SIT314/SIT729 – Week 1 Group Activity  
The Impact of IoT on our lives

short line

# Overview

In this task you are going to think about the impact scalability has on the IoT services that we use.

# Tasks

1. What Internet-of-Things devices, applications or services do you use at home?

* Devices: Smart watch, smart fridge
* Applications: Apple’s Health app
* Services: Tracking user info (heartbeat to measuring circadian clock, motion to detect steps, …), detect environment light intensity (to decide whether turning up the light), detect the temperature / moisture to adjust as according.

1. What Internet-of-Things devices, applications or services do you use at university, at work, when traveling, when outside your home?

* Devices: RFID/NFC card (for entering a building / using a lift / transportation), smartphone (GPS)
* Applications: Access Management System (responsible for opening the entrance door / lift usage), Google Maps (access and collect user real-time location to send to Google Maps platform)
* Services: Backend Server / Service (for handling open door / using lift request), Google Maps platform (handling user request for route, nearby places, …),

1. Quantify the amount of storage/data transmission/processing required for the following IoT applications.

For each, list the type of information that it collects. Examples include, key presses, favourite choices, location, distance travelled. Calculate the storage required for that application for a day/month/year.

A. Health Monitoring using a smart watch, heart rate monitor, and internet connected weight scales.

Smart Watch:

* Heartbeat rate.
* Body temperature.
* Sleep / Circadian cycle.
* Accelerator (steps tracking).
* Bio-electrical impulses (ECG).
* Calories burned.

Heart Rate Monitor:

* Heartbeat rate.

Weight Scales:

* Weight.
* Body composition (fat %, muscle %, water %).

Calculated data storage information is based on DeepSeek references:

Smart Watch:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Data Type | Size / Record | Records / Day | Daily | Monthly | Yearly |
| Heart Rate | ~ 0.1 KB | 1,440 | 144 KB (~ 0.14 MB) | 4.32 MB | ~ 53.00 MB |
| Body temperature | ~ 0.1 KB | 1,440 | 144 KB (~ 0.14 MB) | 4.32 MB | ~ 53.00 MB |
| Steps | ~ 0.05 KB | 24 | 1.2 KB | 36KB | 438 KB |
| Sleep Data | ~ 1 KB | 1 | 1.0 KB | 30 KB | 365 KB |
| ECG | ~ 5 KB | 1 | 5 KB | 150 KB | 1.8 MB |
| Total |  |  | ~ 0.3 MB | ~ 9 MB | ~ 108 MB |

Heart Rate Monitor:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Data Type | Size / Record | Records / Day | Daily | Monthly | Yearly |
| Heart Rate | ~ 0.1 KB | 1,440 | 144 KB (~ 0.14 MB) | 4.32 MB | ~ 53.00 MB |

Weight Scales

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Data Type | Size / Record | Records / Day | Daily | Monthly | Yearly |
| Weight + Body Composition | ~ 0.5 KB | 1 | 0.5 KB | 15 KB | 183 KB (~ 0.18 MB) |

B. Fleet management using IoT devices to track and manage vehicles in logistics and transportation.

Type of information:

* Vehicles registration number / type.
* Departure and Arrival time of a vehicle.
* Route history.
* Real-time GPS Location
* Mileage (Odometer)
* Driver identification name / number / driver license number.
* …

Rough estimation for data storage

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Data Type | Size / Record | Records / Day | Daily | Monthly | Yearly |
| GPS Location | ~ 0.1 KB | 1,440 | 144 KB (~ 0.14 MB) | 4.32 MB | ~ 53.00 MB |
| Travel History | ~ 0.1 KB | 8,640 | 864 KB (~ 0.85 MB) | ~ 25.5 MB | ~ 301.00 MB |
| Engine Diagnostics | ~ 0.2 KB | 1,44 | 28.8 KB | ~ 864 KB (~ 0.85 MB) | ~ 10.2 MB |
| Cargo Information | ~ 0.1 KB | 24 | 2.4 KB | 72 KB | 864 KB (~ 0.87 MB) |
| Total for 1 vehicle |  |  | ~ 1.04 MB | ~ 31.2 MB | ~ 374.4 MB |

C. Smart Agriculture using IoT devices for precision farming, crop monitoring, and livestock management.

Type of information:

* Crop:
  + Pest / disease detection.
  + Growth stage.
  + Type.
  + Weather information: air temperature, humidity, rainfall, wind speed / direction.
  + Soil: composition – pH, nutrient level, moisture level, underground temperature.
* Livestock:
  + GPS tracker.
  + Health sensor: body temperature, heartrate, feeding schedule, ID number, vaccination history.

Rough estimation for data storage:

Crop Per Hectare

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Data Type | Size / Record | Records / Day | Daily Storage | Monthly | Yearly |
| Soil Information | ~ 0.2 KB | 24 | ~ 4.8 KB | ~ 144 KB | ~ 1,728 KB (~ 1.8 MB) |
| Weather Data | ~ 0.2 KB | 24 | ~ 4.8 KB | ~ 144 KB | ~ 1.8 MB |
| Total data storage per hectare |  |  | ~ 10.0 KB | ~ 288 KB | ~ 4.0 MB |

Livestock (a animal / day)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Data Type | Size / Record | Records / Day | Daily Storage | Monthly | Yearly |
| GPS Location | ~ 0.1 KB | 144 | ~ 14.4 KB | ~ 432 KB | ~ 5.26 MB |
| Bodily Information | ~ 0.05 KB | 24 | ~ 1.2 KB | ~ 36 KB | ~ 438 KB |
| Feeding schedule | ~ 0.1 KB | 24 | ~ 2.4 KB | ~ 72 KB | ~ 1.5 MB |
| Total data storage per animal |  |  | ~ 18.4 KB | ~ 600 KB (~ 0.6 MB) | ~ 8.0 MB |

1. Imagine a futuristic home in which everything is fully automated with Cloud-based IoT automations.

What would be the consequences if the internet service was cut off, and no local automation services exist.

A. The home air conditioning system

* Cutoff during the usage:
  + The air conditioning system will not be able to adjust the level of air flow / volume according to the changes in environment factors (moisture, air quality level, user activities …) while “temperature” is still allowing this system to function normally as traditional thermostat does not require internet connection or it will continue to release the cool / warm air given that the traditional thermostat system is being replaces with online automation services.
* Cutoff before any usage:
  + Like above, the system is still able to function normally thanks to thermostat given that this is a traditional thermostat instead of relying on internet connection to release or halt the release of cool / warm air. However, no local automation services exist then the air condition system is still to be able to function normally and required human intervention to manually adjusting the temperature.

B. The Security Access and Alarm System

* Cutoff during the usage
  + Tenants are still able to exist the building but not be able to re-access it because the Security Access is not able to send user information (access key card) to the internet to request for permission to entering the premise.
  + The Alarm System is not online / working as environmental data extracted from sensors are being kept locally instead of sending to backend server for processing and issue back the appropriate commands accordingly.
* Cutoff before any usage
  + Tenants will not be able to enter the building.
  + The Alarm System in this case will share the similar consequences as above.

C. Smart fire, gas, carbon monoxide monitoring system

* Cutoff during the usage:
* The system is still able to pick up data from connecting sensors but will not be able to any adjustment accordingly as not connection is found for this system to send this information to the backend server and receive the instructions back from this latter.
* Cutoff before any usage:
* Like above.