Design of Automatic Plant Areas Using Humidity Sensor Based On Internet of Thing

G Gunawan1*, Marliana Sari1, Benar Surbakti2, and Agustina Ginting3

1Department of Computer Engineering and Informatics, Politeknik Negeri Medan, Indonesia
2Department of Mecanical Engineering, Politeknik Negeri Medan, Indonesia
3Department of Electrical Engineering, Politeknik Negeri Medan, Indonesia

*gunawan@polmed.ac.id

Abstract. Reservoir has many benefits for the community, one of them is as a means to irrigate land and paddy fields. Normally Open and close the valve on the reservoir is done manually and there are many reservoirs that have less solid wall of resistance. Thus causing the dam wall was destroyed. This tool aims to replace manual work becomes automatic and control the water level in the reservoir. The benefits of this tool is to be able to monitor the water level in the reservoir and make the process automatic irrigation. The sensors used in these tools is the HC-SR04 Ultrasonic sensors are used to measure the water level in the reservoir, Sensor soil humidity(YL-69) was used to detect the soil humidity in the paddy fields, RTC (Real Time Clock) is used to display the time, the servo motor is used for opening the water valve to the paddy fields and rivers, Module SIM 800L is used to transmit data the output of this tool to the mobile station devices. Arduino Uno is used to control the input and output. Water level control device based on SMS (Short Messaging Service) and Arduino Uno gateways have been tested and the result is a process of can be done automatically and information from these tools can also be viewed through the LCD mounted on the tool. Water level control device based on SMS (Short Messaging Service) and Arduino Uno gateways have been tested and the result is a process of irrigation can be done automatically and information from these tools can also be viewed through the LCD mounted on the tool.

1. Introduction
The irrigation system is a system to irrigate the paddy fields or plantations by way of stemming the water source and the water flow when needed watering on existing land. On the water reservoir will be no water valve that would drain the water from the reservoir to the paddy fields. In general, the opening of the water valve on the irrigation system is still done manually, the farmers can open the water valve if they want to irrigate their paddy fields. Opening the water valve manually dialed it felt less efficient, because there must be a person who opens and closes the water valve [1]. Resilience of the existing wall on the reservoir still less solid, so frequent breakdown of the walls of the reservoir caused by large volumes of water. This can lead to flooding in the area around the reservoir, which can be detrimental to the community around the reservoir area.

Based on the background of the problems above, we will design a tool to control the automatic water level based on SMS (Short Messaging Service) Gateway [2] and use the Arduino Uno microcontroller, in order to control the process of automatic irrigation. Without having to open and close the water valve manually [3].

Means of controlling the water level has been configured to affect system performance proximity sensors (Ultrasonic HC-SR04) [4], in order to detect the height of the water in reservoirs and irrigation and moisture sensors soil (Soil humidity YL-69), which measures soil humidity is in the paddy fields ,
in order to do an automatic irrigation system. And there is a water valve that leads to the river to drain the water into the river automatically when the volume of the water in the reservoir reaches the maximum limit. Information from the irrigation system can be seen through the medium of an LCD (Liquid Crystal Display) mounted on the Arduino Uno and media information can be sent via SMS to the mobile station device uses a SIM (Subscriber Identity Module) 800L. By utilizing this tool then farmers no longer have to open and close the water valve manually to perform irrigation in paddy fields and not have to worry if the water level in the reservoir reaches the maximum limit, because it is automatically the water will be piped into the river around the dam.

2. Literature Review

2.1. Microcontroller

A microcontroller is a functional computer system on a chip. It contains a processor core, memory (a small amount of RAM (Random Access Memory)), program memory, or both, and supplies the input / output. In other words, the microcontroller is a digital electronic device that has inputs and outputs as well as control with a program that can be written and erased in a special way. Microcontroller is a computer on a chip used to control electronic devices, which emphasize efficiency and cost-effectiveness [5].

The microcontroller used in the products and tools that are controlled automatically, such as engine control systems, remote controls, household appliances, heavy equipment, and toys. By reducing the size, cost, and power consumption compared to designs using a microprocessor memory and a separate input device output, the presence of a microcontroller makes electrical control for various processes to be more economical. With the use of this microcontroller then electronic systems will become more compact design of the electronic system will be faster because most of the system is the software that can be easily modified search more easily traced disruption because the system is compact [3].

In order for a microcontroller to function, the microcontroller requires external components are then referred to the minimum system. To make the most minimal system is not needed and reset the system clock, although in some microcontrollers already provides the system's internal clock, so without any external circuit microcontroller already operation. What is meant by minimum system is a microcontroller circuit that can already be primarily used to run an application. An IC (Integrated Circuit) microcontroller would be meaningless if the only stand-alone [6].

![Microcontroller Arduino Nano](image1.jpg)

Figure 1 .. Microcontroller Arduino Nano

2.2. Humidity Sensor

Soil humidity is the amount of water retained in the soil after the excess water drained. Soil humidity sensor is a sensor that can detect soil water content by measuring soil humidity. The working principle is to provide a soil humidity sensor output value in the form of electrical quantities as a result of water that lies between the sensor capacitor plates. To get the soil humidity sensor readings, the sensor is connected to the Arduino microcontroller with program commands included in it. Perform calibration beforehand by plotting the relationship between the value of the sensor readings with the actual percentage of water content, in order to obtain equations that can be entered on the command program [7].
Soil humidity Sensor Specifications YL-69

- Power supply: 3.3v or 5v
- Signal output voltage: 0 ~ 4.2v
- Current: 35mA
- Pin definition:
  - Analog output (blue wire)
  - GND (black wire)
  - Power (red wire)
- Size: 60x20x5cm [6]

![Figure 2. Soil humidity sensor-69 [6]](image)

2.3. GSM SIM800L

SIM800L GSM is a GSM (Global System for Mobile Communications) / GPRS (General Packet Radio Service) module that is used on the Arduino UNO. Can be used to send sms, calling, data transfer via GPRS (General Packet Radio Service) is a technology that allows sending and receiving data faster and function DTMF (Dual Tone Multiple Frequency) which is a technique of sending the figures forming a phone number that is encoded with 2 tones selected from 8 pieces of a predetermined frequency. SIM800L GSM module supports Quad-band 850/900/1800 / 1900MHz. Equipped also function Bluetooth, FM & Embedded AT [8].

GSM module specification SIM800L

- **chip**: SIM800L
- **voltage Chip**: 3.7-4.2V (datasheet = 3.4-4.4V)
- **voltage Module**: 5.0V (V limit = 4.8-5.2V)
- **frequency**: Quadband 850/900/1800 / 1900Mhz
- **Module size**: 4.0cm x 2.8cm
- **transmitting power**
- **Class 4** (2W) at GSM 850 and EGSM 900
- **Class 1** (1W) at DCS 1800 and PCS 1900GPRS connectivity
- **GPRS multi-slot class 12 default**
- **GPRS multi-slot class 1 ~ 12 (option)**
- **Temperature range Normal operation**: 40 °C ~ + 85 °C
3. Result And Discussion
The following will describe the measurement of soil humidity sensor voltage YL-69 and testing program of soil humidity sensors Joe 69:

3.1. Soil humidity settings
This tool can work under the provisions of Table 1 below:

| Soil humidity state | Logic Value Soil humidity | Action       |
|---------------------|---------------------------|--------------|
| Dry                 | 1                         | Motor On     |
| Moist               | 0                         | Motor Off    |

3.2. Testing analysis
program command

```c
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
#include <Servo.h>
#include <DS3231.h>
Servo myservo;
LiquidCrystal_I2C lci(0x27, 20, 4);
DS3231 rtc(SDA, SCL);
const int Soil = 7;
int bacaSoil = 0;
```
Source code above is used to initialize the sensor used is, #include <LiquidCrystal_I2C.h> as the initialization of LCD, LCD LiquidCrystal_I2C (0x27, 20, 4); used to express the I2C address and the size of the LCD diugunakan.

#include <Wire.h>, #include <DS3231.h> is used as the initialization of the RTC, #include "Servo.h" is used as the initialization of the servo. Servo myservo; used to create the object name servo to servo control. DS3231 rtc (SDA, SCL); means rtc use of data communications at the SDA and SCL pins arduino. Const int Soil = 7; arduino pin is used to declare the use of soil humidity that is pin 7 bacaSoil int = 0; used for reading the sensor value YL-69.

4. Conclusion

Tools can make the process automatic irrigation of agricultural land using soil humidity sensors YL-69 can then send the status of agricultural land conditions using SMS and the Internet of Thing.

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