ASSIGNMENT 1
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TOP 20 USE CASES OF INTERNET OF THINGS-------

1. Connected Car

Insight of this application

- This type of application contains a lot of sensors to monitor regularly the current status of the car.
- Analyzes if any impediment is currently at the front of the car and take immediate steps to avoid any accident.
- It is a self-learning car with the use of artificial intelligence. With time, a car becomes more advanced and smart.
- Predicts any machinery failure before it occurs, which makes it more different than a regular car.
- Users can start the engine by on voice command from a smartphone before driving.
- The report of NHTSA says that it is safer to use an automated car rather than self-driven.
- Possible to control home devices from a car.

2. Smart Home

Insight of this application

- The usage of smart home appliances would make it safer and comfortable to live.
- Home appliances will be able to make decisions with the use of artificial intelligence.
- Conserves energy to home appliances during natural calamity.
- The smart home will generate an enormous amount of data that will help big data industries to predict more customer choice.
- A lot of companies will provide data security for home appliances.

- Voice command technology in smart home appliances will save a lot of time.
- Saves money on the electricity bills.

3. Smart City

Insight of this application

- The opportunity of the IT job sector in a city increases with the use of smart city applications.
- Increases the condition of air and water pollution because of regular monitoring.
- Decreases crime ratio comparing with other cities.
- Reduces traffic and accident with self-driving sensor connected automated car.
- Ensures appropriate use of water and electricity supply.
- Urban people can rely on secured automated public transport systems.
- Sensors connected with the building can detect seismic activity, wind pressure.

4. Precision Farming

Application of IoT in agriculture can make farming practice more effective and precise. Day by day, IoT applications are becoming popular in the farming sector because of good output. The idea of precision farming includes collecting data by field observation, vehicle monitoring, temperature and humidity measure, and so more. A core application analyzes all those data and provides a decision.

Insight of this application

- Analyzes soil conditions and provide the current PH of the soil and what types of farming should be appropriate.
- Detects water and nutrition level of soil and instructs IoT connected water irrigation system.
- Precise farming is a connected automated system with the collaboration of multiple mobile and desktop applications.

- As the population is increasing the demand for food increases as well. So the internet of things applications may provide a solution here.
- Ensures the use of each resource to grow more crops.

5. Agricultural Drone

Monitoring a massive crop field is not so easy. The agricultural drone is an aerial vehicle that can survey the massive field and reveal problems. Birds-eye view from the sky with sensors provides a clear and effective image. It can keep a great impact on agricultural business by saving time and accurate land management decisions.

Insight of this application

- Evaluate field analysis, crop health, crop growth, and pest attack.
- Research is going on overseed planting by drone technology.
- It can spray fertilizer and pesticides, which is much effective than regular spraying systems.
- With proper image processing algorithms, a drone can detect the fungal attacks.
- Excessive water flow on the crop fields can ruin the fields. To prevent that moisture sensor from a drone can detect extra moisture in an area.
- New job opportunity as agricultural drone pilot is coming.

6. Smart Grid

Insight of this application

- Sensing the transmission line smart grid ensures proper electric supply.
- Self-repairing characteristics of the smart grid mean it can automatically reroute electricity during a power failure.
- The transmission level of electricity is more effective than a common grid system.
- Reduces electricity costs of the consumer by suggesting them low-priority electronic devices.

- During heavy load, this IoT application suggests users reduce power consumption.
- Fault detection by the smart grid makes power supply management more reliable.

7. Connected Factories

IoT applications are changing our world, providing smart solutions. The idea of connected factories comprises of tools, machinery, and internet-connected sensors. It's a connected network with different tasks like schedule maintenance, the shipment of products, the flow of operation control and stop or pause a specific process. Generally, a supervisor monitors the entire task held in the factory, but IoT technology proposes remote monitoring by surveillance applications.

Insight of this application

- Real-time scheduling reduces extra energy consumption.
- Fault detection on system ensures quality of products.
- Smart factories run their operation the whole day long and reduce labor costs.
- This system uses a smart vehicle for product transportation.
- Working labor can focus on safer tasks.
- The flexibility of operation increases productivity.

8. Smart Retail

Who doesn't love to shop? IoT applications can make our shopping experience more effective and time-saving. It is a combination of "things" like RFID chip, foot traffic counter, and Wi-Fi monitoring and mobile application of the customer. The idea is when a customer is leaving a checkout system will scan all the products and reduce the total price from the mobile apps of that customer.

Insight of this application

- A customer does not need to maintain a long queue for checkout. The automated system saves time and makes the customer happier.
- The use of IoT deducts extra technology and implementation cost.
- Data management of this application is a challenge.
- Effective transportation of products.
- The sensor located in each self sends notifications if any products are out of stock.

9. Supply Chain Management by IoT

Logistics and transportation management is an old challenge. From manufacture to a retailer, maintaining inventory properly is always a problem. It is possible that a product can be lost during transportation. IoT applications provide a solution by GPS monitoring and RFID tag in a product. IoT technology can solve all the problems of supply chain management.

Insight of this application

- Ensures product transportation to the retailer, which increases the efficiency of the supply chain.
- The automated system ensures the perfect temperature for production, which increases productivity.
- It provides safety from theft and differentiates right products from damaged products.
- Supervisor gets notifications if any damage occurred to machinery.
- Shipment tracking is a challenge. Especially when the shipment is in between two countries. But using the special tag on products can reduce uncertainty.

10. Traffic Monitoring System by IoT

In third world countries, the existing traffic monitoring system is old fashioned. Traffic light somewhere controlled by manually. Traffic rules violator remains out of reach for proper surveillance. The solution of IoT applications could be appropriate here. Traffic control by using the internet of things gives us an intelligent solution with the use of image processing.

Insight of this application

- This application can count several vehicles on each side of the road and apply the KNN algorithm to measure the waiting time of each side.
- Surveillance cameras can detect and capture an image of traffic rules violator, and monitoring authority can take proper steps.
- It provides an extra facility to the ambulance.
- Less human effort to manage traffic system.
- Useful for any city in the world.
- Research is going on to find out the stolen vehicle by this application.

11. Forest Fire Detection by IoT

Forest fire is becoming a concern for many countries. This incident causes a significant loss of both human life and resources. Commonly, people notice forest fire when it is too late. IoT application platform can offer an effective solution. Use of proper wireless sensor can detect forest fire before it spread out.

Insight of this application

- Wireless sensor around the forest detects humidity from air and stores it in the cloud. If humidity is over a threshold system push notification to monitoring authority.
- Different sensor can be used for accurate detection. For example: temperature sensor, soil moisture sensor, ultrasonic sensor, accelerometer sensor.

- In the future, a controlled robot can be used to minimize fire.
- The use of this IoT application can reduce the loss around the forest.
- Sensors can be in sleep mode to save energy.

12. Portable Water Quality Assurance

In 2050 one –third of the world's population will suffer for fresh drinking water. The scarcity of fresh drinking water is increasing in many countries. For fresh drinking water quality should be monitored in real-time. This IoT project or application of remote water monitoring by the sensor with a dozen parameters can help to ensure freshwater supply.

Insight of this application

- The system sends notifications if common parameters include PH, salinity, temperature, turbidity, oxidation-reduction, and so more found one of the above danger levels.
- The use of this application ensures a fresh water supply from the city reservoir.
- This application can be useful in industrial are.
- Early detection of arsenic pollution can save lots of life.
- Data can be accessed anywhere from the world.
- It helps to maintain a good ecosystem in the river.

13. Structural Health Monitoring

Structural health monitoring of any construction at regular intervals is essential for a longer life span. To ensure the safety of any structure engineer uses a structural health monitoring system which is an old system. To avoid any damage or failure, IoT application in healthcare uses modern structural health monitoring method, which is more reliable and secure.

Insight of this application

- Provide accurate and real-time information about any construction.
- This technology can calculate the remaining life of a structure.
- Predict upcoming accident about an infrastructure.
- Collect data of different parameters like vibration, stain, moisture, crack width, etc.

14. Radioactivity Monitoring

The level of radiation around the nuclear reactor is not always the same. Working on a different sector of the nuclear environment could be a risk for life. Besides, nuclear waste and accidental nuclear fuel are so much radioactive that it can cause cancer. Monitoring each sector with sensor-based IoT applications can be a great help to reduce the risk.

Insight of this application

- GM counter is a radiation sensor that can detect radiation in an area and send a notification to the cloud.
- A GPS module and NodeMCU can be used to locate the radiation point.
- Increases security level and reduce the risk factors.
- It is helpful for other organizations to detect possible radioactivity.
- Research is going on for possible prediction of a nuclear blast.

15. IoT Controlled Golf Course

IoT applications are playing a majestic role in every sector of life. The sports sector is one of them. Controlling a giant golf course by IoT applications can be a great example. The basic idea is a golf course will be connected with different types of sensors and data found from

those sensors and devices will help to draw a real-time visible image of the whole golf course.

Insight of this application

- Analyze and visualize the data of the golf course such as soil moisture, humidity, rainfall, temperature.
- Real-time data update helps to improve the maintenance of the golf course.
- Collected data can be used for future improvement.
- Sends email to golfer about the current status of the golf court.
- Track the golf curt and sends them where it may be needed.
- The cost of the golf course is high. Monitoring and proper use of resources can reduce the price by 20%.

16. IoT in Packaging Industry

The next third wave technology is called the internet of things applications. The packaging industry is expanding as it is a growing concern of brands to provide quality products on the customer's hands. A study predicts that IoT packaging in the industry will grow to almost 18% production in 2021. Brands are using IoT applications for primary two purposes. One is for the protection of the product. The second is for embedded information of the product.

Insight of this application

- To preserve a product, the properly accurate temperature is needed. Embedded IoT sensors can change color if the product is beyond temperature.
- One of the major purposes of IoT packaging is to reduce the cost of regular packaging.
- Each company can track each product by IoT packaging systems. It can reduce the threat level for products.
- Use of digital label in each product can provide all types of information about it.
- The use of IoT in packaging can boost the economy of companies.

- Different IoT farm is already providing these capabilities.
- After having insights into IoT packaging, a company can reengineer the system for better customer experience.

17. Landslide Detection by IoT Application

Every year a lot of people die for heavy rainfall and landslide. It can occur for both human activity and natural phenomena. Use of IoT applications can reduce the number of loss. The idea is the authorities have to detect those possible zones first and embed there sensors and accelerometer. The sensor would detect soil moisture, and accelerometer would detect soil movement.

Insight of this application

- Data analysis center analyzes data found from the sensor and using proper algorithms they will predict a landslide in an area.
- Raises awareness among people before the landslide.
- Reduces loss of habitat, resources, transportation.
- Wireless sensor networks use geolocation for monitoring.
- The use of this application can stable the condition of the economy in a country.

18. The Volume of Visitors Check by Smart Phone Detection

Suppose a public event is occurring in your city and there is a presence of unlimited people. But IoT provides a smart solution here to detect their behavior. This IoT application platform contains three sensors located at three points of the event. Two are on the entrance, and another one is in the public transportation area. Lots of sensor scans the whole area to detect the number of the smartphone after 15 minutes and save data to the cloud.

Insight of this application

- This application detects the duration of stay, total project visitors, visitor's volume per location, and so much data of that event.
- At the same time, process data of multiple events.
- It provides control over the presence and behavior of all the people.
- Provides accurate visualization by monitoring pedestrian movements.
- It could be a part of the smart city, infrastructures.

19. Waste Management IoT Application

Waste management of the city is always a challenging problem. Implementation of the internet of things on waste management makes the whole procedure more smart and agile. The system proposes sensors would be connected with each bin. If the amount of waste goes beyond the threshold, each bin will send notifications to the leading cloud program. The administrator of the city will be able to check the current condition of the waste of each section of the city.

Insight of this application

- A city would be more clean and fresh for proper monitoring and use of resources.
- Trash bin collects information of temperature, fill level, location.
- Reduces extra work of workers as they did not know before the accurate status of the dustbin.
- Ultrasonic sensors can be used for measuring the waste of dustbin.
- Sends SMS to authority if any worker avoids cleaning the trash.

20. Urban Noise Detection

The device of IoT applications tends to connect. Noise pollution in urban areas is a common problem. The IoT solution of this problem is to use of each smartphone as a sensor by embedding noise label detecting mobile apps. Data found from each location will save in the cloud, and a software program will show each zone with a high noise label.

Insight of this application

- The monitoring authority will be able to take an accurate decision during the establishment of any construction.
- If the noise increases beyond the threshold around school and hospital, then the authority can come up with a solution.
- Information on noise labels will be available to citizens.
- The ambulance can avoid noisy road by watching the map of noise label of each zone.
- Urban lawmakers will be able to make law with more accuracy and environment-friendly.