SMART MASHROOM FARM

Mr. Sulaiman Makeng 581431017
Mr.Lokman Yusoh 581431044

Advisor

Mr.Fausan Mapa

Faculty of Science and Technology

Fatoni University

CHAPTER 1

1.0 INTRODUCTION

1.1 Project Overview

Life, work, entertainment, tourism are parts of an economy that is starting to change with technology in nowadays that can replace people. And also, in the careers of the people must comply with the changes of the world as well.

In the modern times, full-time jobs or salarymen are not the final answer for those who want to have financial stability or happiness in their work. Therefore, it is necessary to have a second career because there are many more types of work to choose. Now, some people have additional work to do. While many people are not daring to step away from their original point of view, with the idea that the most stable job is to be a person with a certain income. During the past, it can be seen that the cultivation of mushrooms Is an interesting career for those who want to do extra careers Due to low cost Is a plant that uses little water easy to grow and good income.

And nowadays, Agriculturist needs to produces high quality and good price. The earth's changing environment make more difficult to grow plant and output is not quality because of the weather and the environment has the variance. Sometimes it's too hot, sometimes it's too cold and sometimes heavy rain. These factors affect to growth of plants that farmers planted all. That makes growth of plants is not fully. So, growing plant in greenhouses for can control environment in grow plant. Currently the technology plays increasingly a role to an agricultural system in order to add a product value in both the quality and the quantity of products. This project aims to propose for mushroom smart farm by controlling the temperature and humidity including camera real-time with Al by internet of thing. Cultivation of mushroom in indoor greenhouses, it always needs to sprinkle water. When temperature is high, default humidity in greenhouse, will make plant dried and growth of plant is not fully. So, have an effect on output.

Cultivation of mushroom smart farm should be considered temperature and humidity in greenhouse. Temperature is can’t control, will make low humidity.

So, this is the problem occur in mushroom farm in greenhouse of mushroom farmers.

Figure 1.1 mushroom farm

1.2 Problem Statement

Nowadays, in the world have climate variability have an effect on Agriculture to results in productivity to grow up ineffective. That can't to control the temperature, can't increase to humidity.

The most important garden without automation control in the case of problems that the mushrooms to not grow because of the high temperature and lower humidity that will not have smog. (Sprinkler) and water level to control the lower temperature in the greenhouses, and it will make mushrooms dried and growth of plant is not fully.

1.3 Project Objectives

- To develop IOT system in control temperature and automatic machine.
- To show the value of temperature and humidity with automatic include AI control system.
- Reduce risk, increase quantity and quality.

1.4 Scope of the Study

- In this research using an IOT system sensors used to measure temperature and humidity, and using AI to monitoring the growth of mushrooms in mushroom house and control the water pump to opening and closing via Automatic sprinkler by sending data through to the internet.
- Can displaying humidity status and time for recording humidity data and for displaying the working conditions of automatic water pump via mobile as in figure 1.4

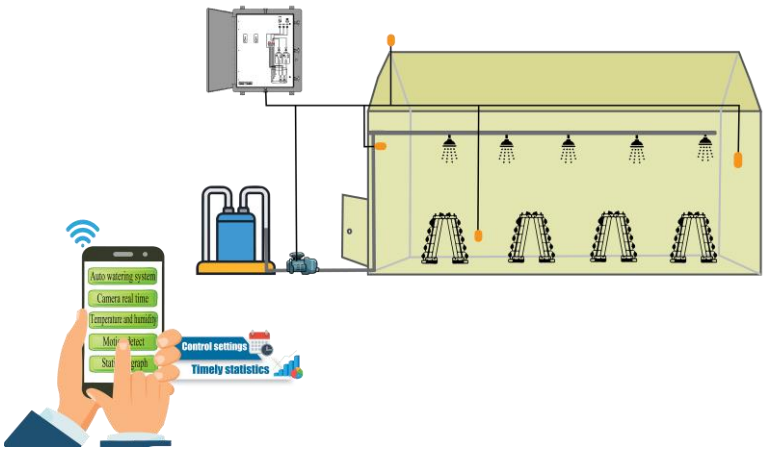

Figure 1.4

From the picture 1.4 shows the factors that affect the growth of the mushroom, consisting.

1) temperature. The optimum temperature for mushroom growth is about 25 degrees Celsius. If the temperature is below 15 degrees Celsius or higher than 35 degrees Celsius, mushrooms The angel will not bloom and causing the clot to get a temperature lower than 20 degrees Celsius in a short time. Or get a low temperature

2.) Humidity in mushroom that requires high humidity and humidity, and suitable house conditions. The moisture content should not be less than 80-85 percent.

3. Nutrient content in Mushroom cubes considered to be important to increase quantity of mushroom. Found that if supplementing with ammonium nitrate supplements will result in mushroom mushrooms Increased by approximately 25 percent.

1.5 Significant of study

To developer

- To study the design and development of temperature and humidity control systems, and image processing system in the house.
- To study the device to create the temperature control, and image processing.
- Increase ability of developer to use software and hardware to be high quality.

To user

- To comfortable using the system of control in technology with Agriculture.
- To know the value of temperature and humidity with automatic control system on Monitoring in Hydroponic Agriculture.

1.6 Software and hardware requirements

SOFTWARE SPECIFICATION	
Software List	**Version**
Arduino IDE web editor	Arduino IDE 1.8.19
Android Studio	**3.3.1 for Windows 64-bit**
Firebase Realtime Database	cloud-hosted database

Fritzing	Fritzing 0.9.3
HARDWARE SPECIFICATION	
Hardware List	**Version**
Smartphone	Specification of oppo a7, oreo 8.1.0, Qualcomm SDM 450 Octa Core, Internal 16GB, 2GB RAM, WLAN Wi-Fi 802.11 a/b/g/ac, hotspot.
Computer Laptop	Specification Window 10 Operating System
demcu ESP8266	ESP32 Wemos LOLIN32 D1 ESP32 WIFI and Bluetooth Development Module
DHT temperature and humidity sensor	DHT11 Digital Temperature and Humidity Sensor DHT11
Relay	Arduino Relay 3 Channel 5V Optocoupler Relay Module
Breadboard	8.5cm x 5.5cm 200 holes 1 breadboards
Automatic water pump	VALU Model ZB-365AL
Character LCD	LANDZO LCD1602 1602 screen LCD Display Module Blue white
Camera Realtime	Camera Module FIFO Webcam Module OV7670 + FIFO(AL422B)

CHAPTER 2

LITERATURE REVIEW

IoT Technology was applied for the mushroom. The developed IoT system was considered stable. Humidity, temperature, moisture and data was considered reliable and accurate. This method can also be extended to cultivations that are made in closed areas. Weather data from the meteorological department can be used along with the sensed data to predict more information about the future which can help farmer plan accordingly and improve his livelihood. Integration of farming with IoT can make it much more efficient and profitable activity.

2.1 Definition

2.1.1 Internet of Things

Internet of things (IoT) was invented by Kevin Ashton in 1999 from the Auto-ID Center program at the university. Massachusetts Institute of Technology, or MIT, from RFID technology that will set a global standard for RFID Sensors that will be connected via the Internet. Which those connections themselves Became the concept of making various electronic devices Can communicate with each other by using sensors to communicate with each other

Today, IoT is applied to many things around the world. Not even the agricultural sector for the purpose of effective farm management by Use human labor to a minimum This is the origin of the term "smart agriculture" or "Smart Farm" which uses RFID Sensors technology to connect with various agricultural equipment. So that those devices Can communicate with the main control equipment such as the use of various data sensors such as Weather Station, Soil Sensor, Plant Disease Sensor, Yield Monitoring Sensor etc. This system can be placed into a wireless sensor network by installing or releasing it in fields to collect information such as soil moisture, temperature, amount of light and chemicals in order to know when and when to use fertilizer, water, insecticides. Different areas Which the fertilizer and water / insecticides will use fertilizer / water / insecticides technology Also known as Variable Rate Technology (VRT), this technology uses a sensor system to analyze data on which plots should be provided with liquid fertilizer and pesticide at any time. Which the technology will be used in conjunction with the Global Positioning System (GPS) technology

2.1.2 Greenhouses for mushroom

Controlled Environment Agriculture (CEA) includes greenhouses, growth chambers, or any totally enclosed structure providing control of the aerial **environment are temperature, relative humidity**, carbon dioxide (CO2) around the leaves & light (for photosynthesis) and oxygen (O2) around the roots and shoots (for respiration). Protected Agriculture are mulches, row covers, shade structures, greenhouses, etc. Any type of method or structure used to extend the **"growing season".**

2.1.3 Image processing

Image processing is a method to perform some operations on an image, in order to get an enhanced image or to extract some useful information from it. It is a type of signal processing in which input is an image and output may be image or characteristics/features associated with that image. Nowadays, image processing is among rapidly growing technologies. It forms core research area within engineering and computer science disciplines too.

Image processing basically includes the following three steps:

Importing the image via image acquisition tools;

Analysing and manipulating the image;

Output in which result can be altered image or report that is based on image analysis.

There are two types of methods used for image processing namely, analogue and digital image processing. Analogue image processing can be used for the hard copies like printouts and photographs. Image analysts use various fundamentals of interpretation while using these visual techniques. Digital image processing techniques help in manipulation of the digital images by using computers. The three general phases that all types of data have to undergo while using digital technique are pre-processing, enhancement, and display, information extraction.

In this lecture we will talk about a few fundamental definitions such as image, digital image, and digital image processing. Different sources of digital images will be discussed and examples for each source will be provided. The

continuum from image processing to computer vision will be covered in this lecture. Finally, we will talk about image acquisition and different types of

2.2 Related Work

2.2.1 Development of temperature and humidity control systems suitable for growth of mushrooms in a mushroom nursery

Development of an appropriate temperature and humidity control system for the growth of mushrooms in mushroom farms

From this system study, it will show heat control, temperature control, water control, ventilation system and display real time information through the mini screen in front of the control box and note the data into the document for analysis Date of harvest When there is no control system and have a control system.

2.2.2 Smart farm

From the study of smart house systems, this system is the use of various sensors in smart houses.

Such as Melon greenhouses Tomato greenhouses Rose house the system has adopted temperature control system, controlling fertilizer, fertilizer and lighting suitable for plants. But this type of system will work to adjust the weather automatically. And have notifications via mobile phone and computers the whole system is called Handy Sense.

2.2.3 Application of IOT technology for smart farm control in mushroom house

Application of IOT technology for smart farm control in mushroom house

The study of this system will be a smart farm mushroom cultivation that can moisten the temperature.

And display the data on Netpie and study the growth of mushroom mushrooms for analysis

And further to build a mushroom house. The equipment used in this system is

NotMCU, LCD, Relay, Fan, DHT 11 Sensor

2.3 Tool of used

2.3.1 Relay module

This is a 5V, 10A 2-Channel Relay interface board. It can be used to control various appliances, and other equipment with large current. It can be controlled directly with 3.3V or 5V logic signals from a microcontroller (Arduino, 8051, AVR, PIC, DSP, ARM, ARM, MSP430, TTL logic).

Figure 2.3.1: Relay Module

2.3.2 DHT Temperature and Humidity

The DHT22 is the more expensive version which obviously has better specifications. Its temperature measuring range is from -40 to +125 degrees Celsius with +-0.5 degrees accuracy, while the DHT11 temperature range is from 0 to 50 degrees Celsius with +-2 degrees accuracy. Also the DHT22 sensor has better humidity measuring range, from 0 to 100% with 2-5% accuracy, while the DHT11 humidity range is from 20 to 80% with 5% accuracy.

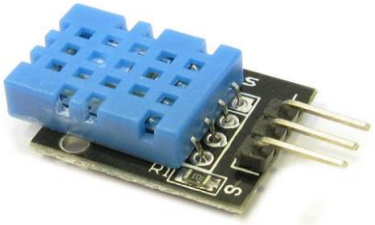

Figure 2.3.2.3 : Servo motor

2.3.3 NodeMcu 8266 CP2102 Development Board

NodeMCU Amica is a ESP8266 Wifi Module based development board. It has got Micro USB slot that can be directly connected to the computer or other USB host devices. It has got appearance as shown in above image. It has got 15X2 Header pins and a Micro USB slot, the headers can be mounted on breadboard and the micro USB slot is for connection to USB host device that may be a computer. It has got CP2102 USB to serial converter.

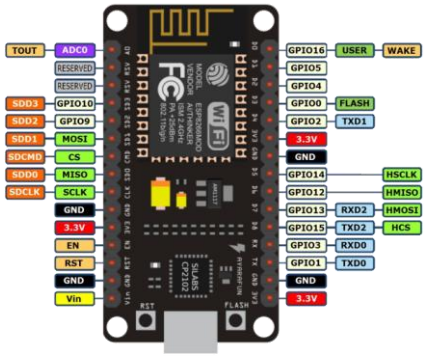

Figure 2.3.3 : NodeMcu 8266

2.3.4 Breadboard

A breadboard is a widely used tool to design and test circuit. You do not need to solder wires and components to make a circuit while using a breadboard. It is easier to mount components & reuse them. Since, components are not soldered you can change your circuit design at any point without any hassle. It consist of an array of conductive metal clips encased in a box made of white ABS plastic, where each clip is insulated with another clips. There are a number of holes on the plastic box, arranged in a particular fashion. A typical breadboard layout consists of two types of region also called strips. Bus strips and socket strips. Bus strips are usually used to provide power supply to the circuit. It consists of two columns, one for power voltage and other for ground.

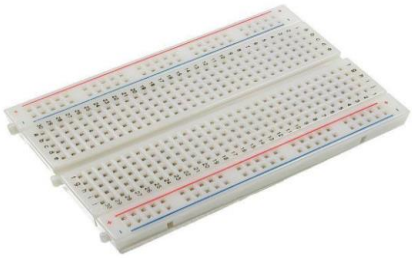

Figure 2.3.4 : Breadboard

2.3.5 Jumper

pieces of plastic 10CM long male mother, mother to the mother of the jumper DuPont line

Figure 2.3.5 : Jumper wires

2.3.6 Automatic water pump VALU Model ZB-365AL

inch automatic water pump The VALU ZB-365AL is the top selling model. Of the bare auto water pump, the motor is made of aluminum Suitable for a variety of applications Both houses and residences with a motor power of 370 watts Pipeline size 1 inch Water flow rate of 34 liters per minute 32 meters high Speed of 2,850 rpm Weight 10.2 kg. The machine is especially strong and durable because the pump housing is made of cast iron with rust protection. The impeller is made of brass, not rust. Shaft and made of stainless steel Comes with a 1.2 meter long cable Highlight is an automatic water pump Which will work automatically when the pressure decreases And will stop working when the pressure reaches the set point Geared impeller suitable for using with little water The machine works quietly. IP44 protection against water and dust Electrical insulation class B Use 1 phase electricity

Figure 2.3.6 : Automatic water pump VALU Model ZB-**365**AL

2.3.7 LANDZO LCD1602 1602 screen LCD Display Module Blue white

The term LCD stands for Liquid Crystal Display, which is a screen made of liquid crystal. The principle is that behind the screen there is a light. Also known as Backlight. When electricity is released to stimulate the crystals Will make the crystal translucent Causing the light coming from the Backlight to show up on the screen Other parts that are blocked by crystals Will have different colors according to the color of the crystal, such as green or blue, so when looking at the screen, will find white letters And found different colored backgrounds

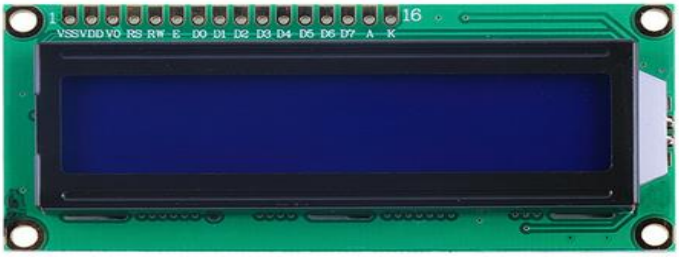

Figure 2.3.7 LANDZO LCD1602 1602 screen LCD Display Module Blue white

2.3.8 Camera Module FIFO Webcam Module OV7670 + FIFO(AL422B)

The OV7670-FIFO Camera Module is a small, low operating voltage and provides all functions of a single chip of VGA camera and image processor. Through SCCB bus control, the sensor can output the whole frame, sampling, and various resolution 8 bits of data. The product VGA image can reach up to a maximum of 30 frames per second. Users can completely control the image quality, data format and transmission mode. All the process of image processing functions can through the SCCB programming interface, including gamma curve, white balance, saturation and chroma

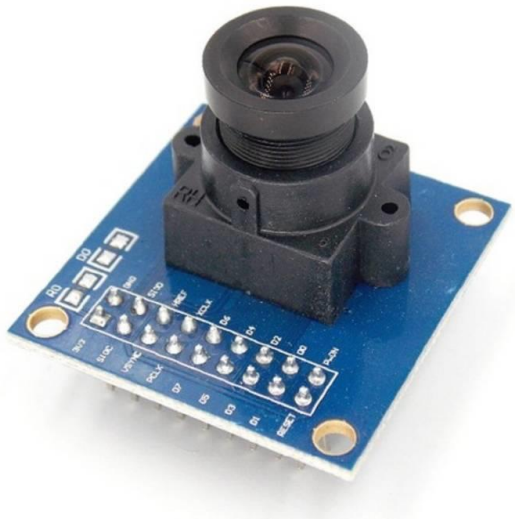

Figure 2.3.8 Camera Module FIFO Webcam Module OV**7670** + FIFO(AL**422**B)

CHAPTER 3

3 PROJECT METHODOLOGY

This chapter brings up to the methodologies which are to create this project. The methodology becomes the most important part that instruction to success for the system with this system will be mentioned to the methodology.

In this system use concept able called the system development life cycle (SDLC) a process for the creation of software to plan and manage the system development process. To achieve the objective of this project. The development team has used SDLC model which including planning, analysis, designing, implementation and maintenance as show the following.

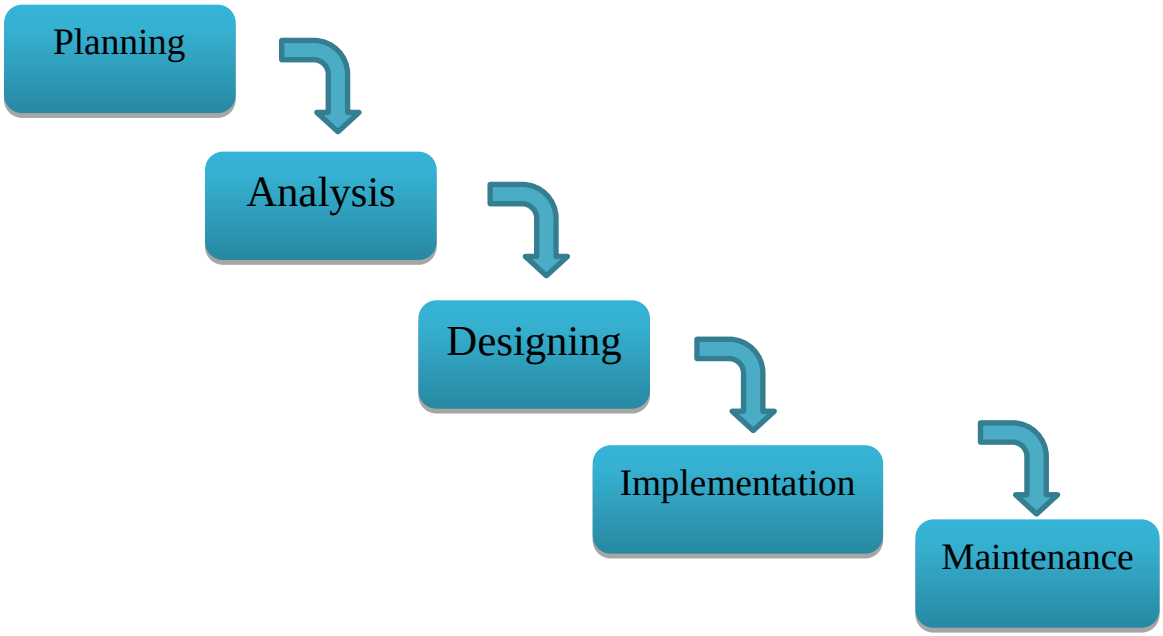

Figure 3.0 SDLC methodology

3.1Phase 1 (PLANNING)

According to this phase, planning process is to discover the objective of developing mushroom farm system to control temperature and humidity control and water pump allowing the sprinkler to spray automatically by displaying humidity status And real-time.

We try to collect information that suitable for our project and make understand about mushroom farm system to temperature and humidity control, and supervise the production by camera real-time.

Actually, planning phase sometime call a system request because it usually begin with a formal request of the system that describes problem or designed in the system. Finally discuss in our group how should we do with this project step by step.

Phase 2 (ANALYSIS)

The purpose of the system analysis phase is to build the logical model of the new system. The first step is system requirements modeling, where we investigate system process and what the new system must do. Requirement modeling continue the investigation that began during the system planning phase. To understand the system, we perform fact-finding using techniques such as interviews, survey, document review and experience.

In the analysis phase developer collect information from old traditional system and interview and observation by see process of system, then collected the data or requirement from user.

Phase 3 (DESIGN)

In the design phase are concerned about the design system architectures. Developers try to design database of system and design structure of mushroom farm system of controller.

Phase 4 (IMPLEMENTATION)

In implementation phase developer have a discussion about the coding and testing of the system. The implementation phase refers to the final process of moving the solution from development.

Phase 5 (MAINTENANCE)

This part is to maintain how the project to be used in real time and to maintain the function of project.

4 CONCLUSION

Environmental condition is a significant factor that needs to be controlled in mushroom production. The device is able to develop an environmental control agriculture system that will increase the production of crops. The control system inside the device is automatically triggered if the environmental conditions are not in optimum condition sprinkler will spray water to control temperature, and has camera real time to process size of mushroom inside the cultivation farm.

This system however requires a stable internet connection to ensure that the data is sent to the internet. Other than that, this system has successfully implemented the concept IoT and automated control in the precision agriculture.

5 REFERENCES

[1] PONGSATHORN METHARIN

https://www.glurgeek.com/education/iotsmartfarmai/

[2] โรงเรือนอัจฉริยะ นริชพันธ์ เป็นผลดี. (11 กันยายน 2559),https://goo.gl/YnFwck

[3] การพัฒนาระบบควบคุมอุณหภูมิและความชื้นที่เหมาะสมต่อการเจริญเติบโต ของเห็ดในโรงเพาะเห็ด, ศุภวุฒิ ผากา, สันติ วงศ์ใหญ่ และ อดิศร ถมยา. (1 มกราคม 2557). , https://goo.gl/tj6yYY

[4] การประยุกต์ใช้เทคโนโลยีไอโอทีควบคุมฟาร์มอัจฉริยะในโรงเรือนเพาะเห็ดนางฟ้า, สุรพงษ์ เพ็ชร์หาญ,รัฐสิทธิ์ ยะจ่อ วีรศักดิ์ ฟองเงิน. (2561). , https://goo.gl/XSn3Au

[5] https://www.wikipedia.org/

[6] https://www.arduino.cc/