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DESIGN AND IMPLEMENTATION CONTROLLING SMART GREENHOUSE BASED ON VOICE AND IMAGE RECOGNITION

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ABSTRACT

Greenhouse system is made to facilitate and control crop seeds before planting, this ordinary planting system can cause attacks and cause crop failure, plants have different characteristics processing processes are needed. This system able to increase agricultural production and improve the quality of crop yields. At present, many construction companies making greenhouse services have offering various types and advantages. currently the greenhouse temperature regulation system uses computer assistance, and the use of computer technology is able to regulate the temperature and state of plants in long distances and the conditions of large agricultural land. the most important thing is the monitoring system and soil temperature and plant conditions, the sensor itself has limitations so that the temperature regulation is added to the camera with thermal imaging technology capabilities, in greenhouse regulation research assisted with voice recognition technology so that the process of watering can be monitorized automatically.

INTRODUCTION

In the current development there are many tools able to automatically can be connected by remotely, Internet of Things (IoT) is a network that connects various objects that have been identifying an Internet Protocol (IP) or internet address, the communicate and exchange information about this tools and able to environment in all condition. Objects in IOT can produce services and achieve a common goal for internet device. This capability IoT have some features on computing anywhere at any time at any time, but one of the weaknesses in implementing IoT is simplification for farming [1].

In the Design Planting System research with object oriented using IoT and this system designed with object oriented, this method will help the user with a

better explanation and easy for using. Designs created using use-case sequence and state-chart diagrams also use the system implementation with Arduino and Raspberry hardware [2].
For IOT system that will be built for resolve the problem and integrating smart garden using voice recognition, this can be used to facilitate watering plants. When the user uses the system user have to use tools to water the plants, the user only uses sound to can be translate water the plants where certain words by the user are integrated into the system [3].

Integrated system has been verified by the system then the system automatically for watering system, these tools able to monitoring the level of soil moisture and watering controlled. Besides controlled this system can provide notification via LED or buzzer, the soil structure is time to be watered and to anticipate when the user does not have time to turn off the system the watering of the plants will be stopped automatically [4].

The more economical benefits of modern agriculture are protected soil moisture this method reducing the use of greenhouses emissions, besides the social impact generated will increase the economic value, this technology has been developing countries, especially Southeast Asia, agriculture in Asia using traditional or conventional, this system has some weaknesses this field cannot increase crop productivity or pest control, this information systems such as weeds and pest attacks information [5].

RELATED WORKS

Android is a subset of software for mobile devices that includes the operating system, middleware and core applications released by Google. As a complement in the form of an Android SDK (Software Development Kit) which provides the tools and APIs needed to develop applications on the Android platform using the Java programming language. Android was developed jointly between Google, Intel, Motorola, Qualcomm, T-Mobile, NVIDIA and 47 other companies incorporated in the OHA (Open Handset Alliance) with the aim of creating an open standard for mobile devices (mobile devices). In addition to giving a number code into each version, Android is also given a name in the form of food names in accordance with the letters of the alphabet. The first version is known as Cupcake with the Android version number 1.5. The second version named Donut with version number 1.6 was released September 15, 2008. The third version as Éclair consists of 2 versions, namely Android 2.0 and 2.1 released one month after Donut was launched. The fourth version is Froyo released in May 2010 with the Android version number 2.2. Next up is Gingerbread which was released around December 2010 with version number 2.3. Honeycomb with Android 3.0 version number. Ice Cream Sandwich version with Android 4.0 version number and Jelly Bean version [6].

Greenhouse using smart technology can be developed and invented using and use electronic low cost component, the electronic system is capable of monitoring temperature and weather changes by utilizing the electronic

components by installed on the Greenhouse so that temperature or optimization conditions can be manipulated and regulated [7].

The Greenhouse control system is designed and works to help of several components and controlled sensors, this sensors readers using the Arduino and Uno microcontroller, this greenhouse can be paired with several components programs on Arduino using C language with program code called "sketch", each sensor will present the changing conditions of the Greenhouse [8].

RESEARCH METHODS

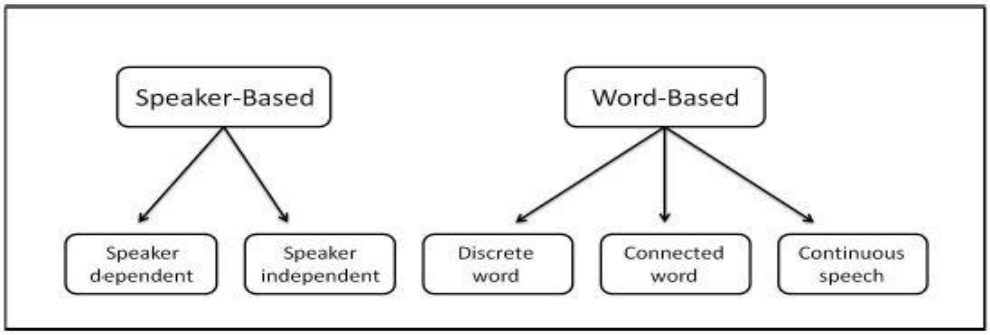

Figure 1 Research Method

- Speaker-Based: Contains templates that require pronunciation practice on speaker dependent and not for independent speaker dependent on algorithms such as LPC (Linear Predictive Coding) to analyze sounds.
- Word-Based: Depending on the speaker himself when saying every word and sentence, it could be discrete words or continuous words.
- Sound sensor is a sensor that works to change the amount of sound into electrical quantities. An example of a sound component is a microphone, an electronic component where the performance of a membrane that is vibrated by sound waves will produce an electrical signal.
- Microphones can be classified into 2 types, namely: Dynamic Microphone is flexible and ideal for various needs. Generally, have a simple design with several parts that can be removed. Dynamic microphones do not have internal amplifiers and usually do not require batteries or external power.
- Condenser microphones are more sensitive than dynamic, because the condenser itself consists of a capacitor with a plate / plate inside which forms the diaphragm and will work if there are sound waves that enter precisely the space between the thin membrane of the plate.

IMPLEMENTATION SYSTEM

Implementation of software based on the results of the analysis and design.

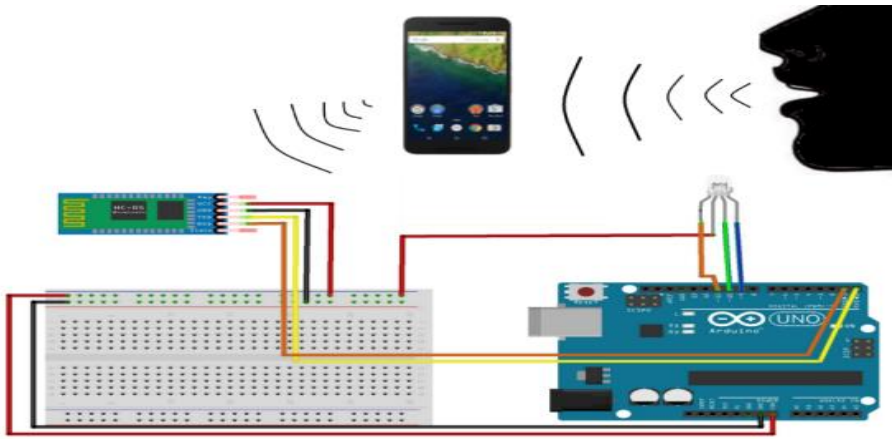

Figure 2 Tools Assembly Method

For the mechanism of automatic watering system based on voice recognition using module HC-05, this module will be installed on Arduino UNO, this module work for automatic watering mechanism based on voice recognition and the implementation shown in the Figure 3.

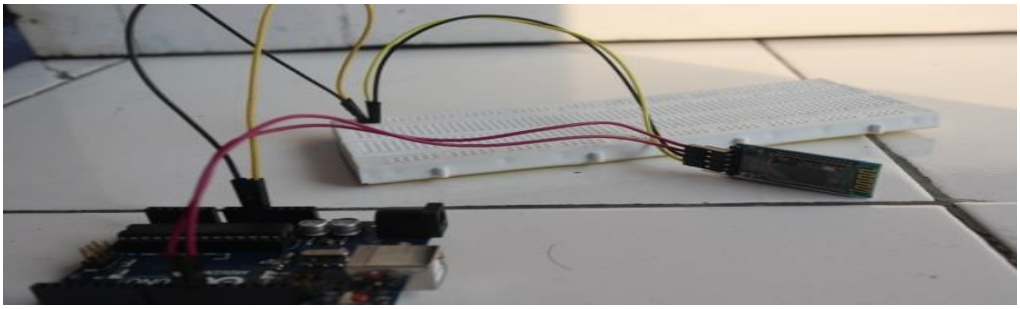

Figure 3 Implementing the HC-05

Proses Coding Arduino IDE

```
#include <SoftwareSerial.h>
Const int relayPin = 13;
Int ledPin1 = 7;
Int ledPin2 = 6;
```

The above program is a library used in automatic plant watering systems where the relay is applied at pin 13 on Arduino, then the green LED pin is pinned on pin 7, and the red pin LED pinned on pin 6.

Table 1 Connect serial cable

SoftwareSerial BT(11,10); String voice; Void() { BT.begin(9600); Serial.begin(9600);

```
pinMode(relayPin, OUTPUT);

pinMode(13, OUTPUT);
}
```

The above program is a declaration for the Bluetooth module that will be integrated with a relay on Arduino. It can be seen that the HC-05 or Bluetooth module is embedded in Arduino with TX pin 11 and RX pin 10.

Table 2 Settings with voice recognition

```
Void loop() {
Bt ();
Soilmosture();
}
Void bt () {
While (BT.available( ) ) {
Delay (10);
Char c = BT.read();
If (C == '#' ) {break;}
Voice += c;
}
}
```

The above program is a declaration of soil moisture sensor module, Bluetooth settings, and a reading declaration of each character spoken through Bluetooth.

Table 3 Language selection

```
If (voice.lenght ( ) > 0 ){
Serial.println( voice );
If ( voice == "*wet" )
{
digitalWrite(relayPin, LOW);
}
Else if (voice == "*finish")
{
digitalWrite(relayPin, HIGH);
}
}
```

The above program is a declaration for voice activation via Bluetooth, where there is already the word "flush" for watering and "done" for the manual watering stop process by the user. The process is all arranged with a relay module that has been integrated with Arduino.

Table 4 Setting the sensor delay

```
Void soilmoisture () {
Int sensorValue = analogRead (A0);
Serial.println (sensorValue);
Delay (800);
}
```

The above program is a declaration for the soil moisture sensor module, pinned A0 pin to Arduino. The delay is to read that the soil is dry or wet.

Table 5 Settings for sensors using available sensors

```
If (sensorValue < 800)
{
digitalWrite (ledPin1, HIGH);
digitalWrite (ledPin2, LOW);
digitalWrite(relayPin, HIGH);
}
Else
{
digitalWrite (ledPin1, LOW);
digitalWrite(ledPin2, HIGH);
}
}
```

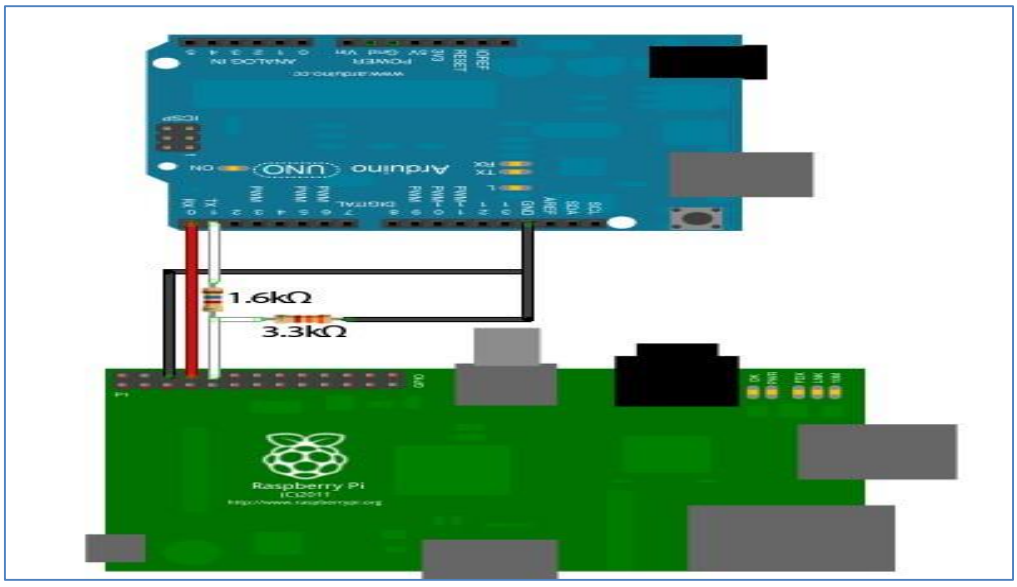

Figure 4 raspberry assemblies for the pattern recognition process

Table 6 Connection and camera settings using Raspberries

```
void draw() {
```

```
background(off);
stroke(on);

// Draw a filled box for each digital pin that's HIGH (5 volts).
for (int i = 0; i <= 13; i++) {
if (arduino.digitalRead(i) == Arduino.HIGH)
fill(on);
else
fill(off);

rect(420 - i * 30, 30, 20, 20);
}
```

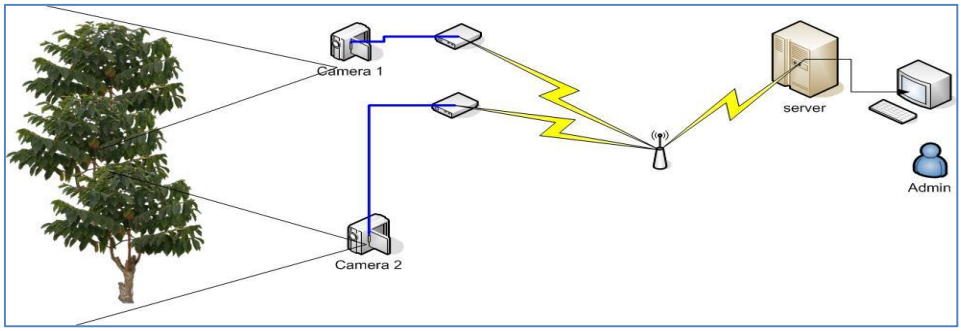

Figure 5 Pattern Recognition Using Raspberry

Figure 6 Pattern Recognition Using Raspberry

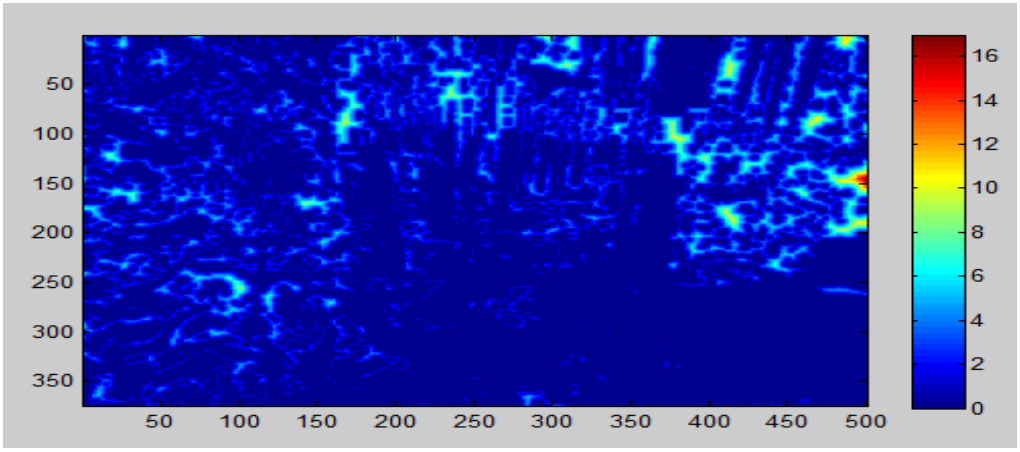

Figure 7 Implementing IoT Is Simplification of the for Farmer

CONCLUSION

In implementing greenhouse control system using voice recognition techniques can be easily implemented, the voice control system enables farmers to control the temperature and room of the greenhouse, measuring the environment by using image processing techniques where the temperature of the soil and the greenhouse space can be detected with change visually displayed colors. Suggestions for further study of room temperature

measurements may be used in cloud so that the temperature data of the plant and the greenhouse room can be monitored periodically.

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