PROBLEM STATEMENTS

1.**SOFTWARE**

EDUCATION

- **EDU1**. The pandemic has caused many issues and obstacles to the implementation of online learning like the cost for accessing tools, management of a lot of students, and security on these online platforms. Make a project that allows peer interaction and peer-to-peer learning and sharing.
- **EDU2**. Around the world, billions of students have been impacted by the lockdown provoked by the COVID-19 pandemic and are out of school. Build a platform to help parents find free resources appropriate for their children's needs.
- **EDU3**. Learning online may lead to a lack of social interaction and fatigue. Create a platform that aims at assessing the level of fatigue among the students and also allowing them to talk to their teachers or counselors and seek help.
- **EDU4**. How to empower students who feel lost, unmotivated, and disempowered? Make an online channel where they can create new things, connect with people, and can participate in challenges.
- **EDU5**. During this lockdown, the education sector is facing many issues due to the restrictions of COVID-19. When using online platforms school students tend to give unnecessary excuses like low connectivity and miss out lectures. Also, some of the students use abusive language and misbehave to irritate the teacher which ultimately leads to the suspension of a class. Develop a platform to monitor the connectivity of the devices connected through an application. It should be able to detect the abusive language and should send the details of the student who misbehaves with the teacher.
- **EDU6**. Irrespective of several restrictions and constraints of COVID-19, how can we empower the students with theoretical and applied topic concerns through online mode? Particularly in problem-based learning, where Learners gain a deeper understanding by being exposed to the topic and problems that are relevant to the real-world application. Develop an online platform framework where always encourage learners to enhance and expose their tacit capabilities and challenge themself to do the same using their innovative ideas.
- **EDU7**. In lock down situations conducting exams is a challenging task due to security, malpractice, and copying. Create a platform to overcome this problem for proper conduction of exams.

HEALTH CARE

- **HC1**. It has been a major challenge for the Government and District Administrations to track COVID-19 patients. Form a real-time information management system that captures the estimated number of patients going to the health facilities and gives a breakup of the major ailments that citizens are suffering from in the state. This has proved to be challenging for the Ministry of Health and would prove to be useful.

- **HC2**. People are trying to cope up with the current situation in many ways to protect themselves from getting affected by COVID-19. There is no current mechanism through which the vendors can be inspected regularly to ensure compliance with the national policy on food safety and hygiene.

- **HC3**. Health facilities and infrastructures are lacking in remote areas of our country and therefore need for special intervention like outreach services, health camps etc. would prove beneficial in these areas. Develop a platform to define these areas.

- **HC4**. There are many fake doctors going around these days promising to provide online services. Many of the common people fall into these traps and then get charged for nothing. Build a platform to verify the online doctors/consultants who claim to help people just for money. This will prove to be very helpful in this time of crisis.

- **HC5**. Make a blockchain based solution to address any issues in Healthcare. Health-Chain is an end-to-end product that prevents any sort of malpractice stemming from forgery of medical bills, wrongful corporate reimbursement requests, and unethical uses of prescriptions. Using image-processing, values from prescriptions/bills are uploaded directly to the blockchain. Thus, any sort of physical records are eliminated, making the system fool-proof.

- **HC6**. In situations like virus spreads or in any other emergency there will be continuous calls on government help centers. For human beings it is very difficult to answer each and every one. So, create a platform or solution to solve this problem.

- **HC7**. If any new virus is spreading then people should know about virus details like living mechanism, reaction to weather conditions, internal structure, effects on humans and other creatures. What is the best way to educate the people regarding the disease symptoms, precautions, remedies to follow, reason for the disease, etc., within no time and should create best awareness. Create a platform for this problem, which can be accessed easily.

INTERNET SECURITY

- **IS1**. Due to lockdown employees that work from home often would do so from their personal computers which are significantly less secure than the organizational ones, making them more vulnerable to email attacks. The vast majority of which include advanced capabilities such as malicious Macros and exploits or redirection to malicious websites – a challenge that surpasses the capabilities of most Antiviruses and email protection solutions. Make a platform that detects if a link is malicious or not and keeps the user safe from downloading suspicious files or applications from the internet.

- **IS2**. A large number of people are using online platforms for meetings and educational purposes. Now, when everyone is dependent on the internet, there is a high risk of getting into malicious websites which can even lead to loss of important information. To ensure their safety, build software that can detect these malicious websites and can notify in time.

- **IS3**. Recently, online operations aiming at end-customers are relying more on web-based services. Many fake e-commerce websites might claim to sell the products which are currently unavailable elsewhere. Considering the overall growing amounts of unaware end-users, we can see more security holes and easy opportunities for cybercriminals. For example: as people can't go out to buy daily necessities they rely on e-commerce websites which may lead them to use unknown/less trustworthy sources which can force them to make the financial processes online. This will help criminals to steal your credit card number, PIN, and security code to make unauthorized transactions, without needing your physical credit card. Make software that helps prevent these credit card frauds and warns the user before they make transactions online.

- **IS4**. In our current global pandemic situation, online life is becoming even more important as we try to communicate while implementing social distancing. The domino-effect of this emergency has led to massive changes that are leading to security vulnerabilities for companies. Consider a data sender who transfers some confidential data to some of his counterparts (third party). Some of these sensitive data get leaked accidentally or purposely by an attacker and is downloaded on his terminal. This data can be bank account numbers, trade secrets, or personally identifiable information that is politically or financially valuable. To avoid this, create a project that allows data allocation tactics (through the counterparts) which improve the chances of identifying data leakages. You can also insert "realistic but fake" data records into the data stream to further improve our chances of identifying unknown data leakages and also the party responsible for it.

- **IS5**. In times of crisis, misinformation abounds. The advent of the internet, social media platforms and real-time messengers has given a free run to criminals and miscreants. Society, today is experiencing something called an 'information disorder' where it has become extremely difficult to disambiguate truth from falsehood. These rumors are a lethal weapon that affects the morale of people. Keeping this in mind, create a platform which helps prevent the spread of misinformation by tracking and tracing of fake news on the internet. This can be done either checking attributions as they are a reliable way of telling if a message is bogus or using a database to check if the site is known for publishing fake news in the past. You may also research what untrustworthy websites generally look like and the kind of content they tend to share.

ENVIRONMENT

- **ENV1**. The pandemic has led to the abandonment of many environmental sustainability programs in India - where smaller municipalities have halted recycling programs due to the risks associated with the spread of the virus. Create a platform that has a personalized collection calendar outfitted with collection dates, automatic reminders, and information on how to reuse, recycle, compost, and dispose of materials.

- **ENV2**. COVID-19 has led to an increase in medical waste as much of the personal protective equipment that healthcare professionals are using can only be worn once before being disposed of (eg. N-95 mask). Create a platform that has a checklist where you can select what type of medical waste you have, covers the safety procedures for handling medical waste, and a section where you can request a collection of waste from your house.

- **ENV3**. Levels of air pollutants and warming gases over many countries are showing significant drops as coronavirus impacts industries and transport. Researchers have shown how carbon monoxide mainly from cars has been reduced by nearly 50% compared with last year. Air Quality Index(AQI) is a pretty robust metric which reflects the air pollution levels and hence a very good way to understand the impact of the lockdown, at least on our lower atmosphere. Create a platform that displays all the necessary information about various gas emissions and AQI of all the cities around the globe and includes graphs for better understanding.

- **ENV4**. Build an automatic illegal solid waste dumping alert system. There are many locations, where illegal waste is dumped by citizens. The participants are expected to provide a solution for real-time tracking and alert systems for illegal waste dumping on the map. Any of the illegal waste dumping by citizens and any ward can be considered. Due to the restrictions of COVID19 as the number of active workers has been reduced, this can be of great help.

- **ENV5**. Many households are using solar water heating systems, rooftop solar, energy-efficient appliances, rainwater harvesting systems, etc. Build a platform that will be used by the citizens to register their green initiatives. The solution shall provide a detailed list of green solution providers, renewable energy and energy-efficient service providers/vendors, etc. so that people can easily get the required information to buy equipment. Also, calculate the energy-saving potential of each initiative. As many resources are unavailable in this time of crisis, this platform can be of great help.

- **ENV6**. You are being a chief secretary to health, higher education and research ministry create a platform for various strategies or methods to overcome situations like new virus spreads and its prevention.

- **SOCIAL DISTANCING**

  - **SD.** Social Distancing is a main factor in the outbreak of COVID-19. Find an effective solution to maintain social distancing using a technology.

2.HARDWARE

• **Smart Street Light Metering System**

HW1. Design a Street Light Metering System for monitoring the power usage. It should calculate the number of units consumed during a day, month and year. Bill should be generated automatically and alert messages will be sent on high power consumption.

• **Multimodal Attendance System**

HW2. Implement a student's attendance in monitoring system using Fingerprint Identification /Radio Frequency Identification Tags etc. The system should automatically mark and notify the attendance of the students to the respective stakeholders of the organization.

• **Smart Security System for a Smart University**

HW3. How will the security office keep a record of all the objects on the campus at any point in time? If any damage occurs to that object, how can it be notified to security immediately? The system should detect any sorts of emergency like fire or earthquake on the campus and the security should get an alert that there is some kind of emergency and immediate action is required. Way to track any movement around the river side slope to make sure student safety during the night. There are generic Internet of Things (IoT) modules designed to connect devices to the internet and control them through cloud software. You are expected to develop economically suitable wireless IoT systems to solve these problems.

• **Water Management System**

HW4. From the underground storage tank, water is pumped using motors to overhead water tanks, which are placed at the highest elevated floor of the building for optimum pressure. The system should also continuously monitor the soil moisture along with rain predictions to water the landscapes in the campus.

• **Smart Podium**

HW5. Often students/teachers forget to switch off the electrical appliances in classroom, so what can be done to automatically operate those appliances through mobile application? Can it be notified via app when there is no one in the class and those appliances are ON? Can we develop a system to keep details of each classroom? Develop a smart podium to manage LCD projector, room lights, presentation controller, air conditioner, audio-video system, etc.

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3.OPEN INNOVATION

• **OI**