SIH2020

List of Hardware Problems

1) **Organization:** GE Healthcare
   Domain Bucket: Healthcare & Biomedical Devices
   Title: Warm patient mattress
   Description: Humans normally maintain a body temperature at 37°C, and maintenance of this relatively high temperature is critical to human survival. Our bodies are designed to tightly control our internal temperature, no matter what the external temperature is. Operating temperature in a CT/MRI/PET exam room is normally between 18deg C to 26 Deg C and kept on an average ~22Deg C. Since room temperature is lower than your body temperature, contact surface of medical device (mattress, pad, support surfaces etc..) quickly absorb the heat from patient's skin, making patient feel cold. This discomfort to patient during medical imaging /Interventional procedures increases the negative patient outcome due to patient shivering & unintended patient motion. Due to this cold temperature, patients may activate "brown" fat at contact surface which contains adrenergic receptors and generates heat by metabolizing glucose. This can show up on scans and potentially hide true "lesions" in PET imaging. Currently hospitals uses blankets to cover or to enfold a great portion of the Patient's body during scan to trap radiant bodily heat and keeping the body warm. Hospitals uses a lot of blankets as each patient requires a new / washed blanket.. busy centers will go through on avg. 10 blankets in a day. Key Constraints: User adjustable temperature Automated temperature control to set temperature " Range 20°C -40°C". Quick response to set temperature within 3 min. Mattress/Pad material:- Radiolucency , MR Compatibility, Biocompatible and Easy to clean. Comfortable foam pad Mattress/pad size: 2mtr length x 0.42 mtr width On/Off switch and Indicator Accurate measurement of temperature of warm mattress/bed (Tolerance +/-1 Deg) Current temperature display of the heating pad/mattress all the time. Fail safe heating mechanism-redundant temperature cut off mechanism Goal : Develop a ~2 meter long warm patient mattress/pad to provide mild warmness to patients during Imaging systems (PET/CT/MRI/Interventional Imaging Systems).

2) **Organization:** Andhra Pradesh Innovation Society, ITE&C Department
   Domain Bucket: Clean Water
   Title: Build an online system for monitoring water quality, leaks, contamination, and managing pipeline network.
   Description: Build an online system for monitoring water quality, leaks, contamination, and managing pipeline network. Design hardware devices to help in the same.

3) **Organization:** Andhra Pradesh Innovation Society, ITE&C Department
Domain Bucket: Clean Water
Title: Cost effective mechanism to treat waste water in small villages
Description: Design and develop Cost effective mechanisms to treat waste water in small villages.

4) **Organization:** Cognizant Technology Solutions India Pvt. Ltd.
Domain Bucket: Security & Surveillance.
Title: Smarter Surveillance System.
Description: Explain the general problem statement in simple terms. i) At present, lot of man hours being spent on physical patrolling of border areas and compound. ii) Fencing wires are not reliable and easy to breach, in large areas it is difficult to be available at all locations, and if someone is breaching in absence of guard, guard will know only when they reach the breach site. Also it takes lot of time to cover the compound walls if the area is large. iii) For smarter India, we need Smarter Surveillance system, which can be developed through Modular design which is easy to assemble at onsite. The users of this system are two-fold: i) Any Security agency who is securing larger area can install on unmanned area and can track through single control room. Technology that can address this issue partially.
i) Module based pre-fabricated rail channels along with towers can be designed which can be customized based on the requirement. System include, railing channel, concrete pre-fabricated base, and surveillance unit which will move on the railing based on the sensors. It can be controlled from control room. Desired Outcome: i) Smarter Surveillance system,
ii) Lesser efforts on surveillance. iii) Lesser breach of security. iv) Lesser casualty on borders. Specific Hardware: Catia v5 license, Electronic Prototyping Components, Programming Boards, Laser Cutter, Hand & Power Tools, Welding Machine, Tube pipes and Wheels, Pipe Bending Machine.

5) **Organization:** Cognizant Technology Solutions India Pvt. Ltd.
Domain Bucket: Miscellaneous
Title: Currently Government Schemes are not being utilized by real beneficiary, and this leads to middle man being taking advantage of situation and also leads to corruption. Self/ Supervised KIOSK based terminal for checking eligibility and also apply for scheme.
Description: Explain the general problem statement in simple terms. i) At present, government announce scheme for different section of society and direct different departments to pass on the scheme benefits to the beneficiaries, but most beneficiaries are not aware of those schemes and middle man take advantage of such gaps. ii) Many website provide such information about schemes but beneficiaries do not go to internet and search for the schemes. They simply rely on the communication from well-wishers or middle man. iii) Today no mechanism is in place to directly provide the benefits to the respective users. iv) Lot of funds came back unutilized. The users of this system are two-fold: i) User who want to avail schemes has to fill certain

details on KIOSK/POS terminal, and they will get all relevant applicable schemes in return. They can then update Aadhar card details which will actually link it to the schemes and government will know directly who want to avail the scheme. ii) Approver can validate the Aadhar card and once approved, benefits can be passed on to the beneficiary without any middle man. Technology that can address this issue partially. i) A multilingual Self operated, or supervised KIOSK preloaded with online application which will be linked to the government site like https://www.india.gov.in/my-government/schemes and can also notify relevant department to approve and give benefits to beneficiary. ii) Basic web base multilingual application can be easily built with minimum efforts. iii) If scheme is related to reimbursement or some monitory help, it will be transferred to bank account directly, or if that is related to some product, it will be sent through logistic to the Aadhar address. Desired Outcome: i) A transparent system and reduced corruption. ii) Wider coverage and easy to avail benefits by user or the actual needy. iii) Government can actually use this data online to track number of beneficiaries. A thought from the recent Issue of Soaring Onion Prices and the need to build a better forecasting mechanism.

6) **Organization:** Cognizant Technology Solutions India Pvt. Ltd
Domain Bucket: Sustainable Environment
Title: Renewable Energy: Innovative ideas that help manage and generate renewable sources more efficiently.
Description: Summary Energy sector has changed over the last 20 years. Renewable energy business is up and running Internet of Things (IoT) plays an important role in these dynamics. Internet of Things economy is expected to gain another 43% by 2022 according to International Energy Agency. As simple as they look, wind turbines are extremely complex constructions often placed in wild conditions—open sea and faraway fields. In order to stay efficient and work at full potential, wind farms should be able to promptly adjust to the changing environment. Not to mention the importance of timely maintenance. IoT and energy solutions—sensor-based technology, analytics for important datum on weather and environment condition and turbine health including blade ejection due to loosening of the bolts. —help automate the management of wind farms, optimize maintenance and thus reduce the cost dramatically. Explain the general problem statement in simple terms. • Maximize the Turbine Power Generation • Un-availability of real time data from wind turbines • Delayed detection of mechanical and structural faults • Delayed order placements of spares/replacements • Reliance on manual inspection of every turbine The users of this system are two-fold: The distribution utility manager wants to monitor all the electrical wind turbine /transformers, so that he can maximize the turbine power generation. He wanted to track the real time health of all parts of turbine including generator, blades etc., live parameters monitored such as wind direction , temperature, current, voltage etc. on a geographical map, so that he can assign a repair crew member to resolve the issue on the open notification. The manager also wants to know the historical information to all the parameters being monitored to analyze the

root cause of the failure and to predict the future outages. He also wants analytical dashboards which helps in the decision making process. However, the manager wants to make his decisions as per the smart data available i.e. live sensor data, historical sensor data, device metadata Technology that can address this issue partially. SAP Leonardo with S/4 Digital Core Since SAP Leonardo site on top of S/4 HANA, it easily integrates with S/4 Digital Core so that it will start reading Wind Turbine real time sensor data at one side and processing business transactions and applications at other. SAP Leonardo enables users to receive instant notifications of any failure events happening at Turbine Tower. When any issue rises such as oil leakage or break down, Leonardo will search for extra available spare part from S/4 Digital Core's Warehouse Management Component. If a spare part exists in the S/4 warehouse, Leonardo will process a PTO (Pick Transfer Order) and assign a work order to nearest technician to a tower using his/her GPS coordinates. A technician will pick up the spare part from warehouse and fix the turbine issue. In case if Leonardo does not find spare part in S/4 Warehouse Component, it will automatically place a Purchase Order to a Vendor and maintain its record in a custom Z table. Once a factory user performs a GR (Goods Receive) for spare part through SAP t-code MIGO, Leonardo will check its existence in custom created Z table & if found, it will automatically create and assign a new work order to a technician. This integrated automation will drastically save time for troubleshooting & maximize the Turbine Power generation Desired Outcome: • Cost efficiency in maintaining and servicing wind turbines • Immediate order placement in case of inventory exhaustion. • To maintain the desired power output from wind farm to grid • Maximize the Turbine Power Generation • Real time insights of mechanical failures in wind turbines • Data Analysis of downtime and its causes • Pattern analysis thereby enabling better forecast.

7) **Organization:** Cognizant Technology Solutions India Pvt. Ltd
Domain Bucket: Smart Communication
Title: Designing devices, which would help in easing communication channels between various communication devices and points.
Description: A truly digital public transportation system for buses, trains and feeder services Explain the general problem statement in simple terms. v) As the population in city grows multifold year on year the commuting times continue to grow. Whether you commute by train (metro/non-metro), bus, smart bike or on feeder services there is no one stop shop for planning your trip using public transport facilities. vi) With raising traffic both road and rail, there is no mechanism to track the arrival / departure times, shift between different modes of transport etc. vii) Today, the user of public transport facility has to shift between two modes of transport on an average (a train and a bus / a bus and a feeder service to the nearby work location). The uncertainty of when these services are available and how crowded it would be makes it hard plan the trip accordingly. viii) From a government point of view, without knowing the demand at various times, it makes it hard for them to increase / decrease these services for full utilization. Hence, it is important to gauge the demand. The users of this system are two-fold: User / Traveler: An end user who uses the public transport services to plan a trip; Government Authorities: Assess and provide the services according to the need

of the users and manage the services based on the demand. Technology that can address this issue iv) A unified system that brings all modes of public transport data into a single source of truth. v) A mobile app and website for end users to plan and book travel across multiple public transport facilities railways, bus, metro and feeder services. vi) GPS sensors on buses, trains, feeder services where feasible and processing capability vii) Payments interface to enable direct payment for the entire trip (that can be scanned for validity at the public transport being used) Technology platform recommendation i) A cloud database with extensible features ii) A distributed database with scalability features iii) Microservice orchestration platform for API integration (Maps, regional data) iv) On cloud UX for creating a native App v) Leverage SMS API gateway vi) Leverage ready apps from Azure or AWS An example comparison of these services: In the UK you can manage all the local commute using the railways using "National Rail" app. This App is a one-stop-shop for users for both trains, London metro tubes, buses etc. An user can plan end to end services using this App. For our idea, some of the key customer journeys envisaged using this are. i) Fetch schedule times of the buses / trains / feeder services individually ii) Book your journey iii) Bar code based identification of tickets purchased iv) Real time tracking of your service (bus / train) and identify the ETA to reach your destination v) Set up alerts for your service vi) Send notifications based on channel of choice (SMS / App notifications) Desired Outcome: iv) User a. Provide a seamless, one-stop, end-to-end experience when planning any trip b. Show all available options to the user from which he can pick which ones he prefers c. No waiting queue at the availed service facility. d. Make bookings/reservations within this service and pay in total the entire amount v) Government a. Promote/boost railways, state bus transport corporations, sub-urban railway, metro b. In the long run, this service can replace state wise bus transport reservation websites with a single website/app leading to huge cost savings c. Additional source of revenue in the form of small commission amounts per transaction d. Provide a major source of data as the service becomes more popular which can help the Govt. to plan for roads/railways/infrastructure development in the future e. Help more transport based entrepreneurs and small businesses to bring their services to the public faster.

8) **Organization:** Cognizant Technology Solutions India Pvt. Ltd.
   Domain Bucket: Robotics & Drones
   Title: There is a need design drones and robots that can solve some of the pressing challenges of India such as handling medical emergencies, search and rescue operations.
   Description: General problem statement in simple terms. i) In a flooding scenario, predict the impact of affected areas and assess the amount of damage ii) Identify most affected people in a flood situation iii) Prioritize rescue operations to the affected people iv) Early warning capability in localized area, to provide early warning to local population through SMS and alerting nearby crews for rescue v) Call out for help feature for users with direct access and location visibility The users of this system are two-fold: General population: An end user who may be effected by the flood scenario; Government Authorities and/or rescue mission crew: Technology that can address this

issue i) A single dashboard that provides simple view of effected areas to crew control centers ii) A predictive AI model that prioritizes threat level displayed on mobile app and early warning sms by collection of the Drone data iii) A mobile app that provides latest information of effected areas and pinpoints effected or to be effected high risk population iv) The mobile app provides live visual streaming of the drone data Technology platform recommendation i) A cloud database with extensible features ii) A distributed database with scalability features iii) Microservice orchestration platform for API integration (Maps, regional data) iv) On cloud UX for creating a native App v) Leverage On cloud AI platform on R or Python for hosting a ML for priority prediction vi) Leverage decision tree model for prediction vii) Leverage SMS API gateway viii) Leverage open platform streaming software for video ix) Use IOT hub services and API library for device API integration x) Leverage ready apps from Azure or AWS Device Integration i) Off the shelve Ultrasonic sensors : Refer ii) Refer ultrasonic sensors for water levels. iii) Simple Drone with single camera for regional mapping iv) Use Bureau of meteorology and river basin forums for data Desired Outcome: i) User 1. Provide a seamless, one-stop, empathy features and things to act for end users 2. Provide a focused incident and threat zone visibility 3. Create a prioritized rescue order feature map for crew on operations 4. Alarm module as dashboard consisting of immediate evacuations area and live video streaming 5. Water rising predictions with 95% accuracy with threat perception from small water bodies – SMS on mobile as early warning ii) Government a. Minimize effected population impacts b. Reduce cost of operations and focus energy where urgent need c. In long run monitor and effectively co-ordinate relief material distribution d. In the long run, this service can other disaster and rescue services e. Crowd sourcing of crews on help and run an integrated disaster control room f. Manage all government agencies army, police, fire rescue, NGO from one place of control so to correctly leverage resources.

9) **Organization:** Mazagon Dock Shipbuilders Ltd.
Domain Bucket: Robotics & Drones
Title: Robotic Arm for inspection, cleaning and painting of tanks on ships to save on time, cost and avoid accidents.
Description: (a) Statement of the Problem. Ships use fuel, oils, sludge, sewage, water and other fluids, which are stored in tanks. When stored in tanks, these fluids tend to stick inside the tanks forming layers of semi-solid substance. Moreover, many impurities of these fluids settle down and stick to the surface of the tanks. It is therefore imperative that the tanks are cleaned on a regular basis on ships. Generally, tanks cleaning on the ship is done during dry dock and whenever the inspection of the tanks is due. Cleaning is done for inspection or if there is any work to be done inside the tanks such as cracks, leaks, etc. Tank cleaning inspection and repairs is a necessary procedure performed on board ships. This process, when carried out by humans, tends to be hazardous, sometimes leading to explosion and accidents. In spite

of all the necessary safety precautions and enclosed space entry procedures, accidents still occur while inspecting, cleaning and repairing tanks on board ships. (b) How it is being Overcome. The problem is, at present, being overcome by ventilating the tanks and use of personnel protective gears. However, the atmosphere in the tanks still remains unsatisfactory and continues to pose health hazards for human beings. The following procedure is followed before making an entry for tank cleaning: - • Fluid Contents of the tank should be removed as practicable as possible and stripped thoroughly before entering. • Ventilate the tank using thorough ventilation or forced ventilation method and make the tank suitable for man entry. • Before making a man entry, the atmosphere of the tank is tested for percentage of oxygen and availability of any toxic gases. This has to be done using remote access if possible, otherwise the person entering the tank for testing atmosphere must wear a breathing apparatus. • Various levels and compartments of tank is tested for the percentage of oxygen and availability of toxic gases. A multi gas analyser is used and a person who is trained and has the knowledge of using such equipment carries out the inspection. Once the tank is found safe for man entry, workers enter the tank and carry out cleaning, inspection, repairs etc. Working within these constrained spaces is hazardous, in spite of all the safety precautions. 4. Why it is Important to Solve. Effective solution of this problem is critical to avoid (a) time delays in inspecting, cleaning and repairing tanks (b) accidents which still occur inside the tanks on board ships. (c) manpower cost. 5. Suggested Solutions. The problem can be resolved by developing a mechanism like a robotic arm with the following attachments: (a) Gas analyser for checking the percentage of oxygen and presence of toxic gases, (b) Camera for inspection of tank and examination of defect. (c) Cleaning Attachment (d) Repair attachments (e) Quality Inspection Equipment The robotic arm should be amenable for reliable operation on a ship and capable of entering the tanks and reaching all areas within. It should have programmable operations like horizontal movement, vertical movement, speed adjustment, single or multistage operation at any desired length and angle range, etc. It should be light enough to carry within the constraints of a ship, with fixing arrangements that match with arrangements on-board ship.

10) **Organization:** Ministry of Health and Family Welfare.
Domain Bucket: Robotics & Drones
Title: Delivery of Essential Medicines by Drones in Hilly areas.
Description: Throughout the developed and developing world, access to life-saving and critical health products is hampered by what is known as the last-mile problem - the inability to deliver needed medicine/blood from a city to rural or remote locations because of inadequate transportation, communication or supply chain infrastructure. To solve this connectivity problem, national drone delivery system needs to be created to carry urgent medicines to patients in need in Hilly and inaccessible areas. Team needs to build a drone that can deliver essential medical products/blood of up to 2.0 kilograms per flight while maintaining the cold chain if needed - in an average fulfillment time of 30 minutes. Also, it should be usable in emergencies, and disaster prone areas.

11) **Organization:** Ministry of Women and Child Development

Domain Bucket: Smart Communication

Title: Network connectivity in remote areas

Description: 1. Rashtriya Mahila Kosh (RMK), established as an autonomous body in 1993 is a national level organization under the aegis of the Ministry of Women and Child Development, for socio-economic empowerment of women. The operating model currently followed by RMK is that of a facilitating agency wherein RMK provides loans to NGO-MFIs termed as Intermediary Organizations (IMOs) which on-lend to Self Help Groups (SHGs) of women. These micro-credit loans are provided to women micro-entrepreneurs in both rural & urban areas, organised in Self-help groups (SHGs) / Joint lender groups (JLGs). . 2. Eligible Intermediary Organizations (IMOs) are Non-Government Organizations (NGOs), Section 8 Companies registered under Companies Act 2013, Urban / Rural Women Co-operative Banks, Co-operative Societies etc. 3. Network connectivity in remote areas – The women beneficiaries (i.e. women micro-entrepreneurs) are not able to access various online services offered by banks, opening of account is delayed, access to email, information of various Government policies / incentives. Solution should also work with 2G mobile network.

12) **Organization:** Dte of IT & Cyber Security, DRDO

Domain Bucket: Security & Surveillance

Title: Soldier Strap

Description: The soldier strap will be given to soldiers and it will have following functionality. 1) GPS location of the soldier. 2) To monitor and record as many as vital body parameters . 3) SoS facility. 4) Sufficient Battery Life. 5) Should support location timeline. Security becomes very important in such straps. Such a strap should transfer information by using a MANET-type communication system. It should access public network only when no node is available in immediate vicinity and only in case of emmergency.

13) **Organization:** Department of Scientific and Industrial Research.

Domain Bucket: Miscellaneous.

Title: Smart Management of Street lights for Energy Conservation.

Description: India has vast length of roads within cities, towns and villages. Also connected to them are the national highways (total length of national highways being about 1.3 million km). Most of the streets are illuminated from evening to morning averaging about 12 hours per day within the habitations. It is well understood that some of the streets may not have vehicles or even pedestrians passing through them throughout the night. In such scenarios there is wastage of electrical energy for illumination of streets. Smart street light management would mean that sensors can sense a movement in an area and switch on the lights before the vehicle or pedestrian passes by and switch it off during no movement thus saving electrical energy.

14) **Organization:** Department of Scientific and Industrial Research.

Domain Bucket: Robotics & Drones.

Title: Landslide monitoring through drones.

Description: The severity and impact of disasters are increasing both in terms of magnitude and frequency causing enormous loss of life, property thus affecting severely GDP and development. The risk of landslide is increasing everyday due to large investments in infrastructure and ever increasing human habitation in moderate to high hazard mountainous region due to strategic as well as socio-economic reasons. Thus landslide hazard mitigation has emerged as one of the top-most priorities of the country.

15) **Organization:** Department of Scientific and Industrial Research
Domain Bucket: Security & Surveillance
Title: Firefighting through high resistance robots
Description: Fire safe infrastructure is an essential part of construction industry. With High rise buildings it becomes more crucial to abate incidents of fire with technological interventions. Design a hardware device that can withstand fire and move inside the place with fire. It should have ability to douse the fire, identify survivors and help them in by dousing fire near them. It can also be a remotely controlled device.

16) **Organization:** Ministry of Micro, Small & Medium Enterprises.
Domain Bucket: Miscellaneous.
Title: Developing Virtual Reality based solutions.
Description: Developing Virtual Reality based solutions in areas like: (i) Creating a virtual showcase/display centre of industrial products – developing solutions for one type of industry like garments, shoe industry etc. (ii) VR solution for emergency rehearsals like fire, flood etc. Provide safety training using Virtual Reality. (iii) Education tools for educating industries in utilization of power by developing virtual reality, augmented reality based solutions. (iv) Developing VR based solution for construction company to show the project plan and interior and exterior look. (v) Virtual reality solution for healthcare sector especially for training the new medical practitioner and Para Medical Staff.

17) **Organization:** Ministry of Micro, Small & Medium Enterprises
Domain Bucket: Software - Web App development
Title: IOT based sensors can be used to determine the Machine Runtime.
Description: IOT based sensors can be used to determine the Machine Run time, idle time and utilisation and projecting the same data in a dashboard to give status, power consumption and real time machine utilisation. Developing such solutions for MSMEs like (i) IOT for acoustic leak detection, to be installed in hazardous and high flammable zones. (ii) Developing IOT based smart agriculture to manage, improve productivity, efficiency of small farms. Various parameters of soil type/ health, climatic conditions, irrigation management should be measured with simple devises placed in the farm, data stored in the cloud to be accessed by the user at any time and make changes in the irrigation according to the plant needs to maximize water usage, improve productivity, reduction in labour etc. (iii) To monitor and reduce water consumption during various processes (iv) To find out major causes of machine

breakdown (v) To give preventive maintenance updates in real time(e.g. when is motor heating too much, bearing vibration is high etc.)

18) **Organization:** Ministry of Housing and Urban Affairs.
Domain Bucket: Smart Cities.
Title: Some cities have public transport, some are in process of adding them. What can be done to make public transport attractive and encouraging more and more people using it? What can be done about the last mile connectivity from the available public transport?
Description:"Some cities have public transport, some are in process of adding them. What can be done to make public transport attractive and encouraging more and more people using it? What can be done about the last mile connectivity from the available public transport?" Design a smart application to help people track and accurately predict the timings of public transport. Add ability to track parking slots near public transport. Design cost effective hardware devices required for the same purpose.

19) **Organization:** Ministry of Housing and Urban Affairs.
Domain Bucket: Sustainable Environment.
Title: Every one out of nine deaths is caused by air pollution. It is the most importalt environmental health risk of our time. Air in our cities is becoming hazardous to breathe. Air pollution in India has increased rapidly over the years owing to population groMh, vehicular emissions, reducing green cover and deforestation, rapid industrialization, ineffective environmental regulations, etc. How can technology help our cities grow and yet reduce pollution?
Description: Every one out of nine deaths is caused by air pollution. It is the most importalt environmental health risk of our time. Air in our cities is becoming hazardous to breathe. Air pollution in India has increased rapidly over the years owing to population growh, vehicular emissions, reducing green cover and deforestation, rapid industrialization, ineffective environmental regulations, etc. How can technology help our cities grow and yet reduce pollution?Design estimation system/hardware device to enable people decide easiest way to reach a place without causing air pollution and carbon foot print of each method. This system should also be able to track the carbon foot print of each individual.

20) **Organization:** Ministry of Housing and Urban Affairs
Domain Bucket: Healthcare & Biomedical Devices
Title: If there is an issue of sanitation and Hygiene in our cities, much of it is also contributed by its citizens. Wlnt innovativc mechanisms can be introduced to make the people more aware in maintaining a better hygiene? What participatory methods should be added to engage the people in this process of sanitation?
Description: "If there is an issue of sanitation and Hygiene in our cities, much of it is also contributed by its citizens. What innovative mechanisms can be introduced to make the people more aware in maintaining a better hygiene? What participatory methods should be added to engage the people in this process of sanitation? Design a

gamified system that issues such products to individuals that can educate people to on ways to maintain hygene, design a strategy to measure and reward the good work done by people."

21) **Organization:** Ministry of Housing and Urban Affairs
   Domain Bucket: Miscellaneous
   Title: Cities have people from
   Description: Better public spaces Cities have people coming from rural areas who have no place to stay or spend time. Design a hardware device to track people entering public space and a companion application to enable people to decide which place is most suitable for them. Indicate if a public place is heavily crowded.

22) **Organization:** Department of Atomic Energy.
   Domain Bucket: Smart Communication.
   Title: Laser based Vibration Sensor operated through mobile.
   Description: Vibration detection plays an important role in the different areas of structural health monitoring and industrial engineering. If the vibration increases above the permissible limits, it might lead to the failure of these structures and machines. Thus, it is very important to continuously monitor the vibration of a critical structure or machine. Vibration can be expressed in terms of its amplitude and frequency. Laser based vibration measurement has gained importance due to its non-contact, non-destructive nature and fast speed. Laser Vibrometer is based on optical triangulation technique. In Triangulation technique for vibration measurement, visible laser beam emitted from a diode laser strikes the target and the backscattered light is collected by suitable optics to focus on a position sensitive detector (PSD). Laser source, target and focusing optics form a triangle. The position of focused spot on the detector is related to the distance of the target from the sensor thus displacement of focused spot on detector is related to the displacement of the target from its equilibrium position. The PSD converts optical signal into electrical signal. Thus a vibration displacement signal in electrical form is generated by the sensor, which corresponds to mechanical vibration of the target. For simple harmonic motion, an optical triangulation based displacement sensors generate a sinusoidal signal whose frequency corresponds to frequency of vibration. Laser vibrometer uses low power Laser diode as light source. The instrument consists in two parts I. Sensor, consisting of Laser light source (Diode Laser), optical system (Focusing lens) to collect the back-scattered light after it has interacted with the object, detection system consisting of opto-electronic device (PSD) and analog electronic circuit to process the detector output and generate ±5V output corresponding to ±5 mm displacement of the object. This analog voltage is to be digitized and then transmitted using blue tooth technology to the nearest mobile phone. II. An application program on mobile phone will receive the dynamic displacement data from laser sensor and computes the FFT of the signal.

This calculated FFT spectrum will carry the amplitude and frequency contents of the vibration. The calculated frequency spectrum is to be displayed in graphical form on the mobile screen and important parameters like dominant frequencies and their amplitude will be extracted from the spectrum and separately displayed. Thus the problem consists of development of compact laser sensor with wireless transmission capability, battery operated and size of the palm for vibration measurement. Then development of suitable Android based mobile app to communicate to the sensor and display frequency spectrum and important vibration parameters on mobile screen.

23) **Organization:** Department of Atomic Energy
Domain Bucket: Healthcare & Biomedical Devices
Title: Generalized Epileptic Seizure Alert System.
Description: Epilepsy is a central nervous system (neurological) disorder in which brain activity becomes abnormal, causing seizures or periods of unusual behavior, sensations, and sometimes loss of awareness.Of the 70 million persons with epilepsy (PWE) worldwide, nearly 12 million PWE are expected to reside in India; which contributes to nearly one-sixth of the global burden. Epilepsy often manifests itself in childhood and is a cause of immense concern for the parents who are often kept on their toes anticipating the next seizure event. This causes psychological and health concerns amongst the primary caregivers who often stay awake through the night in anticipation. Seizures are of many kind with the most prevalent being generalized tonic-clonic seizure A generalized tonic-clonic seizure, sometimes called a grand mal seizure, is a disturbance in the functioning of both sides of the brain. This disturbance is caused by electrical signals spreading through the brain inappropriately. Often this will result in signals being sent to the muscles, nerves, or glands. The spread of these signals in the brain can make one lose consciousness and have severe muscle contractions.The aim of this project is to develop a battery powered, low cost,portable generalized tonic-clonic seizure alert device which can notify nearby family or caregivers when a seizure occurs through alarms, phone calls or text alerts, depending on the device. A caregiver can then help the person during and after the seizure. For example, they can help reposition the person, making sure they are on their side if they are not conscious. They can also make sure someone doesn't fall asleep on their stomach afterwards. If breathing or other problems occur, they can call for medical help. They may also be able to give rescue medications or call for an ambulance if the seizure lasts too long or the person has repeated seizures. The project aims at using Inertial Measurement Unit/tri axial accelerometer as the primary sensing unit coupled with advanced signal processing and machine learning techniques to detect abnormal motions akin to seizures in the patients body.The proposed instrument shall also consist of heartbeat monitoring system for additional analytics related to sleep quality monitoring. The project has significant hardware and software challenges which includes accurate measurement and classification of jerking motions,continuous low power heart rate monitoring, signal processing and machine learning algorithms at a very low power budget. The proposed device will reduce burden on the primary caregivers or family members who often spend sleepless nights anticipating the seizure event.

24) **Organization:** Department of Atomic Energy
Domain Bucket: Security & Surveillance
Title: Digital Imaging of Objects behind Steel walls
Description: Steel is widely used material for fabrication of machinery and equipments in almost all the industries. Maintenance of these equipments may become very expensive and time consuming if it requires de-assembling, inspection and then re-assembling. So, an innovative technology can be developed which will help in machinery inspection in assembled condition by digitally imaging all the objects inside it like X-Rays for human body. This will help in identifying the cause of the malfunction of the machinery and necessary action can be taken. Solution methodology Light waves can pass through glass walls and reflect from the objects behind it. This makes us able to see through a glass wall. Similarly, some other EM waves can pass through concrete walls. There are already many technological developments going on worldwide to use this fact to locate objects behind the concrete walls. Even, moving human body can be detected behind concrete wall upto certain distance using available technology. As EM waves cannot pass through steel walls, use of sound waves/ultrasound can be explored. Instrumentation developed (both software and hardware) should be able to detect either the sound waves generated behind steel wall or send a known sound pulse and get its echo reflected from the objects behind the wall. Developed technology can be envisaged as the multiple microphones mounted on many locations on the machinery to detect and locate the position of the object generating sound. Final outcome A set of compatible hardware and software is to be developed which will be able to detect and locate either the source of sound or create a digital imaging of all the objects behind the steel wall. There should be provision of adjusting the frequency transmitted and received by sensors to consider varying thickness of the wall and material of objects behind it. Challenges Since wave propagation inside the machinery involves very little distance, time difference obtained from various objects behind the steel wall is supposed to be very less. It will be very difficult to detect and differentiate the sound signal obtained from the objects. Advances signal processing technique will be required to be developed to accomplish this task.

25) **Organization:** Gov of Uttarakhand.
Domain Bucket: Smart Vehicles.
Title: UAV's for Disaster Identification and alerting System.
Description: UAV's for Disaster Hardware When disasters happen, whether a natural disaster like a flood or earthquake, Identification etc. It can be extremely dangerous to send first responders in, even though there Alerting System Software are people who badly need help. Drones are useful, and are helping in the recovery after the disaster, but most require individual pilots, who fly the unmanned aircraft by remote control. That limits how quickly rescuers can view an entire affected area, and can delay actual aid from reaching victims. Autonomous smart drones with integrated image processing APIs that have a longer flight time and can relay real time analysis of

images to remote locations will help in early detection and adequate mobilization of resources.

26) **Organization:** Gov of Uttarakhand.
Domain Bucket: Clean Water
Title: Remote Monitoring of the Quality and Potability of Drinking Water Sources.
Description: Uttarakhand state blessed with major water resources including large revering system with its tributaries. In spite of the plethora of water resources, the people of the state are facing the problem of safe fresh water due to slope factor, management issues, urban conglomeration, deforestation and other environmental factors. It is essential to know the quality of water before its consumption for human and agricultural uses. Continuous monitoring of the water resources can also help in predicting the flood chances, if the water level rapidly goes up. Design a hardware solution to measure quality parameters of water along with an app to enable monitoring of water quality at various locations. Ensure that it is easy to use and connect to mobile device.

27) **Organization:** Gov of Uttarakhand
Domain Bucket: Agriculture and Rural Development.
Title: Low cost and affordable Smart Autonomous Remote Monitored Agri-Horticulture systems for eg. Polyhouses developed by CDAC in Kerala.
Description: Design Low cost and affordable Smart Autonomous Remote Monitoring systems for Agri-Horticulture This can be done for scenarios like Polyhouses developed by CDAC in Kerala.

28) **Organization:** Gov of Uttarakhand
Domain Bucket: Agriculture and Rural Development
Title: SOLAR POWERED SMART IRRIGATION SYSTEM
Description: Cost effective solar power can be the answer for all our energy needs. Solar powered smart irrigation systems are the answer to the Indian farmers who generally face the problem of frequent power cut or non-availability of grid supply. This system consists of solar powered water pump along with an automatic water flow control using a moisture sensor. It is the proposed solution for the present energy crisis for the Indian farmers. This system conserves electricity by reducing the usage of grid power and conserves water by reducing water losses.

29) **Organization:** Gov of Uttarakhand
Domain Bucket: Agriculture and Rural Development
Title: Way Out for Man-animal conflict especially for protection of agriculture crops from wild animals
Description: The effects Low prey density in the forest due to natural or man created situation, deforestation and human intervention causing animals migration towards the human habitants especially in the area which comes in forest territory. As per the survey report of FRI Dehradun, Uttarakhand, The state Uttarkhand recorded forest area of 38,000 Sq km which is 71.05% of its total geographical area of 53,483 Sq km

which is largely facing the real issue of Human — animal conflict. The animals are crossing the boarders and destroying the agricultural crop of small and marginal famers in hilly areas of Uttarakhand. A publish report of "wildlife.

30) **Organization:** Gov of Uttarakhand
    Domain Bucket: Agriculture and Rural Development
    Title: Drudgery reduction of women in rural areas
    Description: Rural women play a significant role inside the houses as well as on farm along with animal husbandry works. The triple burden has made the life of rural women especially in hilly areas miserable & full of drudgery. The main activities which significantly increasing drudgery level in hilly rural areas are: Farm activities including harvesting, Weeding & hoeing etc. Home: cooking & collection of fuel and fodder. Animal husbandry and allied activities: We require some technological interventions in order to reduce Drudgery of women.

31) **Organization:** Gov of Uttarakhand.
    Domain Bucket: Sustainable Environment.
    Title: Restoring of transportation system in the Hill areas of Uttarakhand during peak rainy season.
    Description: The state of Uttarakhand comprises of 09 hilly districts. During monsoon season the road connectivity is a major problem. Due to heavy rainfall, complete washout of roads happened up to 50m length, land slide in many locations disturbs the flow of traffic, natural calamity and extreme weather incidents is a matter of concerned. Restoring of connectivity in the shortest possible duration is required so that small vehicles and regular traffic flow can be resumed. The major problem is the situations where there is complete washout of trenches of 50m of hilly road, wherein the only solution is through providing temporary bridges so that the vehicles can move. It should be a safe, durable and low-cost solution.

32) **Organization:** Dte of IT & Cyber Security, DRDO
    Domain Bucket: Healthcare & Biomedical Devices
    Title: Smart clothes for Security Forces
    Description: The solution should support centrally monitoring of group of Security Personnel and also capable of to transfer their individual Psycho-physiological data(like BP, Heart Rate etc) to central location using cloud/any other technology. Security and privacy are very important aspects of this application, ensure appropriate standards are followed.

33) **Organization:** Ministry of Petroleum and Natural Gas.
    Domain Bucket: Miscellaneous
    Title: Technological advances in LPG sector
    Description: A sensor may be developed to be put up on cylinders which will gauge the fuel quantity and automatically inform the linked distributor for refill cylinders. In this way usage of all the customers can be exactly mapped and we can have more accurate predictive demand and supply.

34) Organization: Govt of Goa.
Domain Bucket: Clean Water.
Title: Water Quality Measuring Device.
Description: Scarcity of clean drinking water is a serious problem globally. The natural sources of pure drinking water are declining and are getting polluted. Use of pesticides, fertilizers, dumping of e-waste such as batteries, plastic, etc has lead to such high levels of contamination of water that consumption of it has resulted in outbreak of diseases such as cancer. These contaminants could be visible or non-visible to eyes. Hence the problem statement is to develop a device that would help us measure the purity of water by checking the amount of pollutants, harmful chemicals, plastic molecules, microorganism. Desirable limits of drinking water parameters can be referred from Bureau of Indian Standards (BIS) standard specifications.

35) Organization: Govt of Goa
Domain Bucket: Healthcare & Biomedical Devices
Title: Device to measure Steroid content in Milk/Meat Products
Description: In order to increase the productivity of milk and meat products, the animals/birds are inoculated with steroid which boost the production of milk and development of meat. The same steroid enter the food chain and unknowingly are consumed by humans. It is understood that the effects of steroid on animals is also observed in humans. The steroids when consumed by humans can cause severe damage to the body. The problem statement is to develop a device that would help check the amount of steroids in milk and meat products. Design a tool to insert the steroid and measure the amount of steroid added. This should inform the right amount of steroid that can be added depending on the weight of the animal/quantity of milk to ensure that wrong amount is not added."

36) Organization: Govt of Goa
Domain Bucket: Healthcare & Biomedical Devices
Title: Device to check for harmful chemicals in vegetables and fruits
Description: The use of pesticides, steroids and fertilizers in vegetables and fruits has tremendously increased. It is known that chemicals which are banned in other countries and also by the Indian Government are heavily used without the knowledge of the authorities and the consumers. These harmful chemicals enter human body as the items are consumed. The same have been found to have serious effects on human body giving rise to deadly diseases such as cancer. Innocent consumers are unknowing getting their health deteriorated due to their inability to notice the presence of harmful chemicals in the food items. The problem statement so to develop a device that would identify and measure the amount of harmful chemicals present on the skin and inside the vegetables and fruits.

37) Organization: Department of Empowerment of Persons with Disabilities, Ministry of Social Justice and Empowerment.

Domain Bucket: Miscellaneous.
Title: Problem Statement from PDUNIPPD (Hardware).
Description: Hardware 1. Universal access ATM machines for disabled (divyangjan) 2. Universally accessible toilets for disabled (divyangjan) 3. Customised multifunctional convertible work surface for disabled to encourage various functional positions.

38) **Organization:** Tripura Institute of Technology
   Domain Bucket: Healthcare & Biomedical Devices
   Title: Tracking of babies discharged from S.N.C.U. (Sick New Born Care Unit), Agartala Government Medical College (AGMC)
   Description: The data of babies admitted in SNCU is regularly being submitted to the Ministry of Health & Family Welfare, Government of India. After discharge these babies require regular followup checkup and care up to certain period. Many of such babies are not brought back for followup care which causes inadequate recovery and lack of followup record. Through this tracking system if the parents/ guardians of such babies can be covered to bring the babies for followup care the outcome will definitely be effective and the followup records of such cases will be under digital access.

39) **Organization:** Tripura Institute of Technology
   Domain Bucket: Smart Communication
   Title: Identification of Geo location using Smartphone in absence of internet and mobile network.
   Description: The smart phone will store geo location in remote areas where no access to internet and mobile network is available and the location data with attributes will synced to the server through SMS gateway or internet on availability of the same.

40) **Organization:** Tripura Institute of Technology
   Domain Bucket: Smart Communication
   Title: Calls made to a particular number from a basic phone needs to be tracked accessing the location based information provided by the service provider on the fly and plot the location on map using Google services.
   Description: We are looking for solution when calls made to a particular number from a basic phone needs to be tracked accessing the location based information provided by the service provider on the fly and plot the location on map using Google services.

41) **Organization:** Dr. B R Ambedkar Institute of Technology.
   Domain Bucket: Security & Surveillance.
   Title: Wearable location tracker during disaster
   Description: These trackers will be GPS wearables like watches, pins, and even custom shirts that can mitigate tracking problems even if the fishermen looses his boat during extreme we

42) **Organization:** National Mission for Clean Ganga, DoWR, RD & GR, Ministry of Jal Shakti

Domain Bucket: Clean Water

Title: Artificial intelligence enabled robotic trash boat to drive & harvest floating trash from urban drain.

Description: A large quantity of floating trash is finding its way into the urban drainage systems from where it is potentially able to travel via the urban drain, streams, rivers, lakes and estuaries until it eventually reaches the open sea. A prototype artificial intelligence enabled robotic trash boat can be develop which can harvest floating trash from urban drain. The trash boat can be operate online/remotely.

43) **Organization:** Department of Science and Technology

Domain Bucket: Healthcare & Biomedical Devices

Title: Non-invasive Glucometer

Description: India is Diabetic Capital of the World. India has the highest number of diabetics of any one country in the entire world. Over 30 million have now been diagnosed with diabetes in India. In rural areas, the prevalence is approximately 3 per cent of the total population, the urban areas it is expected to be 9 per cent. Persons suffering with diabetes have to constantly monitor their blood sugar levels and take insulin accordingly. Till now the glucometers are invasive and the process is painful. We have seen devices like Pulse Oxy-meters which are convenient to use and give accurate readings for oxygen levels (SPO2) in blood. Having a Glucometer just like Pulse-oxymeters, which is non-invasive & accurate is a big requirement and has a huge market. The Challenge posted is for having a Glucometer just like Pulse-oxymeters. Major expectations from the device - Non-invasive, Battery operated - Small and easy to use with minimal cost of consumables (if any) - Cost effective – Robust.

44) **Organization:** Government of Andhra Pradesh

Domain Bucket: Clean Water

Title: solutions required to address challenges faced in clean water supply.

Description: 1) An online system monitoring water quality, leaks, and contamination of drinking water in transmission network and managing pipeline network i.e. Synchronisation of pipeline networks, pumping stations and energy management 2) An online system monitoring residual chlorine at end points 3) A mechanism for Equal quantity of water distribution at all consumer ends 4) Cost-effective mechanism to treat waste water in small villages Contact: M. V. S. R. Krishna Murthy, Asst. Chemist, State Level Water Testing Laboratory email id: mudigonda63@gmail.com

45) **Organization:** All India Institute of Ayurveda - Ministry of AYUSH

Domain Bucket: Healthcare & Biomedical Devices

Title: Automated Basti (Enema) Preparation machine

Description: Brief concept behind the problem statement - Niruha Basti (Medicated Enema) is a uniform mixture of Honey, Salt, Sneha (Oil/Ghee), Kalka (Herbal paste) and Kwatha (Herbal Decoction). The ingredients of basti dravya are to be mixed in specific order to obtain the perfect mixture. Honey and rock salt were mixed together

in the beginning followed by addition of Sesame oil. This mixture was then thoroughly mixed. The finely wet grinded paste of Herbal drugs was then mixed in it thoroughly. The decoction of herbal drugs is then added to it and the mixture was subjected to thorough churning in a domestic mixer to produce a homogeneous mixture. The mixture thus produced acquires a physical state of emulsion. Solution – If there can be an AUTOMATIC BASTI BLENDER for crushing and blending basti or enema ingredients with base/bowl made of wood/metal/ceramic/granite with heavy pestle connected to machine that rotates automatically around the base at a specific speed There should be separate sections of main 5 ingredients i.e, honey, salt, oil, paste of drug and decoction of drug. The automatic blender should be pre-programmed for each ingredient to be instilled into the bowl/mortar in a specific measurable amount (as per the percentage of each ingredient required in the final product) automatically at a specific interval with the help of a set self- timer attched into it. This will not only help making Basti/ Enema conveniently but also will prevent individual differences in final Basti by making a standard final manufactured Basti.

46) **Organization:** All India Institute of Ayurveda - Ministry of AYUSH
Domain Bucket: Healthcare & Biomedical Devices
Title: Virtual reality (VR) for Yoga-Asana, Meditation
Description: Yoga & Meditation – An essential daily Routine Need Motivation and proper environment.Problem Statement – Need Instructor & Calm environment Solution A virtual reality device can be made which features different modes of tratak like spot,candle etc. This device will help in better concentration as it will provide soothing environment. Yogasana can be performed well in this environment . VR software requirement: The VR Experience should be able to provide the virtual tour of interiors of yoga hall. The participant should be able to move around and do Yogasana. The VR Experience should be smooth.

47) **Organization:** Ministry of Railways
Domain Bucket: Robotics & Drones
Title: Intelligent Scanning System
Description: We are looking for solution of automatic checking of parcels in parcel offices (both booked by Railway and leaseholders). We are expecting the solution to be (1) Automatic (without human intervention), (2) quick and (3) cost effective. Expectations from solution are (1) It shold automatically detect and check parcels in parcel office (booked by both Railway and leaseholders). Parcels' count and details should be updated to centralised server. (2) Software component should show details of parcels (eg. PRR/PWB no., Source, Destination, To, From, Content, etc.) in parcel office to officials and operators. (3) If parcel is dispatched from parcel office, it should be removed from In Office Parcels and if parcel is received at Parcel office, it should be added to In Office Parcels.

48) **Organization:** Ministry of Communications.
Domain Bucket: Miscellaneous.
Title: Solution for initiating some kind of alarm to protect underground fiber while digging the road for construction
Description: Solution for initiating some kind of alarm to protect underground fibre while digging the road for construction any other purpose. Frequent fibre cut is a serious problem being faced by Telecom industry, leading to poor up time of the Telecom Network and poor service to Citizen. Fibre cuts are primarily due to road construction activities. If at the starting time of digging of road, an alarm can be generated, it may avoid cutting of fibre.

49) **Organization:** Ministry of Communications.
Domain Bucket: Smart Communication.
Title: Upgrading 3G Mobile for LTE/4G network.
Description: Upgrading 3G Mobile for LTE/4G network- There are many user with 3G handset who are using mobile services mainly for voice communications. For example senior citizens, school students/kids (phone given by parents to be in touch in case of emergency or to just convey the status in reaching or leaving school) helpers (maid/servants). However, with roll out of LTE/4G network by major telecom operators and voice service (by VoLTE) at much cheaper cost such subscribers are forced to but a new LTE/4G mobile or to forego such benefits. It may be worthwhile to explore the possibility of upgrading the 3G mobile handset which already support packet data functionality, to LTE/4G mobile and to start with focus may be limited to the VoLTE capability along if the cost of solution with software upgrades and hardware (w.r.t. RF part) vis-avis a new LTE mobile is quite low, it will also help in reducing the e-waste or recycling of 3G/4G mobile phones."

50) **Organization:** Ministry of Communications.
Domain Bucket: Smart Communication.
Title: Cost effective innovative solution for long distanch (3 to 8 kms)
Description: Cost effective innovative solution for long distanch (3 to 8 kms) wireless (LAN) Broadband Connectivity to sparsely located individual households in rural areas (Last mile Connectivity) from Fram Panchayat (USO) ONT locations. Under Bharat Net project of Deptt. Of Telecom, fibres have reached to more than a lakh of Gram Panchayats. But extending broadband connectivity from these Gram Panchayat ONTs to individual households located at a distance of 3 to 8 km is a problem. Extending fibre to individual houses is expensive, messy and very difficult to maintain in far flung rural areas. WiFi connectivity has short range problem. Benefits: It can offer a cost effective solution to last mile broadband connectivity [problem, which will facilitate greater broadband penetration to rural population. It will ensure the proper utilization of USOF Bharat Net fibre and also help in bridging the Digital Divide to a greater extent.

51) Organization: National Jute Board, Min of Textiles

Domain Bucket: Miscellaneous

Title: How to get another dedicated internet service provider (ISP) for an e-governance portal

Description: How to get another dedicated internet service provider (ISP) for an e-governance portal, currently in use, replacing an existing ISP Providing broadband connection with a static IP Address.

52) Organization: National Jute Board, Min of Textiles.

Domain Bucket: Smart Textiles.

Title: scientific way of assessing the quality parameters of raw jute produced/sold by farmers by linking with raw jute crop assessment through remote sensing application of NRSA/ISRO.

Description: Design a scientific method for assessing the quality parameters of raw jute produced/sold by farmers by linking with raw jute crop assessment through remote sensing application of NASA/ISRO. Download publically available images published by NASA and ISRO. Use this data to identify jute production as well as identify quality of crop based on their location and image parameters.

53) Organization: National Jute Board, Min of Textiles.

Domain Bucket: Smart Textiles

Title: Digital / Laser printing – creating a niche for Surat

Description: 1. Surat has emerged as a hub of fabric printing, as this activity is associated with the processing activity and is a value add over and above processing 2. With over 500 process houses in and around Surat, printing has been a natural extension to value addition for all the process houses. Most of them have at least 4 printing machines, with capacity to print about 3000 to 30000 meters per machine per day depending upon the design. 3. There exists a business opportunity for having small sized digital partners synchronized with the existing equipment to get value added output at one go, while most of the printers are imported, industry also plans to develop a prototype of Indian made printing machine in the long run. 4. Surat leads in multi-color design printing on fabrics. It can become a hub for digital and Laster fabric printing for the world, should the units be equipped with printing equipment of varied sizes. 5. The equipment for printing machines is an equally important area, in which the industry currently is looking for solutions, color transfer pump systems on a printing machines are the heart of the printer. The improvement to such systems is explained herein below: (5.1) current scenario – the color feeding systems to the printing machines is manual in nature. This results in wastage of expensive printing colors by 25% to 30% as the process is dependent on human intervention. Apart from the wastage aspect, there is also more water required for washing which not only leads to higher costs, but has an adverse environmental impact. (5.2) proposed changes- the industry is exploring design of an auto color feeding system, using

pneumatic or gear based pumps. This will lead to reduced wastage, lesser use of water and meeting environmental compliances 6. An R&D facility would be needed in Surat in order to carry out the necessary development as suggested above and come up with firm findings on which system would be better for commercialization. 7. The following graph shows the revenue projection of India's technical textile machine manufacturing market till 2018.

54) **Organization:** Govt. of Bihar (DOA).
Domain Bucket: Agriculture and Rural Development.
Title: Developing a real time produce life time monitoring & sharing mechanism to enhance output realization to farmers through private sector participation and DBT.
Description: We are looking for solution to estimate soil fertility status on real time basis and to give advisory on fertilizer and compost usage. This will help in better planning for fertilizer application in crops and maintain soil fertility status. The solution is expected to (1) provide help to farmer for getting soil fertility status on real time basis, when needed. This can include actual value of different parameters' estimating soil fertility and overall status. (2) provide advisory on fertilizer and composit usage to farmer, periodically. This should be based on soil fertility status.

55) **Organization:** Department of Science and Technology.
Domain Bucket: Smart Communication.
Title: Video conference – Eye to eye contact – Mobile App.
Description: Problem: During video calls, often eye to eye contacts are missing because the camera and the screen are misaligned. During the calls, the tendency is to see on the screen and not in the camera, which leads to misaligned conversations. Solution desired: It is desired to design some mechanism to align both the video streams so that the conversations are effective.

56) **Organization:** Department of Science and Technology
Domain Bucket: Energy / Renewable Energy
Title: Smart Networks for Renewable Integrated Sources for standalone Microgrids.
Description: Conditioning Monitoring (CM) of electrical system is the process of systematic data collection and evaluation to identify changes in performance or conditioning of the system, or its components, such that remedial action may be planned in a cost effective manner to maintain reliability. It is the process of continuous monitoring of their electrical parameters in order to identify a significant change which is indicative of a developing fault. Different micro-grids groups have been developing their own remote maintenance and diagnostic units on engineering system of their choice. The appropriate low cost generic tools, providing safe solution are required, to address the challenge for robust and reliable micro grids.

57) **Organization:** Govt. of Madhya Pradesh

Domain Bucket: Security & Surveillance

Title: Solo IOT devices to capture video and audio evidences.

Description: Project intends to develop various IOTs devices to camouflage CCTV system. It may look like display board for publicity. It will have various IR lights to illuminate and capture in nights. It should have following features: - Display System (for advertisement or name board) - Wi-fi/ internet connectivity - Multiple systems may be connected through blue tooth - Remote Joystick to fine tuning and focusing on target persons or things).

58) **Organization:** Education department Gujarat.

Domain Bucket: Healthcare & Biomedical Devices.

Title: IoT based Smart bottle for Healthcare.

Description: During recent years, due to the technological advancements many sophisticated techniques has been evolved for assuring fast recovery of the patients in hospitals. Need for good patient care in hospitals, assessment and management of fluid and electrolyte is the most fundamental thing required. All most in all hospital, an assist/nurse is responsible for monitoring the electrolyte's bottle level. But unfortunately most of the time, the observer may forget to change the bottle at correct time due to their busy schedule.To overcome this critical situation, a IoT based automatic alerting and indicating device is proposed where sensor is used as a level sensor or weight sensor. It is based on the principle that the sensor output changes when fluid level/weight is below certain limit. When Fluid level/weight is low, will alerts the observer through the display or/and mobile phone at the control room indicates the room number of the patient for quick recovery Hospital uses simple electrolytes bottles with no indication, it may create a problem to patient because the reverse flow will start, blood start to flow from body towards bottle. In, Hospital ICU, CCU, NICU, OPD, OT, most of all department of hospital required such kind of automatic monitoring and indication system. Also Health care industries will one of the users. such monitoring system can be useful in small , medium and large size of hospitals and also it useful during home care. If such a monitoring system builds, it will decrease the chances of patients hazards and increases the accuracy of health care in hospital. In future we can design a ready mate portable cover system for such bottle. Ready mate Wearable sensors on sides of bottle can detect level/weight of-fluid inside bottles. Such data can also send to nurses and/or doctor`s mobile and they can start or stop the fluid and also monitoring fluid condition, such things required security password also. Hospital staff, the constant need to manually monitor the level of bottles is avoided. This is of high advantage to the patients especially during night times. This system also avoids the fatal risk of air bubbles entering the patient's bloodstream, which is a serious threat as air bubbles in blood can cause immediate death. Such a device will create assurity of non-harm condition to patients. and also helpful to monitoring of data and such data can be stored and will be useful in future.

59) **Organization:** Education department Gujarat

Domain Bucket: Smart Cities
Title: Traffic Clearance for Ambulance/(or other priority Vehicle) through Artificial Intelligence
Description: Traffic is the most critical problem in major cities in India. Sometimes emergency vehicle does not get route to reach at the destination due to heavy congestion on the road. Even if its desired, driver or owner of vehicle is in such a crucial position that he/she can not give space to such emergency vehicle. Emergency vehicle may be ambulance or fire-fighting equipment carrying vehicle, police van or disaster management vehicle. In emergency situation, vehicle should reach in time at proper destination but unfortunately traffic situation block that vehicle. In emergency situation like severe heat attack, pregnancy , accident, fire etc. it is necessary for a vehicle to reach at the destination in short time. In medical emergency, it is necessary to provide emergency medical treatment to the patient. It is necessary to reach at nearest and best hospital in time. Most of cities and even district place are having problem of traffic and due to which ambulance and other emergency vehicles are not getting free route to reach at the destination. Other Emergency occurs anywhere at any location, at any time, and in various ways will make one at risk such as fire. Fire fighting vehicle must reach in time to save life and property. These situations require a speedy response. So it is very crucial and important to establish direct, fast and efficient technique without delay. Artificial intelligence may help us to solve this real life challenge. Patient, Fire brigade office, Hospitals, Police Traffic congestion has grown to an alarming event in major cities across India. Ambulance Driver will select route to reach hospital. System will automatically control traffic light based on population of vehicle and based on priority on that route. (Controls entire area surrounding route). Other features like Ambulance arrival indication to surrounding vehicle will give extra benefit. Emergency vehicle will be able to reach at the destination in time. If emergency vehicle is ambulance, patient will get treatment in time. Iif emergency vehicle is fire fighting equipment it will be able to control fire. If emergency vehicle is police van, it will be able to control crime. Vehicular traffic is endlessly increasing everywhere in the world and can cause terrible traffic congestion at intersections. This solution will allow emergency vehicle to get route during emergency situations. Traffic congestion and tidal flow are major facts that cause delay to ambulance.The loss of human life due to accident and delay in getting proper treatment must be avoided. In order to save human life from accidents and unnecessary delay due to traffic congestion will be avoided due to this solution and it will help to save precious human life.As cameras are deployed on most of the signals today, Computer Vision can be used for vehicle count and will be stored and updated in a steaming manner. This will thus help create effective algorithms to alter the time of the traffic signals based on this real time vehicle count, also by making sure that the traffic congestions doesnt increase exponentially and multiple emergency vehicles does not put the system in a deadlock.

60) **Organization:** Education department Gujarat
Domain Bucket: Miscellaneous
Title: Cost Effective harmonic filters.

Description: Many UPS, Variable frequency Drives, soft starters required to install in many applications in continuous plant industries like Pharmaceuticals, chemical, agro, food, textile etc. They are the sources of harmonic generation. Because of harmonics, power quality disturbances, voltage deflection, neutral loading, requirement of higher capacity switchgears, life of switchgear decreases. Also, for neutral loading and unbalancing in the power system occurs and life of distribution devices like transformer will also decreases. Presently in market many devices like active filters, passive filters are available. But it leads to plant modifications and also its not cost effective solution. It also leads to shut down because of retrofication. Hence, task is to find out cost effective harmonic filters. Use of UPS, Variable frequency Drives, soft starters etc. is going to increase day by day. Hence harmonic generation cannot be eliminated. Problem solution is find out cost effective harmonic filters, which do not demand system modifications. Pharmaceuticals, chemical, agro, food, textile and other continuous plant industries. Cost effective harmonic filters if possible to install without system modification then it will benefit power system. Reduction in Neutral current, increase in power quality, increase in life of switch gears, cost saving in switch gear cost. Reduction in Neutral current, increase in power quality, increase in life of switch gears, cost saving in switch gear cost. Hence, efficient operation of all continuous plant industries.

61) **Organization:** Ministry of Power.
Domain Bucket: Robotics & Drones.
Title: Remotely Operated Vehicle (ROV) for inspection of the HRT (Head Race Tunnels) in Hydro-electric Plant.
Description: In Hydro-electric Project (HEps)s, monitoring and upkeep of HRT (Head Race Tunnels) is a critical task for proper operation and safety of the plant especially in Himalayan Rivers carrying huge silts. For inspection of the HRTs, the HRT needs to be emptied & inspected which is a cumbersome process. In order to avoid interruption in operation of the plant, services of a Remotely Operated Vehicle (ROV) for inspection of the HRT in submerged condition could be considered for deployment. Apart from problems of excessive silt in HEPs especially in Himalayan Region during the monsoon season, cases of high acidity in the water has also been reported in some projects, due to which problem of abrasion/erosion of submerged E&M equipment/components occurs resulling into safety hazards and higher O&M cost. As such, there is need to explore abrasion/erosion resistant materials which could be utilized for manufacturing of underwater/ submerged E&M equipment for Hydro Power Plant for improved & sustainable performance and O&M cost minimization.

62) **Organization:** Department of Science and Technology
Domain Bucket: Miscellaneous
Title: Chapati making machine for household.
Description: Chapati is integral part of Indian cuisine. Making chapatis is a routine activity of indian families and is a time consuming and monotonous job. Usually for

making 10 chapatis it takes almost half an hour, and three times in a day may take lot of productive time. There are some Roti making machines which are for mass scale usage or not fully automated. It is required to design a Roti making machine for Indian household which can be programed for number of chapatis, can take wheat flour and water automatically, of size which can be easily used in kitchen, easily cleanable, low in maintenance and affordable by middle class Indian family.

63) **Organization:** Department of Science and Technology
Domain Bucket: Agriculture and Rural Development
Title: 1. Quick analysis of quality of cereals, oilseeds and pulses using AI
Description: This will enable the farmer to get better price for better quality. Presently, all produce is treated as having the same composition.

64) **Organization:** Department of Science and Technology.
Domain Bucket: Food Technology.
Title: Use of Technology to Test Adulteration of Edible Produce
Description: Food is essential for nourishment and sustenance of life. Adulteration of food cheats the consumer and can pose a serious risk to health. Food is adulterated if its quality is lowered or affected by the addition of substances which are injurious to health or by the removal of substances that are nutritious. The challenge is looking for technological solutions to give the consumer an opportunity to detect common adulterants in consumer food.

65) **Organization:** Department of Science and Technology.
Domain Bucket: Smart Cities.
Title: Smart Building Energy Management System using Machine Learning.
Description: Develop a machine learning model, method, architecture or appliance to reduce building energy use and emissions – A smart sensor for industrial buildings. An experienced operator can do a good job of adjusting set points and schedule. But no matter how good they are, a human's ability is limited by the amount of data he or she can process. Significant opportunities exist to take advantage of external data sources including real-time occupancy sensor networks, changing space schedules, weather forecasts, grid carbon intensity, and other environmental conditions that could help us better predict space set-points and schedules 24x7. Machine learning means each forecasting instance could be improved upon, as the system would have the ability to measure the results each time it forecasts space energy demands and re-adjust predicted set points and schedules accordingly.

66) Organization: Govt.of Sikkim.
Domain Bucket: Smart Education.
Title: CLASS ROOM ATTENDANCE DISPLAY.
Description: Design a small display board for displaying the number of students present during the first period. The class teacher locks the number and later others teachers can check the display for verification. Design a hardware based solution using CCTV camers that captures entry and exit of students in a class room. Additionally it should have ability to count the number of students in the class periodically.

67) Organization: Govt.of Sikkim.
Domain Bucket: Energy / Renewable Energy.
Title: Mini Hydro power project for Schools.
Description: Schools in Sikkim are all located in the inclined slope where streams flow down the hill with high current. If we place small power plant in these running streams we can generate electric power which can be used in school for various power apparatus ,machine ,Labs and others daily uses. Moreover it will be good site for electric power generation. For such we are in need of equipments to set small power plants and installation guide. Design a method to develop such models that can generate considerable amount of electricity by using waste or cheap products. Demonstrate multiple models of such power generators along with documentation that can be used by students to create such models themselves.

68) Organization: Ministry of Consumer Affairs, Food & Public Distribution.
Domain Bucket: Food Technology.
Title: IoT based solution for monitoring of pollution through pesticide in fresh fruits and vegetable available in markets.
Description: Exceeding level of pesticide contamination of fresh fruits and vegetables causing a health risk to common people as a normal man cannot identify it. A technology or equipment is to be developed to monitor the level of pollution through pesticides in fresh fruits and vegetables available in the market.

69) Organization: Ministry of Railways.
Domain Bucket: Security & Surveillance
Title: Smart Sealing System (Electronic recording of seal position of SLRs/VPUs).
Description: Existing practice: • After loading booked consignments, card seals with lac imprint fastened across the closed doors using strings. They are used as security feature throughout the train journey. • Paper seals are for one time use. Wherever, the seals are found tampered, fresh seals are applied. • RPF personnel check the seals manually en-route at different stations and record the seal position. In case of a criminal interference, these seal positions are back-traced and reconciled to fix the place of occurrence. Problems: • Lot of human resource is wasted. • The seal checking is not very thorough. Errors in recording the seal position cause difficulty in fixing the

place of occurrence. Sometimes, the PO is incorrectly fixed due to which crime is not detected. • The seal position is ascertained as a follow up to incidence of crime after passage of lot of time. If seal tampering is conveyed immediately, the PO would be ascertained immediately and effective response will be launched increasing prospects of detect ion of the case. Solution required: • Has to be low cost and scalable. • The instruments used must be reusable. • The solution has to be simple. • It should alert the control room of the division having jurisdiction if the seal is tampered on a running train en-route. The information with geo tagging and time stamp to be relayed.

70) **Organization:** Ministry of Railways.
Domain Bucket: Robotics & Drones.
Title: Intelligent Scanning System (Non invasive, quick and cost effective way of checking of parcels in parcel offices (both booked by railway and leaseholders)
Description: Existing practice: • Presently random checking of parcels by opening them. Problems: • Not many parcels checked. Unchecked parcels may carry objectionable offensive or dangerous material. Solution required: Non-invasive, quick and cost effective way of checking of parcels in parcel offices (both booked by railway and leaseholders) is the need of hour.