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SIT123: Data Capture Technologies

# Lab Work Week 5.2: Data Capture Scenarios (30 marks)

In this task you will investigate two scenarios that involve capturing data and making inferences based in the data.

You can use similar ideas for your project.

## Due Date Friday 5:00pm, 2nd September 2022

## Pre-requisites: You must do the following before this task

1. **Attend Class (Lecture) & Seminar**
2. **Read this sheet from top to bottom**

## Task Objective

Read the project ideas given below and consider their requirements

**Scenario 1:**

John has two plants on the balcony of his house. These plants require constant attention and caring. He has to water them when they require and make sure the soil moisture is kept at optimum levels. Otherwise the plants will not be in good shape and may not survive. John has become very busy these days and with his age it is hard for him to keep record and remember when to water the plants. He is looking for a smart solution to notify him when the plants need to be watered. Such a solution needs to provide a notification using an LED light connected to the pot to indicate when the soil moisture is below and over a certain limit. In addition, John also wants to find out if both plants require the same amount of water, or if he should be watering them different levels.

Note: Assume that both plants are planted in identical pots, using identical potting mix.

**Scenario 2:**

Jane, Megan and Kim are university students who enjoy cycling. Since they live in different suburbs, they usually cycle on their own, and not together. They think that it will be interesting to compare where they’ve been cycling. They want to see if they can find out some common areas and times to cycle together, based on things like distance, elevation, day of the week and times of the day.

## Task Submission Details

There are 8 questions in this task. Answer all of them in this word document itself and submit to unit site.

### **Q1: Propose a solution to the problem given in Scenario 1, using the Sense-Think-Act paradigm. Give an overview of your proposed solution, and outline its Sense-Think-Act requirements.**

* (5 marks)

John is a highly busy and elderly individual who cannot regularly tend to his plants. John has devised a solution in the shape of an Arduino gardener. Therefore, the moisture sensor will first be utilised to measure the soil's moisture content. The water level sensor will then be used to monitor the water levels in both pots, since John wanted to know the water levels so that he does not offer too much or too little water. John has now developed a solution. But he also needs to know when soil moisture is below or beyond a specific level, therefore John has programmed Arduino to emit SOS light signals whenever the soil moisture is below or above the specified amount.

### **Q2: Propose a solution to the problem given in Scenario 2, using the Sense-Think-Act paradigm. Give an overview of your proposed solution, and outline its Sense-Think-Act requirements.**

(5 marks)

In order to start bicycling together, Jane, Meghan, and Kim need to identify the same parts of the city and the same times when they all have to ride through. They solved the problem by using a variety of apps to monitor their whereabouts while they pedalled about. This means that by keeping tabs on their whereabouts, they will be able to piece together a timeline of their travel based on the timestamps of the many stops along the way. On the other side, they all made a GPX file of their positions, so they have a report they can use to simply determine their elevation. They will be able to determine where everyone was at the same moment by comparing their current positions. Now they know they can share the road.

### **Q3: What kinds of hardware do you think can be used to solve the problem in scenario 1?**

(3 marks)

Arduino Uno .Moisture Sensors .Water Level Sensors .Data logger shield and Jumper wires

### **Q4: What kinds of hardware do you think can be used to solve the problem in scenario 2?**

(3 marks)

A GPS-enabled tracking app on a smart phone Mobile Device or Desktop Computer

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### **Q5: Think of a data collection approach to be used in Scenario 1.**

1. What things can result in ‘dirty data’ in this case?  
   Duplicate or Incomplete data
2. What can you do to clean the data?

Excel is a simple tool that can be used to clean and fix this kind of data, among many others.

(4 marks)

### **Q6: Think of a data collection approach to be used in Scenario 2.**

1. What things can result in ‘dirty data’ in this case?  
   Insecure data and an abundance of data
2. What can you do to clean the data?

Microsoft Excel and IBM InfoSphere can be used to clean up this kind of unclean data, but we still need to take precautions to prevent it from falling into the wrong hands.

(4 marks)

### **Q7: Propose some ways to extend your proposed solution for scenario 1.**

(3 marks)

John is an exceptionally bright individual, and he proposed certain improvements that would have made the solution even stronger. First, John had a buzzer placed in addition to the led lights so that he would be warned and alerted no matter where he was in the home. John might also benefit from an advanced programme like "Bylnk App," which would send him push notifications if the soil moisture in his yard drops below a certain threshold. When the water level in the planters becomes low, John may activate the automatic water machine to water the plants.

### **Q8: Propose some ways to extend your proposed solution for scenario 2.**

(3 marks)

There aren't many ways to make this solution more comprehensive, but one thing that can be done is to recommend that the three girls use a high-end journey tracking app like Apple's cycle tracking service, which will keep their data safe and give them access to insightful, in-depth information about their rides.