**COURSEWORK SUBMISSION FORM**

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| **STUDENT USE** | | **STAFF USE** | |
| Module Name | Internet of Things | First Marker’s  (acts as signature) |  |
| Module Code | 6COSC014C | Second Marker’s  (acts as signature) |  |
| Lecturer Name | Shirin Primkulova | Agreed Mark |  |
| UoW Student IDs |  | **For Registrar’s office use only (hard copy submission)** | |
| WIUT Student IDs | 00010023 |
| Deadline Date | 7.12.2022 |
| Assignment Type | Individual |
| Word Count | 696 |

**SUBMISSION INSTRUCTIONS**

**COURSEWORKS *must* be submitted in *both* HARD COPY (to the Registrar’s Office) *and* ELECTRONIC unless instructed otherwise.**

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# Introduction to case

The project will primarily target the agricultural spectrum. The reason for this lies in the huge size and contribution of this particular field. According to USDA (2016), food and agricultural sector contribute over $750 billion to the gross domestic product when food-related industries are involved. However, agriculture is highly dependent on the climate. This means that growing crops can become more difficult during climate change. This phenomenon could also pose some difficulties for farmers in terms of control and supervision.

# Proposed solution

Since it is not always for farmers to be aware of the agricultural conditions, especially during weather changes, the introduction of smart agricultural system could solve the problem. My idea is to develop a mobile application which will act a supervisor for growing crops especially in rural areas. The platform which collects all data of plant and earth where those plants were planted will be mounted into a placement with its modules. The platform which is connected to the internet via Wi-Fi protocol will be storing collected data about moisture of earth, humidity, temperature, and many parameters into Firebase backend which parallelly exchanges that information with smartphones which also is connected to the internet. Mobile application derives a convenient graphical interface that lets user to interact with platform way more easily.

# Things used

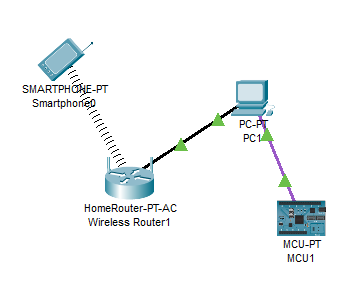
In this provided list below, there will be listed things that have been used on project with its explanatory definition whether how it was used.

* NodeMCU, it’s a whole platform that helps us to connect all modules and centralize processes. It’s based on ESP8266, a low-cost Wi-fi microchip with built-in TCP/IP networking software which gives opportunity to connect and transfer data via Wi-fi protocol. By using ESP8266, the project will be transmuting data to mobile application by accessing firebase.
* LCD Display, in order to display the states of the program that is being executed on the NodeMCU.
* DHT11, this module helps us to get information like humidity & temperature using sensors. Using this module, all information regarding to plants environmental state will be obtained.
* Rele 2, a simple switcher for our third-party module. Water channeling system will be connected to the platform via rele and using reles, platform will turn on/off plumb regarding to the automation of system.
* Infrared receiver, to receive button signals from remote control. In emergency cases, if phone’s battery dies, user won’t have access to the application. Therefore, there will be a remote control that has access to the platform.
* Plant moisture sensor, this module helps us to measure moisture level of dirt (earth). Regarding to indicator, watering system will be turned on/off as this module is the main parameter of system.

# Technology used and obtained results

* NodeMCU – it could have been replaced by something more advanced like other bigger platforms by Arduino by letting the platform to something more complex or bigger codebases.
* C programming language within Arduino eco-system. This rather would be called a limitation as the C compiles directly to bare metal binary which uses most minimal size of memory.
* Medium sized LCD Display to show most of the information available on the platform. Just for emergency cases if the phone’s battery dies. Phone application shows all information, built-in display serves as a secondary resource of information. It also would be replaced by something smaller or bigger sized display to maintain better information display.
* Android Studio is used to maintain android application as the client side for users. It is also possible to use hybrid libraries and frameworks to maintain client side such as electron, react native or tauri.

The picture below represents whether how the platform transmutes packets.



# Future improvements

Currently, the platform is in the state of plugin-in-play, and it needs another platform that controls the water flow by opening and closing it. Also, this project has extensibility issues as this project has been done to meet the requirements of coursework. If this were a personal or free form project, it would have been used better platforms as raspberry pi to utilize more codebases to make measurement even more accurate and add more support for other type of sensors.

**References**

# USDA (2016). Climate Impacts on Agriculture and Food Supply. Available from <https://climatechange.chicago.gov/climate-impacts/climate-impacts-agriculture-and-food-supply#ref2> [Accessed 3 December 2022]