

Applications of Sensor Networks.

- Environmental Monitoring
- Drinking Water Quality
- Disaster Relief Management
- Soil Moisture Monitoring
- Health care Monitoring
- Green House Monitoring
- Body Area Network.

1) Wireless Sensor Networks for Environmental Monitoring:

- Wireless sensor networks (WSNs) allow for innovative and attractive solutions, as well as for pervasive environmental monitoring by providing many important benefits such as real time access to data, coverage of wide areas, long-term monitoring, and system scalability.
- *Sensors used for environmental monitoring:*
Environmental sensors include: soil sensors, temperature and humidity sensors, gas sensors, rainfall sensors, light sensors, wind speed and direction sensors, etc. Not only can environmental information be accurately measured, but the data can also be tested, recorded and stored.
- Environmental sensors including biosensors are therefore necessary for monitoring the entire ecosystem, so that damage caused by toxic contaminants such as arsenic, mercury, lead, chlorides, and other heavy metals and pathogens present in our surroundings can be prevented or minimized.
- micro-electro-mechanical-systems (MEMS), low power WSN technologies were developed, and environmental monitoring could be conducted remotely and in real-time.

2) Drinking Water Quality:

- Monitoring water quality with WSN employs nodes that can detect physico-chemical parameters such as pH, conductivity, turbidity and chlorine.
- Real-time monitoring enables early warning capability to ensure timely response to water contamination.
- **TOC Sensor** - Total organic carbon (TOC) sensors are used in checking the quality of water.

There are two different TOC measurement devices available on the market: TOC analyzers

TOC sensors.

- Situ sensing technologies and doing spatial-temporal data mining for water quality monitoring. The main objective is to develop data mining techniques to water quality databases and use them for interpreting and using environmental data.

3) Disaster relief management.

- Wireless sensor networks utilize the technologies which can cause an alert for the immediate rescue operation to begin, whenever this disaster is struck.
- Novel sensor network architecture, useful for major disasters including earthquakes, storms, floods, fires and terrorist attacks.
- The SNs are deployed randomly at homes, offices and other places prior to the disaster and data collecting nodes communicate with database server for a given sub area which are in-turn linked to a central database for continuous update.
- Under normal operating condition, the database servers from different sub-areas

which are in turn linked to a central database for com

are connected by a backbone & any disruption due to disaster could force them to be connected via a satellite.

4) Soil moisture monitoring :

- Soil moisture monitoring device provides information about the water status of soil. knowing the soil water status can help you plan when to irrigate and how much water to apply.

- Soil moisture wireless sensor networks are used in the field of information monitoring for precision farm irrigation, which monitor the soil moisture content and changes during crop growth and development through sensor nodes at the end.

A custom made moisture sensor is interfaced with mica 2 mote wireless board.

In place of monitoring of the moisture level, a rain gauge is used to wake up the SN's from the sleep mode and it saves the energy consumed by WSN. This helps in achieving robustness and longevity.

5) Health care monitoring

Applications of sensor networks in Health care monitoring :

- Telemonitoring of human physiological data.
- Tracking & monitoring of doctors and patients inside a hospital.
- Drug administrator in hospitals
- Monitor and record the patients data such as blood pressure, heart rate temperature etc.

- A monitoring system connected to a hospital makes medical assistance at home possible through the IoT concept. Thus different types of sensors can be used. Example : GPS receiver, blood pressure, blood glucose, body temperature and breathing sensors.

- They are also used in medical devices used to assist with the diagnosis, prevention, monitoring and treatment of a disease or injury.

6) Body Area Network.

- Wireless Body Area Network is a short range wireless network of wearable computing devices.
- Technologies used in wireless body area network:
 - Wifi
 - Zigbee
 - Bluetooth
 - IEEE 802.15.6

* Medical Applications :

① Remote healthcare monitoring :

- Sensors are put on patients body to monitor heart rate, blood pressure & ECG.

② Telemedicine

- Provides healthcare services over a long distance with the help of IT and communication.

* Non-Medical Applications :

① Sports :

- Sensors can be used to measure navigation timer, distance, pulse rate and body temperature.

② Military :

- Can be used for communication between soldiers & sending information.

③ Lifestyle & entertainment :

- Wireless music player & making video calls.

7) Green house Monitoring :

- The Green house effect is a process that when gases in Earth's atmosphere traps the sun's heat. This process makes earth much warmer & make earth a comfortable place to live.
- Greenhouse Gases : Carbon Dioxide
Methane
Nitrous oxide etc.
- The greenhouse remote monitoring system measures
 - indoor : carbon dioxide, temperature, humidity
soil moisture, light, and air pressure.
 - Outdoor : Wind speed, wind direction. & rainfall.
- Wireless sensor networks (WSNs) allow for innovative & attractive solutions, as well as for greenhouse monitoring by providing many important benefits

such as real time access to data,
coverage of wide areas, long term monitoring
and system scalability.