PHASE-2

ENVIRONMENTAL MONITERING USING IOT

Introduction:

As the world faces an unprecedented climate crisis, it has become increasingly important to monitor the environment and keep track of the impact humanity is having on the world. One of the most promising technologies that can help achieve this goal is the Internet of Things (IoT). IoT in environmental technology allows us to collect real-time data on various environmental parameters, such as air quality, water quality, and soil moisture, among others, leading to actionable insights

FOUR BASIC STEPS OF ENVIRONMENTAL MONITORING:

There are four critical components for IoT-based environmental monitoring to support vital insights and decision-making:

1) Observation (Monitor the Environment and Collect Data):

The first step in the environmental monitoring process is to observe and collect data. This involves using sensors or other IoT devices to measure factors such as air quality, temperature, and humidity levels.

These connected IoT devices gather data about the environment and transmit it to a central hub. From here, the data can be reviewed in real-time or used for further analysis off line.

Often these systems produce unexpected results and temporal variances. For example, high CO2 levels when offices are highly populated could explain drowsiness or loss of concentration. This can also apply to public spaces such as bars and restaurants where invisible environmental factors may be making the consumer experience uncomfortable.

2) Analysis (Measure Data):

The next step is to analyse the data collected by IoT devices. This includes looking at trends over time, identifying areas of concern, and any correlations between environmental variables, time of day, behaviours and the relationships between indoor and outdoor metrics.

IoT sensing devices pick out key points of the data that indicate everything from chemical and water leaks to air pollution levels. This data analysis can help businesses measure their environmental footprint and make informed decisions about how to reduce their environmental impact.

For some businesses, this can be relatively benign or related to levels of comfort for workers, whereas others are related to safety. For example, monitoring systems placed in drains can be on the lookout for external pollutants such as diesel, oil, and paints that can stress the environment or harm livestock, fisheries or members of the public.

3) Storage (Catalogue Data):

Once the data has been analysed, it needs to be stored so that it can be accessed in the future.

IoT environmental monitoring systems make this easy by storing the data in a secure cloud-based database, allowing businesses to access the data whenever they need it and analyse how their environmental impact is changing over time.

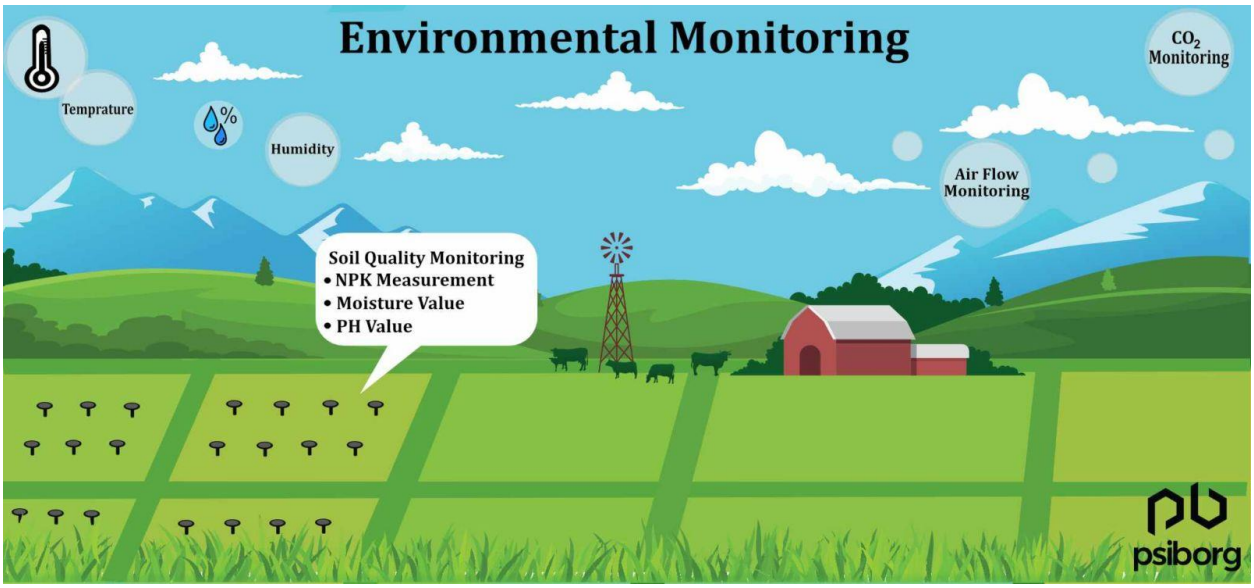
Global databases, such as the Microsoft Planetary Computer, catalogue enormous quantities of environmental data from around the world – although not every cloud database is that large.

4) Action (Provide Actionable Insights From the Data and Analysis):

Finally, businesses need to be able to take action based on the data that has been gathered and analysed.

IoT-enabled environmental monitoring systems can provide insights into how businesses can best reduce their environmental impact, such as by using renewable energy sources or introducing water conservation measures.

These actionable insights may involve changing operational processes, implementing new technologies, or even making changes to their overall business strategy.



DEVICES USED FOR ENVIRONMENTAL MONITORING:

Environmental monitoring devices come in a variety of shapes and sizes, from small handheld devices to larger IoT-enabled systems.

The most common types of environmental monitoring devices include:

Sensors:

These measure air quality, temperature, humidity, light levels and other factors. They can also be used to detect chemical or water leaks.

Measure	Sensor	Characteristics
Temperature and relative humidity	Sensirion SHT11	Temperature range: -40 °C to +123.8 °C Temp. accuracy: +/- 0.5 °C @ 25 °C Humidity range: 0 to 100% RH Absolute RH accuracy: +/- 3.5% RH Low power consumption (typically 30 μW)
Barometric pressure and temperature	Intersema MS5534	Pressure range: 300 to 110 mbar Pressure accuracy: +/- 3.5% Temperature range: -10°C to 60°C Temperature accuracy: +/- 2°C Operating range 3.6 to 2.2 volts
Outdoor Light	Hamamatsu S1087	Spectral response range λ: 320 – 730 nm Peak sensitivity wavelength λp 560 nm Photo sensitivity S (A/W) Infrared sensitivity ratio 10%
Ambient Light	Taos TSL2550	Range: 400 to 1000 nm Operating range 3.6 to 2.2 volts

Data Loggers:

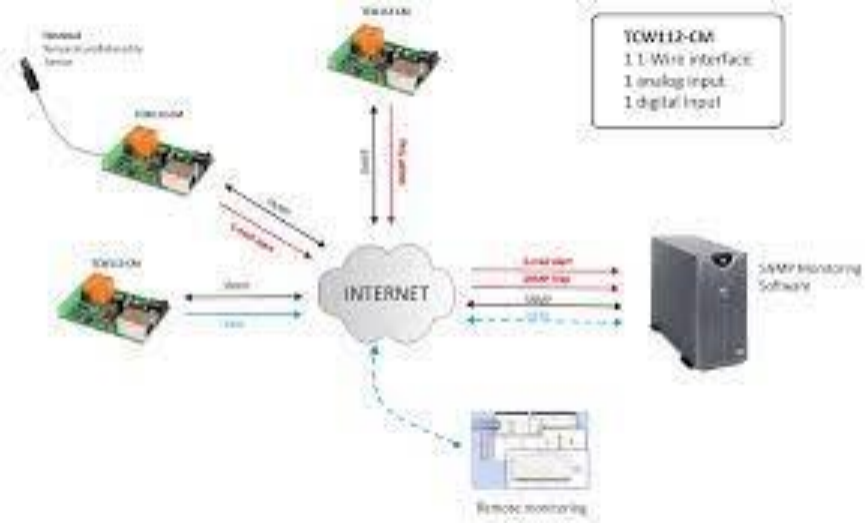
These record and store data over a set period of time. This can be used to measure changes in the environment over time or detect any sudden changes.

GIS (Geographic Information System):

This combines mapping technology with real-time data to provide detailed visualisations of environmental conditions.

Remote Monitoring Systems:

These systems allow users to monitor environmental conditions remotely and in real-time, providing timely insights into the state of their environment.

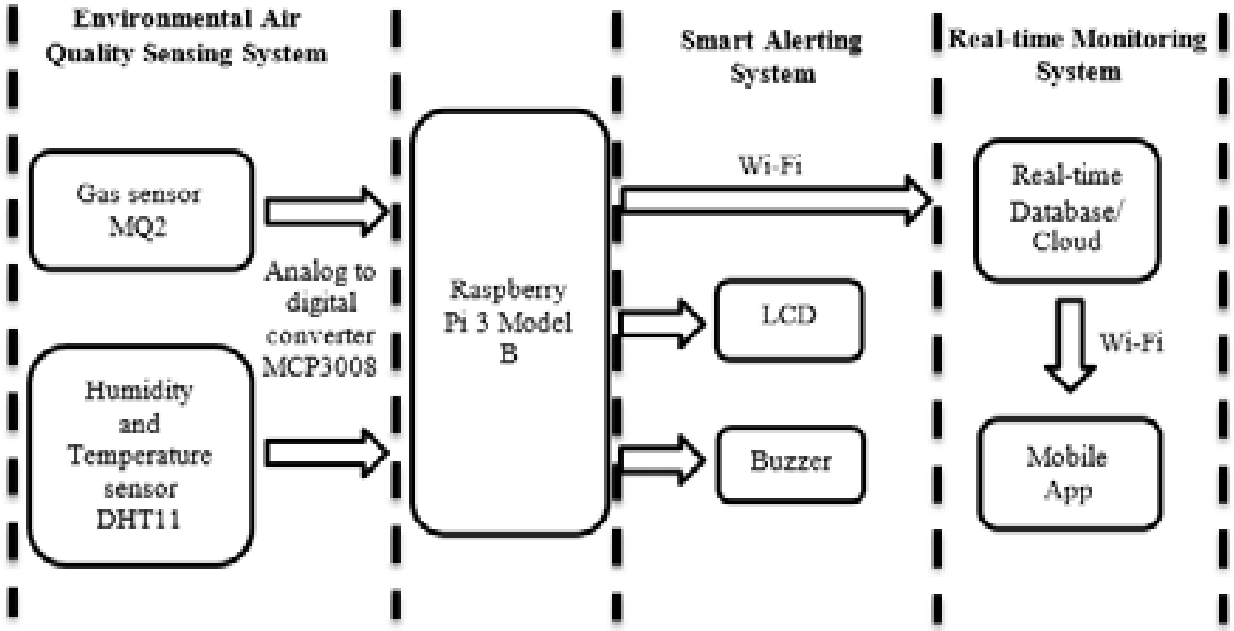


Drone-based Systems:

Drones can be used to collect aerial data and conduct surveillance of an environment. This helps businesses monitor for potential problems or hazards, such as oil spills or illegal logging.

IoT-Enabled Systems:

IoT-enabled systems collect data from multiple sources and provide a comprehensive view of the environment. These systems are used to measure long-term trends, identify areas of concern, and monitor environmental changes over time.



IoT-enabled environmental monitoring systems are increasingly popular as they provide businesses with the ability to collect and analyse large amounts of data quickly and accurately. This can help inform decisions around reducing their environmental footprint and achieving sustainability goals.

CONCLUSION

IoT in environmental monitoring has the potential to significantly impact the way we manage our environment and improve human health. It offers a more efficient and accurate method to monitor environmental conditions and make informed decisions about environmental management. Continued investment and development could enable IoT to play a crucial role in mitigating the effects of climate change and preserving the planet for future generations.