



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

SECP1513 - SECTION 04

REPORT PART 1

ASSIGNMENT: LOW FIDELITY PROTOTYPE PART 1

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INTRODUCTION

We are a group of students that have come together to work on a project that is connected to autonomous farming. We hope to develop an application named “Autofarm” as a result of this project. We created this application specifically for farmers or anyone who has a garden in order to make their everyday tasks a little easier. We relate this initiative with one of the four industrial revolutions (4IR), which is the Internet of Things (IoT), because of the advancement of technology today. This is due to the fact that the Internet is readily available and accessible from any location.

The advantages of “Autofarm”

Farmers will be able to overcome the following issues once this project is completed:

1. Autofarm will notify the farmer when it is time to water the plants, ensuring that the plants are always healthy.
2. Autofarm will notify the farmer when it is necessary to fertilize the tree in order for the tree to receive sufficient nutrients.
3. When the plant is fruiting, the Autofarm will notify the farmer, and the farmer will know if the plant is fruiting or not.
4. Autofarm will notify farmers if there are pests on their crops that are causing damage to the plants.

CONTENT

How our project related to 4th Industrial Revolution :

Autonomous farming is a revolution of traditional way to modern method where Internet-of-things(Iot) devices/equipment take place in the farming site. Internet of things is an ever growing 4th Industrial Revolution as is spreading the whole over the world in each and every field.

In our project :

Autonomous farming :-

- Equipment such as sensors, automatic self-watering devices, signal creators and etc are being used in order to make the farmers/croppers work easier and guarantee a profitable farming.
- These equipment are Iot devices where it is connected to our application via the internet so that the person in charge of the farming fields can supervise the condition of crops or plantations much more easily through our sensors.
- Even without a person physically to be at the site, through the application that connected to the Iot devices equipped in the farming area, information such as presence of pests/ need of water and fertilizers can be detected and notify the farmer.
- Since those equipment are connected through the internet, despite day and night those technologies can still be functioning all the time.

Potential Client

We have a plan to attract Agriculture Industry Companies not only in Malaysia but in other countries if possible. This is the first step to move to the 4IR technology application in Agriculture Industry.

1. Rice Company

As we all know, rice companies are the most common agriculture company in Asian region, especially in Malaysia, Indonesia and Thailand. In addition, rice is a common thing that we put in almost all dishes in Malaysia. So we planned to introduce and develop some equipment that can save time and boost productivity for these companies.

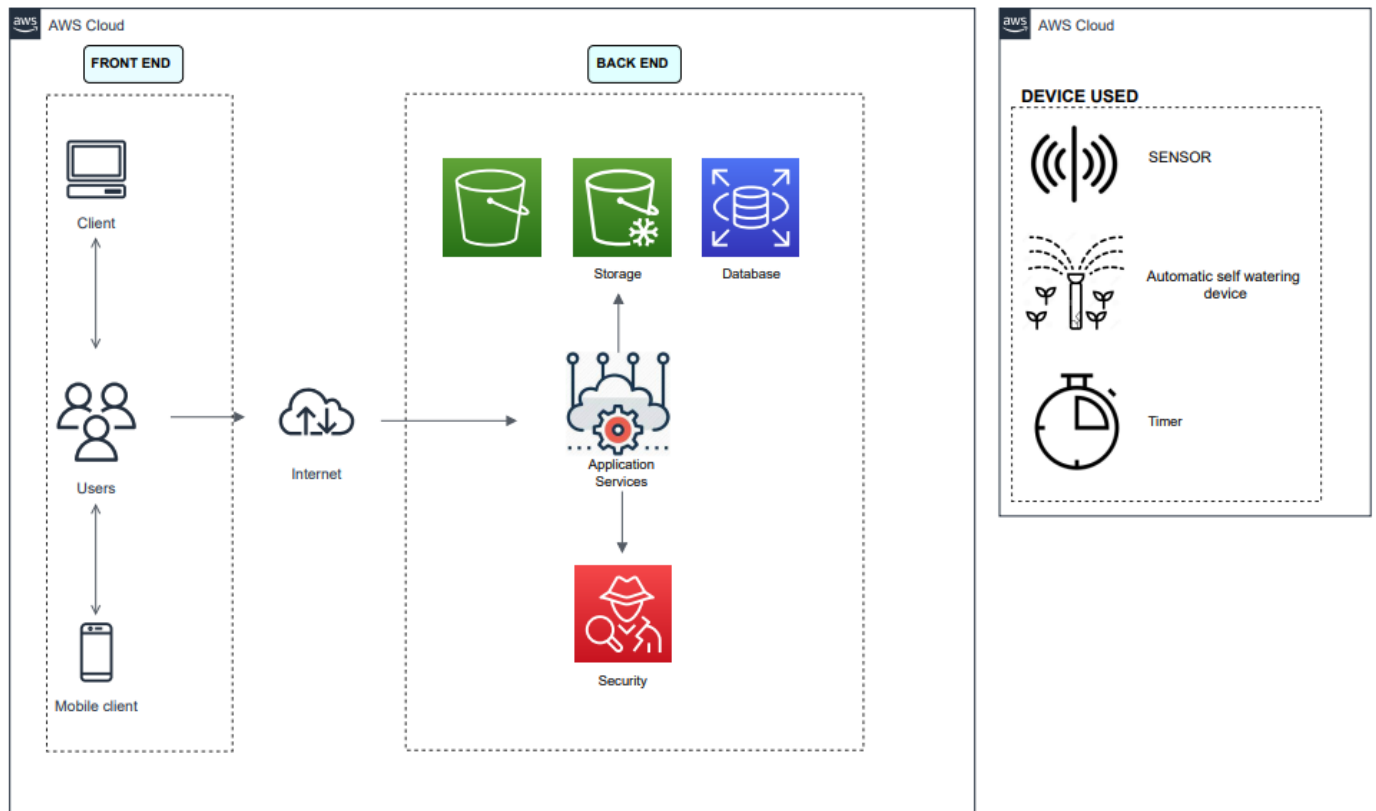
2. Wheat Company

Wheat is the product that is popular in many countries such as countries in Asia and America Region, especially China, India and USA since these countries have the most wheat productivity in the 10 years period (2009-2019). This happens because wheat product can be consumed as food and drink. Wheat product also can be snack.

3. Fruit Company (etc corn, strawberry)

Nowadays, many companies produce a carbonated drink and juice based on fruit flavour. They also use fruit in isotonic drink. We planned to make increase the product quality and make it maintain its quality by suggesting smart farming to them. A smart farming is a farming system that utilizes IoT that used remote sensors and analytical tools to collect real time data of elements such as the soil's pH value, the temperature, the humidity and the weather. By using this we can boost up the probability of good product productivity for these companies.

ARCHITECTURE PLANNING AND DESIGN



Front end

- In order to access the apps, users must provide their email and password.
- It is possible to use these apps on a computer or smartphone.
- The Internet is also required to use these apps.

Users will receive a notification from the apps if :-

1. The time has come to water the tree

- Using the apps, users may programme the autonomous self-watering equipment to water their trees at a specific time.

2. Fertilization time

- Users can specify a fertilization time for their plants, and when that time comes, the apps will send a signal.

3. Fruit or vegetable products from plants

- When the plant bears fruit and it is mature, the user will receive a message that the fruit is ready to be plucked.

4. Plant-damaging insects.

- A notification will be sent to the user if pests are present on the plant. As a result, consumers will be aware of the presence of pests.

Back end

- Back end is the service provider platform to manage the resource and data and make sure all the application services are moving fluidly.
- Our application uses amazon web services as our main cloud service provider.
- There are several categories of the back end services used in the application.

1. **Storage** - used for store client's information and client's farm information

- ❖ Amazon simple storage service(Amazon S3) allows us to store and protect enormous amounts of data for our use case which is for web-based applications and mobile applications.
- ❖ Amazon S3 Glacier storage classes allows us to archive old data or unused new data when a user deletes the application , so that whenever any client wants to reused back the application , they can reuse back their email to login, and get back all the data that they used before this.
- ❖ Amazon Relational Database Service allows us to set up and manage system databases in the cloud so that client information is stored in a structured database and it is easy to access the Information when needed.This services also provide scalable databases so that we just use the database within our capacity only.

2. **Security** - used to protect the application from vulnerabilities

- ❖ Amazon detective allows us to identify the root cause of the suspicious or any security issue , like malware attack and denial of service(DOS). This service automatically collects log data from our application aws resources and uses technolo like machine learning to make sure we can find the root cause of the problem faster and in an efficient manner.

CONCLUSION

In conclusion, we can say clearly that this project is one of the developing technologies in the fourth industrial era especially in the field of agriculture. This is because this project uses the concept of IoT that allows devices embedded with sensors to connect and interact with each other over the internet. Thus the users can easily control or monitor remotely and at any time. We believe that this project will be in high demand in the industry throughout Malaysia and around the world. We also believe that this achievement will be able to give efficiency to the agricultural space, and create a virtuous cycle that makes food products more accessible to consumers, saves farmers time and reduces the environmental impact of agriculture by driving sustainability into the process.

However, there are definitely limits to any technology developed by humans, such as this project's limited connectivity in rural areas. Most of the farming and plantations area involves in rural areas, where the implementation of cloud computing technology needs good network performance and bandwidth speed. Unless this network problem is not solved, then the implementation of several smart farming technologies will become problematic. Since most of the sensors and cloud based computing depends on cloud services, the services and network needs to be strong enough to be implemented in rural areas. Other than that the limitation is interoperability of different standards, since several agricultural technologies come from original equipment manufacturers cause several of available tools and technology often do not follow the same technology standards and platforms. The challenges lies in transforming the smart devices to connect the IoT to the current agricultural technology which are mostly unavailable yet. Therefore the agricultural industry in Malaysia needs to be sensitive to current technology in order to produce agricultural technology that can communicate with IoT.

Although this project has some capacity limitations, however of course there are more benefits about this project such as it could effectively control the growth environment of the planted crops. Farmers who manage the facility should be able to monitor the growth status of the planted crops by using mobile devices from their offices, without physically going to the facility. This project could increase the farm profits due to precise control and optimal prescription of agriculture and at the same time also be able to contribute to the economic upliftment of the country. Beside that, since the agricultural sector can severely be affected by the weather, thus the industry needs the best solution measures for this problem, Therefore application of this project between IR4.0 in dealing with weather-related problems would be very useful. For example, we can offer a simulation model to precisely predict the oncoming weather pattern so that farmers can be ready with a proper mitigation plan. We strongly believe that this autonomous farming project will able to help many farmers in developing their business