrect Pin Codes. Even if correct Pincodes are provided as per information available with the customer, there is a mismatch in the internal operations as the constant upgradation of delivery network with Nodal Delivery Centres with merged pincodes etc makes it too dynamic for internal operators to keep pace with the changes. This leads to mistakes, delays and wasteful movement of mail pieces in the system. Expected Solution: An AI-based scanning solution is proposed to identify the correct delivery location for mail items with unclear or mismatched addresses. This system will utilize advanced machine learning algorithms to analyze

DYNAMIC MAIL TRANSMISSION SOLUTION USING BEST CONNECTIVITY ACROSS MODES "Serving a large country like India with the habitations across states, cities, towns, blocks and villages with geographic diversity as well is a complex task. The availability of multiple modes of transport for secure transmission of mail, parcels, cargo and people is a boon. Postal mail with its volume, value and weight profile has unique requirements for efficient and effective transmission to cover all delivery points around the sorting and transmission hubs that have been created over the years. With a focus on dynamic allocation and use of available transport within the structure of mail operations defined by the Department of Posts, we need a system to help choose the best mode across land, rail, air and water for fastest transmission of mail in each local context. "	Background: India Post boasts the world's largest postal network. However, ensuring the timely and accurate transmission of mail remains a significant challenge. Transmission of mails in the Department of Posts is done through its own Mail Motor Service and hired contractual Road Transport Network. Apart from that Postal Mail transmission is also heavily reliant on third party operators, viz., Railways, Flights, Ships, Helicopters etc. Few issues that hamper timely transmission are natural calamities, rescheduling or cancellation of flights / trains / ships / helicopters etc., security detention, Embargo, Road / Rail accidents, blockage etc. Description: Postal services are the backbone on written communication even today. In a country like India, that is heavily dependent on migrant workers and earning members of families living in far off places, parcels / gifts / medicines etc. sent through the postal network too play a vital role.In order to transmit all such mails in a streamlined way, and in a time-bound manner, methodical planning and utilizing all available transport channels in the most effective manner is of utmost importance. Expected Solution: 1. Predicting optimum mode of routing and transmission using the best available connectivity, considering real-time data and availability of space. 2. Mode of transmission that will be interactive with the transport agency. 3. The solution should also have interface for monitoring mail transmission, suggesting alternative routes, self-learn from previous situations to identify the fastest mode of transmission utilizing all available channels. 4. Alerts to the customer (both sender and addressee) may be sent conveying information about any changes/delay in normal transmission caused by any beyond-control situations.

AI based identification of Financial (Banking & Insurance) needs based on demography and economic / farming Cycle "While the Post Office Network serves everyone, everywhere, on all days, the need for various services including financial and insurance services has a seasonal variation to it. There is a need to time communication and support to customers at times they require it most based on their daily routines. A robust system to segment, target and focus on each customer based on their needs from time to time is needed for India Post to direct its service force to make efforts in response to such needs."	Background: The Department of Posts has implemented various Post Office Savings Bank (POSB) Schemes in All over India uniformly. However, each socio-geographic formation at the state, district, block and village level has its own demographic realities that require a customised thrust for making the relevant financial and insurance services available to the served population around each post office. For example, in West Bengal, there are some villages where percentage of females are higher where if Melas for Sukanya Samriddhi Accounts (SSA) and Mahila Samriddhi Samman Patras (MSSC) can be arranged, the effectiveness of the sales effort and the conversion rate will be higher. Similarly, in some villages the number of senior citizens are higher and higher number of Senior Citizen Social Security (SCSS) accounts can be opened for their benefit to justify presence of post offices in these areas. But there is no such report from where it can be identified, where and when the need of which product is higher. All melas like SSA, MSSC, Postal Life Insurance (PLI) , Rural Postal Life Insurance (RPLI) have been arranged in villages without the knowledge of percentage of male/female/child and senior citizens resulting in moderate to mediocre success for the efforts. Description: The Department of Posts has implemented various POSB Schemes in All over India uniformly. Actual demographic location-wise population is to be identified. In West Bengal, for example, there are some villages where percentage of females are higher, in some villages the number of senior citizens are higher. In some sectors demand young generation and service holders are much higher. The need of the youth and service holders are very different from the demands of other sector of people. Density of farmers and business-oriented people are higher in some areas. All melas like SSA, MSSC, Public Provident Fund (PPF), Recurring Deposits (RD), Time Deposit (TD) PLI, RPLI have been arranged in every city and villages without the knowledge of percentage of male/female/child/senior citizens and other sectors of people and as a result the success of all the melas are found not satisfactory. Expected Solution:

AI based Customized time slot Delivery of Articles/Parcels " To align with the needs of the modern lifestyles of customers and their expected time of availability at the home or office address where an item needs to be delivered, the time slot can be decided in consultation with the customer based on an AI Driven correspondence system as per demand/request of the Sender or Receiver"	Background: Due to fast and hectic lifestyle, in modern era, GenZ often desires to get more customised, time bound doorstep service for their opted products or services. E-commerce organisations like Amazon,Flipkart, financial organisations like ICICI, HDFC etc are providing door step products/services with use of advanced technology like digital platform or machine learning through AI. This creates another level of acceptance across the world among the recipient for the organisation. This is becoming part of basic customer expectation and needs to be included in the Department's common value proposition with the help of a robust system tied to its operational system. Description: India Post as the largest mail delivery organisation in India delivers articles/parcels at the door step of customer. The delivery is one of the key services the Department offers to the citizens of India. Department reaches last mile of delivery through its branches. The delivery process initiates at the booking Post office after receiving mails/articles. After sorting, the concerned Postman of the delivery Post Office has to reach to the recipient for delivering article mostly during the office hours, i.e. in between 10am to 5pm. In many instances, recipient cannot receive the article within that time range of the delivery due to his absence at the delivery address. In that case i) Post man either has to make 2nd attempt or next day delivery which falls within same time range orii) after unsuccessful delivery Postman has to serve intimation for next day delivery or for window delivery at Post Office by the recipient personally. In both cases, wastage of valuable working hours of the Postman happens for sure. Moreover, due to such incident, recipient has to take leave from his/her work as delivery time range/slot gets coincided with his/her working hours for collecting the article. In many cases article gets returned to sender because of non-availability of the addressee within time range of Postman delivery. This creates dissatisfaction on the delivery service among both Sender and Receiver of the article/consignment, thus lowering departmental performance index. Hence

Building a National Web Community of Philatelists "This is to overcome challenges faced by philatelists across India and to design a solution that enhances their experience and fills up gaps in access to information, raising demand and ensuring fulfillment as per interest for each Philatelic item and ancillaries released and made anywhere in the country through a web based community and a National Philately Deposit Account.	Background: One of the primary concerns for philatelists in our country is the limited access to philatelic material released nationwide. Currently, each postal circle releases its own material, catering primarily to philatelists within its respective jurisdiction and immediate reach. Consequently, philatelists from other circles often find it challenging to obtain such material. Additionally, there is a lack of awareness regarding ancillary releases among the philatelic community nationwide. Description: To address these issues, the development of a comprehensive website dedicated to philately, which would serve as a centralized platform for philatelists across India is the prospective solution suggested. This website would facilitate the creation of a National Philately Deposit Account, enabling philatelists to access philatelic material released pan India. Other supporting mechanisms to strengthen the community can also be thought of and integrated to the main solution. Expected Solution: The proposed website would offer the following features: Centralized Platform: The website would display philatelic material released by all postal circles across India, ensuring that philatelists have access to a wide range of items. Online Ordering and Payment: Philatelists would be able to order and pay for philatelic material online through the website, streamlining the purchasing process and eliminating geographical barriers. Standard Postal Services: Postage for ordered items would be charged at the standard rates for Registered/ Speedpost services, ensuring reliable and efficient delivery. Cancellation Releases: Information regarding cancellation releases would be made available on the website, allowing philatelists to obtain cancellations on postal stationery through the website. Rates for such services can be determined accordingly.

Grey Water Management (GWM)- Implementing low cost technical solutions to mitigate water contamination, especially removal of contaminants, before discharge into rivers and lakes.	Background and Description: Effective Grey Water Management is essential to maintain the health of aquatic ecosystems and ensure the safety of water sources. With increasing urbanization and industrial activities, water contamination has become a pressing issue. The need to implement technical solutions that can efficiently remove contaminants, such as heavy metals, chemicals, and microbial pollutants, before water is discharged into rivers and lakes is critical. These solutions should align with the principles of sustainability and be cost-effective, scalable, and adaptable to various environmental conditions. Greywater should be treated at the source to minimize pollution and reduce the burden on natural water bodies. In areas where greywater is managed at a community level or Drain End Point, technologies should be integrated to treat large volumes of water efficiently, ensuring minimal environmental impact. Expected Solutions: Develop and deploy technical solutions that can effectively mitigate water contamination, focusing on the removal of contaminants before the discharge of water into rivers and lakes. These solutions should be robust, easy to maintain, and capable of handling varying levels of contamination.
Grey Water Management (GWM) - Mechanism for treating grey water and black water together in densely populated areas preferably having low land implication.	Background and Description: In densely populated urban areas, the challenge of managing both grey water and black water together becomes more complex due to space constraints and higher volumes of wastewater. A comprehensive mechanism is required that can efficiently treat both types of wastewater with minimal land usage while ensuring public health and environmental safety. The system should be designed to maximize water reuse and minimize waste generation, adhering to the principles of sustainability. This approach could include centralized treatment plants with advanced technologies for water purification, or decentralized systems that integrate grey water and black water treatment at the community or household level. The goal is to develop a solution that not only meets the needs of densely populated regions but also contributes to the overall reduction of water pollution and conservation of water resources. Expected Solutions: Design a mechanism that effectively treats grey water and black water together, especially in densely populated areas with limited land availability. The solution should be innovative, space-efficient, and capable of producing water safe for reuse in various applications, including agriculture, sanitation, and industrial processes.

GOBARdhan - Low-cost kits to measure nutrient content of F/L OM	Background and Description: At the village level, the production and utilization of Fermented/Liquid Organic Manure (F/L OM) face significant challenges, particularly in understanding the nutrient profile of the bio-slurry. This lack of awareness often leads to inefficient application, reduced crop yield, and potential environmental issues due to over or under-application. Accurately measuring the nutrient content of F/L OM is essential for optimizing its use and ensuring sustainable agricultural practices. However, existing solutions are often expensive and complex, making them inaccessible to small farmers. Expected Solution: The development of low-cost, easy-to-use kits that can accurately measure the nutrient content of F/L OM. These kits should be affordable for small farmers and provide reliable data on the levels of nitrogen, phosphorus, potassium, and other essential nutrients. This will enable farmers to make informed decisions about the application of F/L OM, thereby improving soil health, crop yield, and overall sustainability.
GOBARdhan - Low-cost enrichment models for F/L OM (Fermented / Liquied Organic Manure)	Background and Description: Fermented/Liquid Organic Manure (F/L OM) is a valuable resource for improving soil fertility and crop production at the village level. However, the nutrient content of F/L OM can vary widely, often being insufficient to meet the needs of various crops. Enrichment of F/L OM with additional nutrients or through enhanced fermentation processes can significantly improve its efficacy as an organic fertilizer. Despite this potential, current enrichment methods are often too costly or complex for small farmers to implement, limiting their ability to fully benefit from F/L OM. Expected Solution: The creation of low-cost, scalable enrichment models for F/L OM that can be easily adopted by small farmers. These models should focus on enhancing the nutrient content of F/L OM through affordable additives or optimized fermentation techniques. The goal is to produce a more potent and consistent organic fertilizer that can boost crop yields while remaining accessible and practical for village-level production.

Personalized testing kits for testing Bacteriological contamination at delivery points	Background and Description: The Jal Jeevan Mission (JJM) emphasizes not only the provision of safe drinking water but also the assurance of its quality at the household level. Bacteriological contamination, particularly by pathogens such as E. coli and Total coliform, presents significant health hazards, especially in rural areas. Traditional methods of testing for bacteriological contamination are often inaccessible, costly, or require specialized knowledge, making them unsuitable for widespread use in rural communities. The goal of this challenge is to develop a personalized testing kit specifically designed to detect bacteriological contamination in drinking water. This kit should be user-friendly, affordable, and capable of providing accurate results comparable to those obtained through laboratory analysis. The ultimate aim is to empower rural households to independently monitor the bacteriological safety of their drinking water, enabling timely intervention to prevent waterborne diseases. Expected Solutions: i. The device should be portable and sensitive enough to detect even low levels of bacteriological contamination (E. coli & Total coliform) as per BIS 10500: 2012, which mandates that these pathogens should not be detectable in any 100 ml of sample. ii. The detected value should clearly indicate the level of bacterial contamination in a 100 ml water sample, with results displayed in a digital format. iii. The testing kit should be affordable, easy to carry, and user-friendly, requiring minimal training for operation by individuals in rural settings. iv. It should be durable and capable of functioning effectively in the challenging environmental conditions typical of rural India, including extreme temperatures and humidity. v. The kit should provide quick results, allowing households to promptly assess the safety of their drinking water. vi. Calibration of the testing kit should be straightforward, ensuring consistent accuracy over time. vii. The kit should have low operation and maintenance costs, making it sustainable for long-term use. viii. The testing kit must comply with relevant regulatory standards for water quality

Personalized testing kits for testing Residual Silver ion level at delivery points	Background and Description: Under the Jal Jeevan Mission (JJM), ensuring the safety and quality of drinking water is critical. Residual silver ions are often used as a disinfectant, especially in cases where chlorine may not be suitable. However, the concentration of residual silver ions in drinking water must be carefully monitored to avoid potential health risks, as excessive levels can be harmful. Existing methods for testing silver ion levels are often complex, expensive, and inaccessible to rural populations. The objective of this challenge is to develop a personalized testing kit specifically for measuring residual silver ion levels in drinking water. The kit should be affordable, easy to use, and capable of delivering results with accuracy comparable to that of laboratory tests. This will empower rural households to monitor and ensure the safety of their drinking water, preventing potential silver ion overexposure. Expected Solutions: i. The device should be portable and capable of accurately detecting low levels of residual silver ions in drinking water, ensuring compliance with safety standards. ii. The detected value should clearly indicate the concentration of silver ions in a 100 ml water sample, with results displayed in a digital format. iii. The testing kit should be cost-effective, easy to carry, and simple to operate, requiring minimal training for rural users. iv. It should be robust and reliable under the harsh environmental conditions often found in rural India, such as fluctuations in temperature and humidity. v. The kit should deliver quick results, allowing users to promptly assess the safety of their water supply. vi. Calibration of the testing kit should be easy to perform, ensuring accurate and consistent readings over time. vii. The device should have low operational and maintenance costs, making it suitable for long-term use in rural settings. viii. The testing kit must adhere to all relevant regulatory standards for water quality testing in India. ix. It should be powered by lithium or another suitable battery, with a minimum operational time of 24 hours after full charging. x. The device should pose no risk to users or the environment during its operation and disposal.

Live Location Tracking	Description: 1. National Security Guard (NSG) is a Federal Contingency Force, which operates within a Close Quarters Battle (CQB) environment in an urban warfare scenario. NSG operates on modus operandi of Small Team Operations, with the House Intervention Team (HIT) being the smallest combat unit. 2. In any CQB scenario, the NSG Task Force operates down to a HIT level with the Task Force Commander situated at the Integrated Command Post (ICP), with an aim to get real time location of the soldiers and a better tactical picture of the ongoing operations. The HITs mostly operate in built up areas (for example in Hotels, Hospitals, Metro stations, Buildings of National importance, etc) consisting of multiple floors and basements. Every soldier operates with the advanced military gear and radio communication utilized for conveying operational decisions. In such a setup, knowing the exact location of the soldier down to the floor/ basement is of paramount importance. 3. Traditional GPS/ GSM based solutions give the location on a 2D scale with no information regarding the floor at which the soldier is operating. Getting down to the floor level requires the installation of hardware on the floor for tracking the soldiers with the help of RFID or utilization of altimeter, accelerometer carried by the soldier. 4. Live location tracking in urban built up areas for CQB operations, addressing the following problems. (a) Location Tracking of HITs. Live tracking of HITs so that the Commander is able to track HITs operating on multiple floors/ basements. This helps in efficient command and control and thus enabling early success in the operations. (b) 3D Model. NSG keeps a database of 3D models of buildings which are potential targets for terror attacks. The 3D models of the buildings exist in the industry standard format. It is required that the resultant live location of the HITs (obtained through these trackers) be displayed on the pre-existing 3D models of the buildings.

Conversion of 2D Blueprints into 3D Model	Description: 1. National Security Guard (NSG) operates inside buildings, built up areas and other infrastructures like metro stations, schools, etc in case of any terror. Since the operations are of National security significance, better understanding of the target layout is of paramount importance. 3-Dimensional walk through of the buildings helps in the efficient understanding of the target layout and also enables effective briefing of the troops by the Commander for operating inside such targets. 2. Presently, the building authorities provide 2-Dimensional layout of the building in the form of blue prints/ floor plan. Assimilation of the situation and appreciating the potent threat with the help of 2-Dimensional layout turns out to be a challenging task. In such a scenario, a 3-Dimensional walk-through of the building helps significantly in increasing the efficiency of the ground forces while operating. 3. The software which needs to be developed should take the 2-Dimensional blueprint layout as input and also should take various parameters like length, breadth, height of the building, layout of staircase, entry and exit, etc as additional inputs. The software should then export them to a file and create a full fledged 3-Dimensional walkthrough model of the building. The software must also include the facility for integration of exported model to the offline Google maps, Satellite pictures (if any available). 4. Since the target includes buildings which are secretive in nature, the software is required to be operable fully in standalone mode, without any internet connectivity required in future. For the initial installation phase, the system can be connected to the internet to facilitate fetching up of Maps, satellite imagery from open source, etc required for the software functioning. 5. This software would also reduce the time taken during the initial briefing of the troops prior to the launch of any operation. It further increases the efficiency of the operations, thus resulting in early success. 6. The conversion of 2-Dimensional blueprints to 3-Dimensional models must address following problems. (a) Software should take 2-Dimensional blueprint as

Indigenous logistics Drones to enhance operational & logistic capability	Background: ITBP is a border guarding force deployed along Indo China Border which is high altitude mountainous terrain, remote & sparsely populated area. Prevailing sub zero temperature in deployment area coupled with low atmospheric pressure & high wind speed drastically reduces output of human as well as electronic equipment as compared to plains/semi plains areas. Further deployment of ITBP is valley based which is connected through main land by narrow road/track which remain cutoff due to prolonged winter/monsoon season. Thus unique & harsh climatic condition coupled with poor road connectivity in remote mountainous area make it quite impossible to deploy cutting edge equipment which are readily available in the Indian market. In such conditions, logistic sustenance including supply of essential medicine & fresh ration becomes difficult, time consuming and risky, which ultimately affects morale of deployed force personnel and their operational efficiency. Logistic Drone can be useful in the delivery of life saving medicines, essential equipments, fresh ration, small arms and ammunition, important manuals and documents etc. Description: The above Problem Statement envisages, that Logistic Drone be developed to transport 35-40 Kg logistic supplies such as life saving medicines, medical equipments, water, fresh fruits and vegetables and other critical resources to ITBP troops deployed at remote forward area. Logistic Drone with payload capacity of 40 Kg can significantly reduce delivery time and cost in area having poor road infrastructure or which remain cut-off during prolonged winter and monsoon season. Expected solution: A Logistic Drone capable to transport 35-40 Kg payload at high altitude area (9000 ft- 16000 ft) and stable against high wind speed (40-70 Km/Hr.). The flying endurance should be more than 75 minutes and mission range should be more than 20 Kms (one side) with total endurance to fly minimum 40 Km without change of battery, the Logistic Drone can be powered by battery, fuel, solar/combination of any two of these. Operating altitude should be up to 1500

Fake social media accounts and their detection	Background: At present the ITBP guards 3,488 km long India-China borders ranging from the Karakoram Pass in Ladakh to Jachep La in Arunachal Pradesh. Apart from this, the Force also has important roles in many internal security duties and operations against the left wing extremism in the state of Chhattisgarh. Creating fake accounts on Facebook, Instagram or at any other platform and fake account uses, should be identify for account suspension or legal action. To safeguard the organization from the unknown fake account messages over any social sites, a tool may be developed for their identification. Also a central agency should be designated to get the information about the identified fake account holder informed by the developed tools and accordingly, concerned social site organization will approach to delete/suspend the fake account in time bound manner worldwide. Description: How to discover/identify fake profiles on Facebook, Instagram, twitter or other social apps using tools. Also subsequently how to ignored/reported/make to delete of these identified fake accounts by the tools/ through concerned agency in India. Expected solution: 1. Tools for identifications of fake account should be developed for popular social sites. 2. A Central Agency should be designated to get the information about the identified fake account holder info by the developed tools and accordingly, concerned social site organization will approach to delete/suspend the fake accounts in time bound manner worldwide.

Design and develop an AI-powered operational management system to optimize resource utilization, enhance situational awareness and improve decision-making processes.	Background: At present the ITBP guards 3,488 km long India-China borders ranging from the Karakoram Pass in Ladakh to Jachep La in Arunachal Pradesh. Apart from this, the Force also has important roles in many internal security duties and operations against the left wing extremism in the state of Chhattisgarh. Description: 1. The system should leverage advanced AI algorithms to analyze real-time data from various sources, including surveillance cameras, Drones Sensors and satellite imagery to provide actionable insights to ITBP personnel deployed in remote border regions. 2. Key functionalities should include intelligent threat detection, anomaly identification, predictive maintenance for equipment and infrastructure, route optimization for patrols and automated reporting of incidents. 3. The system should be scalable, adaptable to rugged terrain and harsh environmental conditions and seamlessly integrate with existing ITBP command and control systems for enhanced operations effectiveness and border security. Expected solution: 1. Tools of AI should be developed for popular social sites. 2. A Central Agency develop tools on AI-powered operational management system to optimize resource utilization, enhance situational awareness and improve decision-making process

AI-Driven Inclusive Assessment Tools for Skill Ecosystem	Develop an AI-powered quality assessment tool designed to evaluate candidates across the entire skill ecosystem. Assessment includes pen-paper exam, online MCQs and descriptive exams, practical exam and viva voce exam. The tool should cater to the needs of all candidates, including Persons with Disabilities (PWD), and support assessments in online, offline, and blended modes. Background: The skill ecosystem in India encompasses a diverse range of learners candidates in various skilling programs. Ensuring the quality and fairness of assessments across these different levels and systems is a significant challenge. Additionally, there is a need for assessments that are inclusive of Persons with Disabilities (PWD) and adaptable to various modes—online, offline, and blended. An AI-driven assessment tool that can standardize and enhance the quality of evaluations across the entire skill ecosystem is essential to meet these diverse needs. Key Requirements: 1. Holistic Assessment Coverage: The tool should be capable of assessing a wide spectrum of skills and competencies, suitable for candidates at different educational levels—ranging from schools and ITIs to specialized vocational training under SSCs. 2. Inclusivity for PWD Candidates: The tool must be designed with accessibility features, including voice-to-text, text-to-speech, alternative input methods, and customizable assessment formats, ensuring that PWD candidates are assessed fairly and effectively. 3. Multi-Mode Assessment: The tool should support online, offline, and blended assessment modes, offering flexibility to cater to candidates in diverse environments, including remote and underserved areas. 4. AI-Powered Personalization: Leverage AI to provide adaptive assessments that adjust the difficulty level and question types based on the candidate's performance, ensuring that the assessment is tailored to the individual's skill level and learning needs. 5. Real-Time Analytics and Feedback: The tool should include advanced analytics capabilities to provide detailed feedback to candidates and educators, helping to identify strengths and areas for improvement, and guiding further learning and

Innovative Gerontological Care Solutions: Designing the Future of Elderly Care Products	Develop innovative products or solutions that enhance the quality of life for the elderly, addressing their unique physical, emotional, and social needs. The products should be designed with a focus on accessibility, ease of use, safety, and affordability, catering to the growing demand for geriatric care. Background: As the global population ages, the demand for geriatric care products and solutions is rapidly increasing. Elderly individuals often face challenges related to mobility, health management, social isolation, and safety, which can impact their overall quality of life. There is a need for innovative products that address these challenges while being easy to use, affordable, and accessible. This hackathon challenges participants to design and develop geriatric care products that enhance the independence, well-being, and dignity of the elderly. Key Areas to Address: 1. Mobility and Accessibility: Design products that improve mobility for the elderly, such as advanced walking aids, wheelchair innovations, or home modifications that enhance accessibility. 2. Health Monitoring and Management: Create solutions for continuous health monitoring, medication management, or personalized care plans that can be easily used by elderly individuals or their caregivers. 3. Safety and Security: Develop products that enhance the safety and security of elderly individuals, such as fall detection systems, emergency response devices, or home automation solutions tailored to their needs. 4. Social Interaction and Mental Well-being: Design products or platforms that combat social isolation and promote mental well-being, such as virtual companionship tools, community engagement platforms, or cognitive stimulation devices. 5. Affordability and Sustainability: Ensure that the products are affordable for a broad range of elderly users and consider sustainability in design, with durable, eco-friendly materials and energy-efficient solutions. Expected Outcomes • Improved Quality of Life: The products developed through this challenge should significantly enhance the quality of life for elderly individuals, making daily tasks easier, safer, and more comfortable. •

Voice-Controlled Gaming Tools for Enhanced Learning in the Skill Ecosystem	Develop voice-controlled gaming tools that enhance learning and skill development within the skill ecosystem. These tools should be designed to engage learners in an interactive, immersive experience, making it easier to acquire and reinforce skills across various vocational and educational disciplines. Background: The integration of gaming and interactive tools into the learning process has proven to be an effective way to engage learners and enhance skill acquisition. Voice control, as an emerging technology, offers the potential to make these learning experiences even more intuitive, accessible, and engaging. By leveraging voice commands, learners can interact with educational games in a more natural and immersive way, potentially improving retention and mastery of skills. This hackathon challenge invites participants to create voice-controlled gaming tools tailored to the needs of the skill ecosystem, encompassing various vocational disciplines and learning environments. Key Areas to Address: o Vocational Skill Training: Design voice-controlled games that simulate real-world vocational tasks, allowing learners to practice and refine their skills in a safe, controlled environment. These games could cover trades such as carpentry, welding, healthcare, and more. o Interactive Learning Modules: Develop voice-controlled learning modules that guide learners through complex processes, providing instant feedback and adaptive challenges based on their responses. o Accessibility and Inclusivity: Ensure that the games are accessible to all learners, including those with disabilities. Voice control can be a powerful tool for making learning more inclusive, particularly for individuals with mobility impairments or other physical challenges. o Gamified Assessment: Create assessment tools within the games that evaluate the learner's progress and skill proficiency in a fun and engaging way. These assessments could be used to track progress over time or certify competence in specific areas. o Personalized Learning Paths: Implement AI-driven personalization that tailors the game experience to the learner's individual needs, strengths, and learning pace, making the educational

Designing Innovative Products for Empowering the Delivery Workforce	Develop innovative products or solutions that empower the delivery workforce, addressing their unique challenges related to safety, efficiency, health, and work-life balance. The solutions should enhance their productivity, ensure their well-being, and improve the overall experience of delivery workers in the rapidly growing gig economy.Description Background: The delivery workforce is a critical component of the modern economy, especially with the rise of e-commerce and on-demand services. Delivery workers often face challenges such as long working hours, physical strain, safety risks, and the pressure to meet tight deadlines. These challenges can lead to fatigue, stress, and a lack of work-life balance. There is a growing need for innovative products that can empower delivery workers by improving their safety, efficiency, health, and overall job satisfaction. This hackathon challenge invites participants to design solutions that address these challenges and support the well-being and productivity of the delivery workforce. Key Areas to Address: o Safety and Security: Develop products that enhance the safety and security of delivery workers, such as advanced tracking systems, emergency response tools, or wearable devices that monitor health and safety conditions. o Efficiency and Productivity: Create tools or platforms that optimize delivery routes, reduce delivery times, and improve the overall efficiency of the delivery process. This could include AI-driven logistics solutions, real-time traffic analysis, or automated delivery systems. o Health and Wellness: Design products that support the physical and mental health of delivery workers, such as ergonomic gear to reduce strain, fitness trackers, or mental health apps that offer stress management and support. o Work-Life Balance: Develop solutions that help delivery workers manage their schedules more effectively, allowing for better work-life balance. This could include flexible scheduling tools, rest and recharge apps, or community support platforms. o Sustainability: Incorporate sustainable practices into the design of delivery-related products, such as eco-friendly packaging

AI-Enhanced Career Guidance System for Personalized Career Pathways	Develop an AI-powered career guidance system that provides personalized career pathways for students and professionals. The system should consider an individual's aptitude, aspirations, abilities, and work experience to recommend tailored career options and future progression opportunities. Background: Career guidance is a critical component of educational and professional development, yet many individuals struggle to find the right career path that aligns with their skills, interests, and long-term goals. Traditional career counseling methods often lack personalization and may not fully account for an individual's unique profile, including their aptitude, aspirations, abilities, and past experiences. This hackathon challenge invites participants to create an AI-enhanced career guidance system that leverages data to provide personalized, dynamic, and future-oriented career recommendations for students and professionals. Key Areas to Address: o Aptitude Assessment: The system should include AI-driven tools to assess an individual's natural aptitudes and strengths, identifying the areas where they are most likely to succeed and find satisfaction in their work. o Aspirations and Interests: Incorporate methods to capture and analyze the user's career aspirations, interests, and values, ensuring that the recommendations align with their long-term goals and passions. o Ability and Experience Mapping: The system should evaluate the user's current abilities, skills, and experiences, mapping these against potential career paths to identify where they stand and what further development might be needed. o Future Progression and Skill Gaps: Use predictive analytics to identify potential future career progression opportunities based on industry trends and individual growth potential. The system should also highlight any skill gaps and suggest targeted learning opportunities to help users advance. o User-Friendly Interface: Develop an intuitive, user-friendly interface that makes the career guidance process accessible and engaging for users at all levels, from students exploring initial career options to professionals considering a change or advancement.

An online system to automatically verify new title submissions by checking for similarities with existing titles	Background: Press Registrar General of India (PRGI) maintains a database containing approximately 160,000 titles. When a user submits a new title for verification, we need to check its similarity against the existing titles in our database. The goal is to ensure that the new title does not duplicate or closely resemble any existing title to avoid confusion and maintain uniqueness. Additionally, the system must enforce specific guidelines to ensure that certain words are not used, combinations of existing titles are not allowed, and titles with similar meanings or periodicity modifications are rejected. Problem Description Develop a system to automatically verify new title submissions by checking for similarities with existing titles in the database and ensuring compliance with specific guidelines. The system should reject titles that are too similar to existing ones, contain disallowed words, or violate other outlined rules. Additionally, the system should provide a probability score indicating the likelihood of a title being verified. Requirements: 1. Similarity Check: a. Implement a mechanism to check for similar-sounding names using phonetic similarity algorithms (e.g., Soundex, Metaphone). b. Identify titles that have common prefixes or suffixes (e.g., The, India, Samachar, News). c. Ensure that variations in spelling or slight modifications do not bypass the similarity check (e.g., Namaskar vs. Namascar). d. Calculate a similarity percentage for each title comparison. 2. Prefix/Suffix Handling: a. Maintain a list of disallowed prefixes and suffixes. b. Reject any new titles that include these disallowed prefixes or suffixes if they cause the new title to resemble an existing title closely. 3. Guideline Enforcement: a. Maintain a list of disallowed words (e.g., Police, Crime, Corruption, CBI, CID, Army). b. Ensure that titles containing these disallowed words are rejected. c. Prevent the creation of new titles by combining existing ones (e.g., if "Hindu" and "Indian Express" exist, "Hindu Indian Express is not allowed"). d. Check for titles with similar meanings in other languages and reject them (e.g., "Daily Evening" and "Pratidin Sandhya"). e.