

Assignment 1

Rishabh Maheshwari

19BCY10145

Use cases of Internet of Things

Smart Factories

1. Enterprise Asset management

Enterprise asset management involves: work management, asset maintenance, planning and scheduling, supply chain management and environmental, health and safety (EHS) initiatives. Businesses collect real-time data from an asset with IoT sensors.

IoT-powered asset management increases real-time visibility of assets and helps businesses optimize their resource while providing benefits such as:

- Increased operational efficiency
- Better control over the sales lifecycle
- More efficient safety and compliance checks
- More responsive smart environment.

2. Predictive maintenance

Maintenance is conducted to prevent predicted problems. So over the lifetime of a machine, some components may never be checked if they are not predicted to cause problems.

For example, Fanuc is a robotics company that is working on reducing the downtime of machines with IoT technology. Fanuc uses sensors to predict when the failure of the component will happen.

3. Industrial process automation/optimization

Organizations can keep a real-time record of the metrics of all the machines inside a plant using IoT and IP networks. Manufacturers can use this data to automate workflows and to optimize production systems. Automation and optimization support industrial companies to reduce costs and increase the quality and volume of output.

Smart Cities

4. Outdoor surveillance

When IoT CCTV cameras combined with artificial intelligence and machine vision, governments can automate surveillance of streets through cameras. As IoT enables connectivity of machines, they are able to record and analyse video data in real time, and they can provide police officers with insights instead of single pieces of images.

5. Smart lighting

Smart lighting is made up of street lighting with IoT sensors. Sensors collect data about the condition of traffic and pedestrians. With that data, street lights provide optimum lighting so that street lighting systems can save up to 80% of the energy.

6. Electronic Road Toll Collection and Traffic Management

Traffic engineers augmented by smart systems at a central traffic management center (TMC) can analyze data from IoT sensors then optimize timing of traffic lights throughout the day. This can help divide the traffic more evenly over roads as traffic volume fluctuates.

7. Smart parking

In cities like San Francisco, parking is a big problem. With IoT sensors, parking problems in a city can be minimized.

Working principle of smart parking is:

- Sensors are attached to parking lots to detect parked cars
- Measurements are periodically sent to the cloud by microcontrollers
- Mobile Apps use cloud data to identify empty parking spaces,
- Drivers check mobile apps to identify vacant parking spaces close to the location they aim to go to.

8. Noise Monitoring

In smart cities, sound monitoring systems can monitor noise levels and warn companies that violate limits and help manage noise levels.

9. Structural Health Monitoring

IoT allows remote collection of architectural data to monitor events such as vibrations and changes in material conditions, predict structural damage, and prepare action plans for structures such as bridges, buildings, stadiums, ships, airplanes, etc.

Water Management

10. Water conservation

Sensors detect the water level in tanks and alerts when the water level is lower than the threshold. Well™, a smart home water conservation system developed by Mindtribe, uses IoT sensors to monitor water usage.

11. Smart Irrigation

IoT sensors determine the weather condition and the soil moisture, which will help in getting the appropriate amount of water that soil needs. Bosch offers an IoT solution that measures how much water the tree needs and provides that amount of water.

12. Leakage Management

IoT sensors can detect temperature changes, water leakage, chemical leakage, and pressure level in water tanks.

13. Water Quality Management

IoT sensors determine what kind of chemicals are in the water. They also identify metrics such as total dissolved solids (TDS), bacteria, chlorine, electrical conductivity, etc.

Digital Health

14. Ultraviolet Radiation Monitoring

Sunlight consists of three major components:

- Visible light: Wavelengths between 0.4 and 0.8 micrometers,
- Ultraviolet light: Wavelengths shorter than 0.4 micrometers,

- Infrared light: Wavelengths longer than 0.8 micrometers.

Ultraviolet (UV) rays are electromagnetic waves that account for about 10% of solar light. When overexposed, UV rays have harmful effects such as skin cancer, premature aging, cataracts, and immune system suppression. IoT sensors measure UV sun rays to warn people not to be exposed in certain hours.

15. Companion Robots

A companion robot is a robot that is designed to create companionship mostly for elderly and single children. IoT sensors are essential for robotics and it is the same for companion robots as well. Sensors detect objects that surround the robot and enable the robot to move.

Researchers claim that people have become more receptive to companion robots during the pandemic. Since social isolation may lead people to loneliness, anxiety and frustration, especially for the elderly.

16. Medical Fridges

Medical fridges monitor the temperature of vaccines, medicines and organic elements for clinics and health centers. Medical fridges provide an opportunity to follow all safety standards and national regulations of the pharmaceutical market using IoT sensors. They prevent medicines and vaccines from spoiling.

17. Patient Surveillance/Remote Patient Monitoring

20% of patients who had surgery are readmitted to the hospital within just 30 days. Remote patient monitoring (RPM) systems use wearables to monitor the condition of patients who are resting at home after surgery. RPM enables real-time data collection about patients' body temperature which is the main indicator of infections. With RPM, doctors can observe patients' data and provide early diagnoses without requiring patients to be physically present at the hospital.

Smart Retail

18. Near Field Communication (NFC) Payment

NFC enables contactless payments. POS vendors include NFC support in their systems, and customers are adopting contactless payments via their smartphones.

19. Layout Optimization

Sensors in the store collect data like voice, image or video to better understand customer habits and preferences. Retailers can get insights to redesign the layout of their stores. The optimized layout can enhance sales. IoT sensors enable retailers to control the rotation of products on shelves and warehouses to automate merchandising decisions.

Smart Homes

20. Remote Control Appliances

IoT powered home appliances let residents remotely switch on and off devices using smartphone apps to avoid incidents and save energy. Additionally, these devices can make autonomous decisions based on sensor inputs such as preparing fresh coffee when a resident is identified to wake up. Other examples of autonomous or remote controlled actions include:

- turning on lights,
- starting the coffee maker,
- setting temperature,
- open up a music playlist,
- locking doors.

Home Intrusion Detection Systems:

21. Smart locks

Eyelock is a security provider vendor that offers its clients an iris-based authentication solution.

22. Motion detection

Manything is another vendor in IoT based home security market. It streams homes/office videos and lets users receive alerts when it detects any activity.

