

## IMPLEMENTATION AND TESTING

### Implementation



#### 5.1.1 Design Tools

From the design of the tool that has been designed, the tool has 3 sensors. PH sensor to get water quality result, Turbidity sensor to get water turbidity quality result, Ultrasonic sensor to get water volume distance to result from the water surface. The Solenoid valve as an automatic drain door.

### Code PH sensors

Sensor PH function to monitor water quality level

#### **#define deviation + 7.5, Compensation difference**

Code above to deviate the PH value (to NULL).

### Code Turbidity sensors

Turbidity sensor to detect the incidence rate in water. This code is the calibration code of the Turbidity sensor.

```
1. float turbidity = turbiditysensval * (5.0 / 1024.0); // convert
   analog menjadi voltase (0 - 5V):
2. float turbiditys = (-1120.4*turbidity*turbidity)
   +(5742.3*turbidity)-4352.9;
3. turbiditys = 2870-turbidity;
```

This Code is used to calibrate the Turbidity sensor value into the NTU value form.

### Code Ultrasonic sensor

Ultrasonic sensors to measure the water volume distance from the water surface:

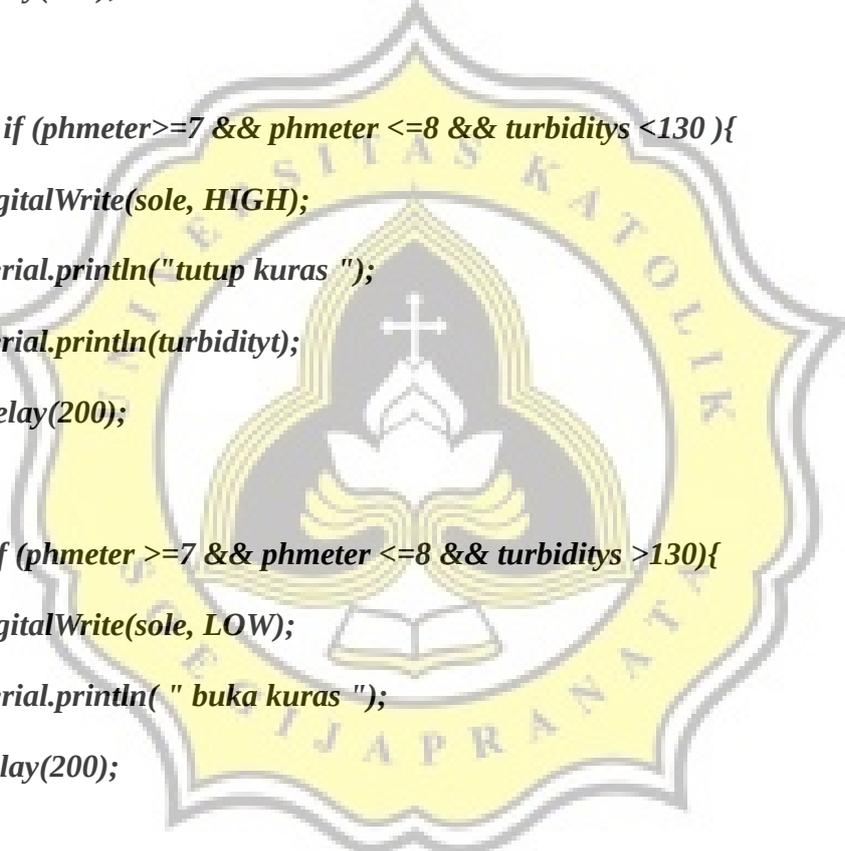
```
durasi= pulseIn(echo, HIGH); // menerima suara ultrasonic
jarak= (durasi/2) / 29.1; // mengubah durasi menjadi jarak (cm)
Serial.print(" Jarak = " );
```

Code above to change the duration value to distance.

### Code Solenoid Valve

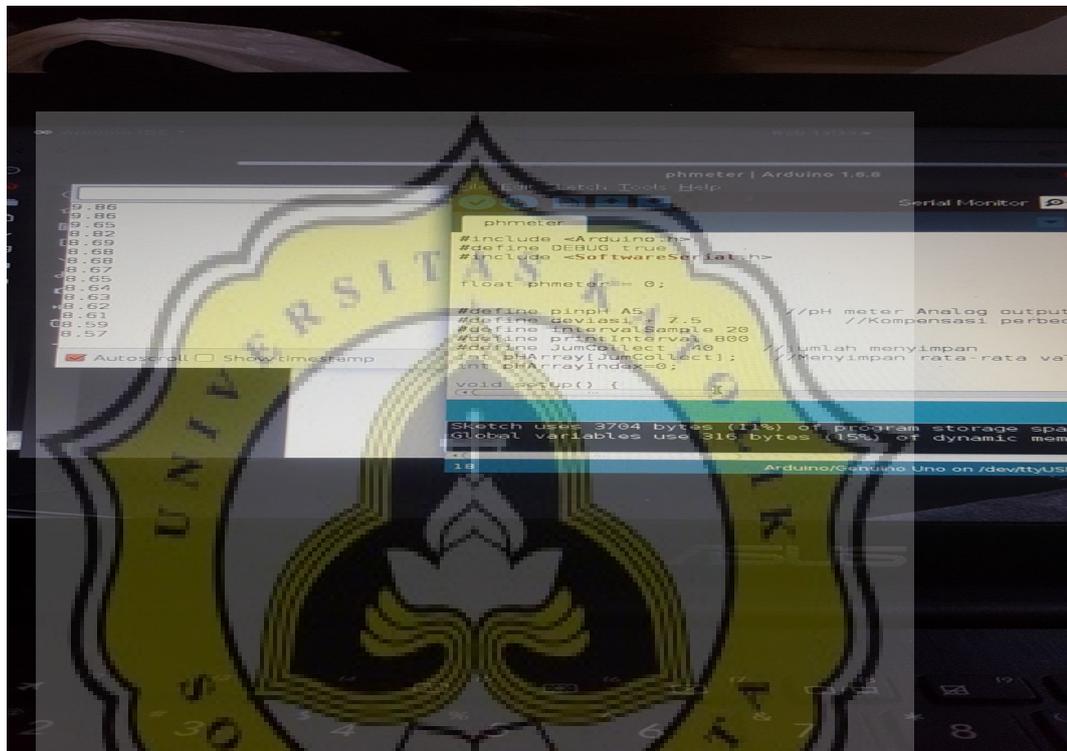
The Solenoid Valve is used as an automatic drain door, following its code:

```
if( phmeter>8 && turbiditys >130){  
    digitalWrite(sole, LOW);  
    Serial.println( " buka kuras 1 ");  
    delay(500);  
}  
else if (phmeter>=7 && phmeter <=8 && turbiditys <130 ){  
    digitalWrite(sole, HIGH);  
    Serial.println("tutup kuras ");  
    Serial.println(turbidityt);  
    delay(200);  
}  
else if (phmeter >=7 && phmeter <=8 && turbiditys >130){  
    digitalWrite(sole, LOW);  
    Serial.println( " buka kuras ");  
    delay(200);  
}  
else if (phmeter<7 && turbiditys<130) {  
    digitalWrite(sole, LOW);  
    Serial.println( " buka kuras ");  
    delay(2000);  
}
```



The code above is a command that opens or closes the solenoid valve automatically based on PH and Turbidity sensor values.

## Testing



The image shows a screenshot of the Arduino IDE interface. The main window displays a sketch named 'pHmeter' for an Arduino Uno. The code includes headers for Arduino.h and SoftwareSerial.h, defines a pin for the pH meter (A5), and sets various parameters like compensation, sample interval, and number of samples. It also defines an array to store pH values and an index. The setup function is partially visible. The Serial Monitor window on the right shows the output of the sketch, displaying a list of pH values: 8.86, 8.86, 8.85, 8.82, 8.69, 8.68, 8.67, 8.65, 8.64, 8.63, 8.62, 8.61, 8.59, and 8.57. The IDE status bar at the bottom indicates that the sketch uses 3704 bytes (11%) of program storage and 316 bytes (15%) of dynamic memory.

```
pHmeter | Arduino 1.8.8
Sketch Tools Help
Serial Monitor

pHmeter
#include <Arduino.h>
#define DEBUG true
#include <SoftwareSerial.h>

float pHmeter = 0;

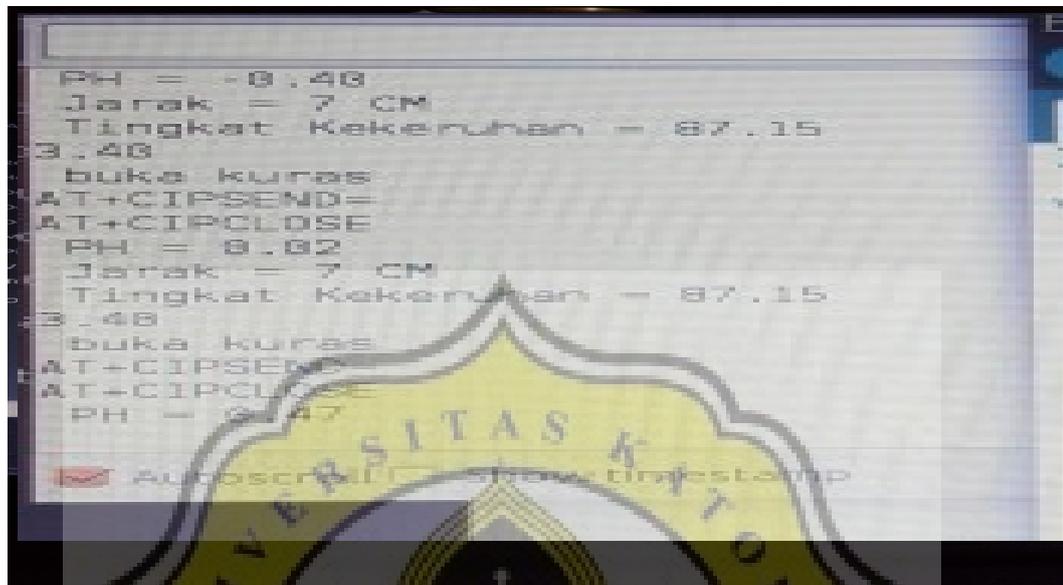
#define pinPH A5 //pH meter Analog output
#define devias1 7.5 //Kompensasi perbed
#define intervalSample 20
#define printInterval 800
#define jumlahCollect 40 //jumlah menyimpan
int pHArray[jumlahCollect]; //Menyimpan rata-rata val
int pHArrayIndex=0;

void setup() {
  ...
}

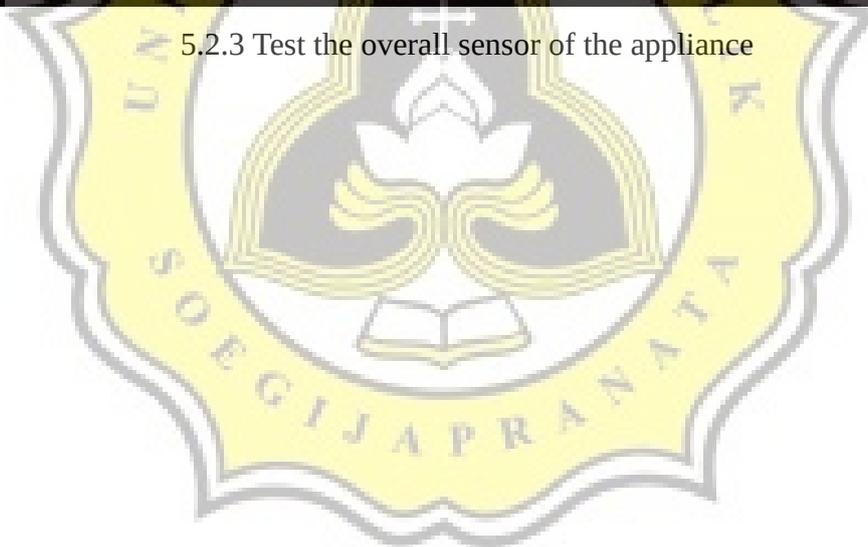
Sketch uses 3704 bytes (11%) of program storage space.
Global variables use 316 bytes (15%) of dynamic memory.
18 Arduino/Genuino Uno on /dev/ttyUSB0
```

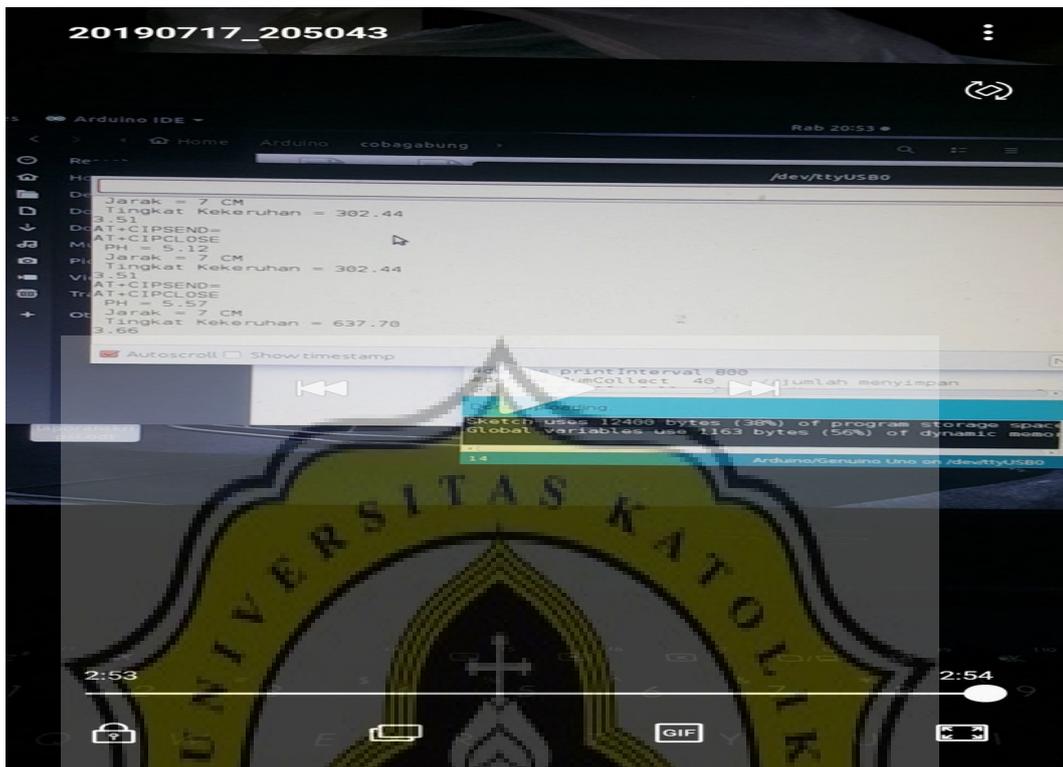
5.2.1 Testing the calibration and testing of PH sensors.

### 5.2.2 Test Calibration and Turbidity sensor measurements



### 5.2.3 Test the overall sensor of the appliance

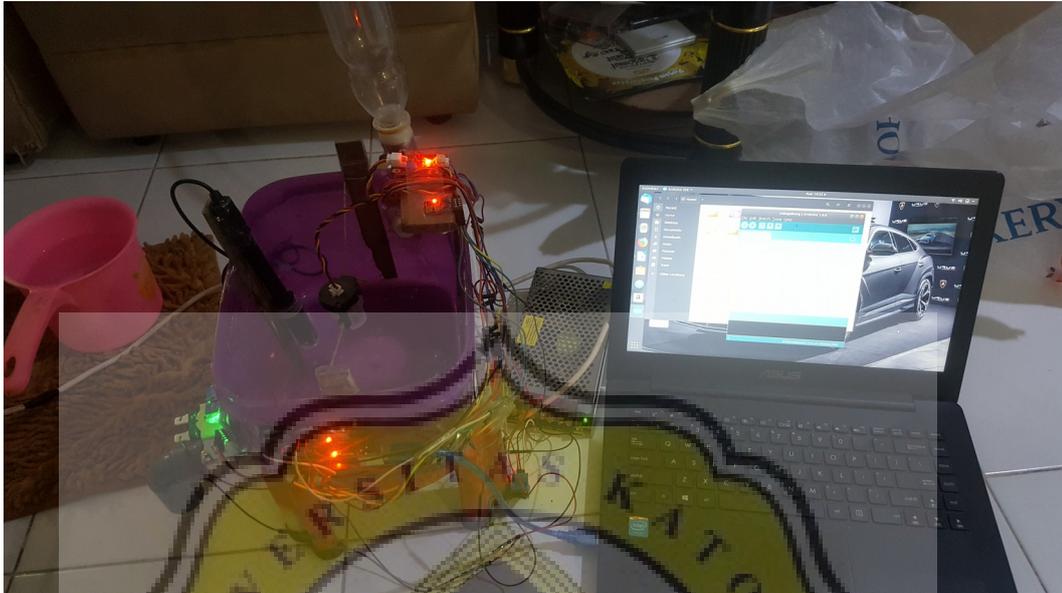




5.2.4 test the measurement rate of PH one



5.2.5 PH Measurement rate Test Two



5.2.6 An example of the overall speed test of the appliance, using water media mixed with Coca Cola, so that the PH becomes stable again and turbidity becomes clear again. But it takes a very long time. PH meter readings After several experiments were conducted from 0-4 takes about 2 minutes 57 seconds to 3 minutes, while from 0-5 it takes about 2 minutes 54 seconds to 2 minutes 57 seconds. Similarly, the Solenoid Valve has a hole diameter of 0.5 cm so that every second is only able to shed 3 drops of water or equivalent to 0.201 ml/sec due to 1 drop of water equivalent to 0.067 ml. So that the process of draining in 2 times the experiment Takes a very long time that is 1 hour 57 minutes to 2 hours to be able to reach the PH and the water clarity is stable again.