

Module 1

Detail 2-3 different potential use-cases for IoT, where:

- The sensors take readings and communicate with platforms
- Data is ingested which informs insights and triggers actions on actuators
- The overall impact is an improvement of the lives of humankind

In your description be sure to include the current state of play, IoT solution and the outcomes / benefits.

1. Smartwatch: A simple smartwatch can implement sensors to record a variety of metrics, including heart rate and heart rate variability (HRV), irregular heart rhythms, sleep cycle and tracking, regular daily activity and fitness, and even stress or body temperature. These fitness metrics would benefit individuals who are focused on fitness and health, aiding them in organisation and management in this aspect of their lifestyle. With mass amounts of data, these smartwatches can be programmed to predict or suggest ways of improving their fitness lifestyle through data analysis and AI, such as machine learning.

Beyond fitness metrics, they can be used as a safety device, detecting sudden falls, or extremely irregular low/high heartbeat. A GPS device can instantly alert appointed contacts and can contact emergency services.

2. Real-time inventory management in retail: by tracking each product from being stocked to being checked out, this will increase the level of management and organisation in inventory. There are sensors such as RFID and NFC tags that can be attached to products, usually clothes, that can be tracked from when it is made during production, to when it is placed inside the store. This tracking will ensure these processes are being executed correctly. The use of tags can also eliminate the need for manual stocktake and counts as they can be detected by a handheld scanner.

We also see the possibility of changing the way supermarkets run with instant detection of goods when placed into a shopping cart, automatically showing the customer the list of items in their cart as well as the total price. This can be connected to a mobile app where receipts, reward cards and payments can be made through, streamlining the shopping experience and minimising the need of manually checking out each item. This also reduces the rate of theft, which is common through self-checkouts, given that the accuracy of this method outperforms self-checkouts.

Module 2

```
{  
    Plant_no: id  
  
    Time: Date and time  
  
    X: number  
  
    Y: number  
  
    Moisture_percentage: number  
  
    Temperature: number  
  
    Light_percentage: number  
  
    Humidity_percentage: number  
}
```

Module 3

Using a relational database would be the most optimal data structure we could use to store and access the data. The following can be proposed:

Entity	Description	Fields
Zone	The a “zone” or a particular portion of the overall land.	zone_id, zone_name
Crop	Holds details about a particular crop species.	crop_id, crop_name, crop_moisture_min, crop_moisture_max
Sensor	The installed sensors.	sensor_id, zone_id, sensor_type, sensor_install_date, sensor_lat, sensor_long
Telemetry	Readings of crop moisture level and other metrics.	tele_id, sensor_id, tele_moisture
Sprinkler	Sprinkler control logs.	sprinkler_id, zone_id, sprinkler_status, sprinkler_flow