

CHAPTER 5

IMPLEMENTATION AND RESULTS

5.1. Implementation

In this final project, the C programming language is used which is used in the Arduino IDE software programming application. In this project using Ultrasonic Sensors HC-SR04, here is the coding and explanation used in this final project.

In the program lines 1 - 5, which includes the library to connect Wemos D1 Mini, Ultrasonic sensor connect to Wemos.

```
1. #include <TinyGPS++.h>
2. #include <SoftwareSerial.h>
3. #define BLYNK_PRINT Serial
4. #include <ESP8266WiFi.h>
5. #include <BlynkSimpleEsp8266.h>
```

In the program lines 6 - 40, which is to make a void loop to connect the ultrasonic sensor and determine the distance from obstacles and potholes / derivatives.

```
6. if (distance <= 130) //jarak sensor 133cm, 200cm dan 400cm
7.
8.     {
9.         Serial.println (" jarak talalu dekat ");
10.        Serial.print (" Distance= ");
11.        Serial.println (distance);
12.        digitalWrite (buzzer_pin, HIGH);
13.        digitalWrite (led_pin, HIGH);
14.        delay (500);
15.    }
16. else {
17.        Serial.println (" jarak talalu jauh ");
18.        Serial.print (" Distance= ");
19.        Serial.println (distance);
20.        digitalWrite (buzzer_pin, LOW);
21.        digitalWrite (led_pin, LOW);
22.        delay (500);
23.    }
24. if (distance >= 110) //jarak sensor 133cm, 200cm dan 400cm
```

```

25.     {
26.     Serial.println (" jarak talalu dekat ");
27.     Serial.print (" Distance= ");
28.     Serial.println (distance);
29.     digitalWrite (buzzer_pin, HIGH);
30.     digitalWrite (led_pin, HIGH);
31.     delay (500);
32.     }
33. else {
34.     Serial.println (" jarak talalu jauh ");
35.     Serial.print (" Distance= ");
36.     Serial.println (distance);
37.     digitalWrite (buzzer_pin, LOW);
38.     digitalWrite (led_pin, LOW);
39.     delay (500);
40.     }

```

The following is a picture of a patented tool used during testing on this tool, a 3cm diameter PVC pipe paired with an ultrasonic sensor, buzzer and LED, here is the picture.



Figure 5.1 Blind Stick.

5.2. Testing

In this final project the tool is tested using calculations and done manually, for ultrasonic sensors tested with walls and human obstacles, down stairs and through holes. The ultrasonic sensor testing was carried out in two test scenarios, namely: testing the distance to the wall and humans at different angles, and testing the descending path by going down stairs and walking between ditches.

5.2.1. Distance Test

This is the result of the Ultrasonic Sensor HC-SR04, the test starts with a distance of 133 cm, 200 cm and 400 cm. The objects used are humans and walls with angles of 0° , 45° and 90° , done in tabular form as below.

Table 5.2.1.1. Test Distance 0°

Test Distance	Success	Fail
133 cm	100	0
200 cm	100	0
400 cm	22	78

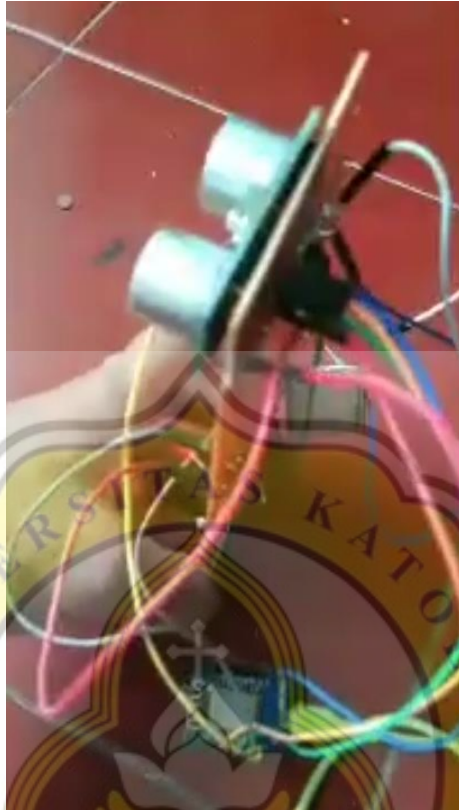


Figure 5.2.1.1. Test Distance 0°

Based on the picture above, testing was carried out with an angle of 0 degrees by looking at the angle ruler, testing was carried out 3 times, with each test as many as 100 trials, for test results please see table 5.2.1.1 above.

Table 5.2.1.2. Test Distance 45°

Test Distance	Success	Fail
133 cm	0	30
200 cm	0	30
400 cm	0	30

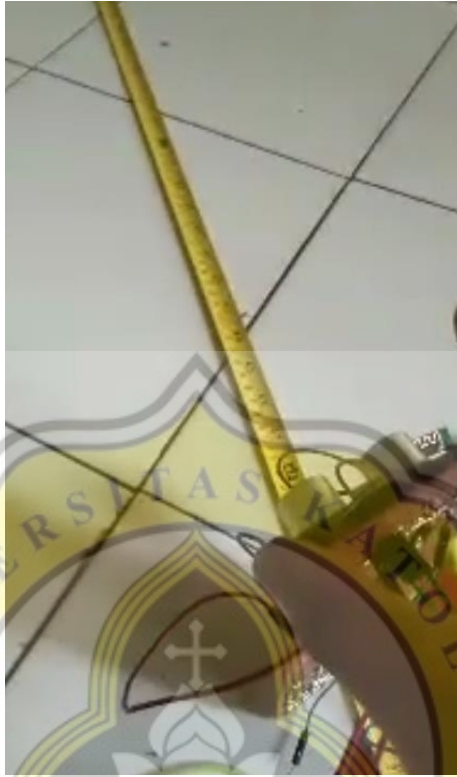


Figure 5.2.1.2. Test Distance 45°

Based on the picture above, testing was carried out with an angle of 45 degrees by looking at the angle ruler, testing was carried out 3 times, with each test as many as 30 trials, for test results please see table 5.2.1.2 above.

Table 5.2.1.3. Test Distance 90°

Test Distance	Success	Fail
133 cm	0	30
200 cm	0	30
400 cm	0	30



Figure 5.2.1.3. Test Distance 90°

Based on the picture above, testing was carried out with an angle of 90 degrees by looking at the angle ruler, testing was carried out 3 times, with each test as many as 30 trials, for test results please see table 5.2.1.3 above.

5.2.2. Test by Descending

This is the result of a test scenario of descending stairs, walking through sewers or walking through potholes. Done in tabular form as below.

Table 5.2.2.1. Descending Test

Descending test	Success	Fail
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Down the Stairs Test	50	0
Test Walk Through Gutter	31	19



Figure 5.2.2.1.1. Test Walk Through Gutter

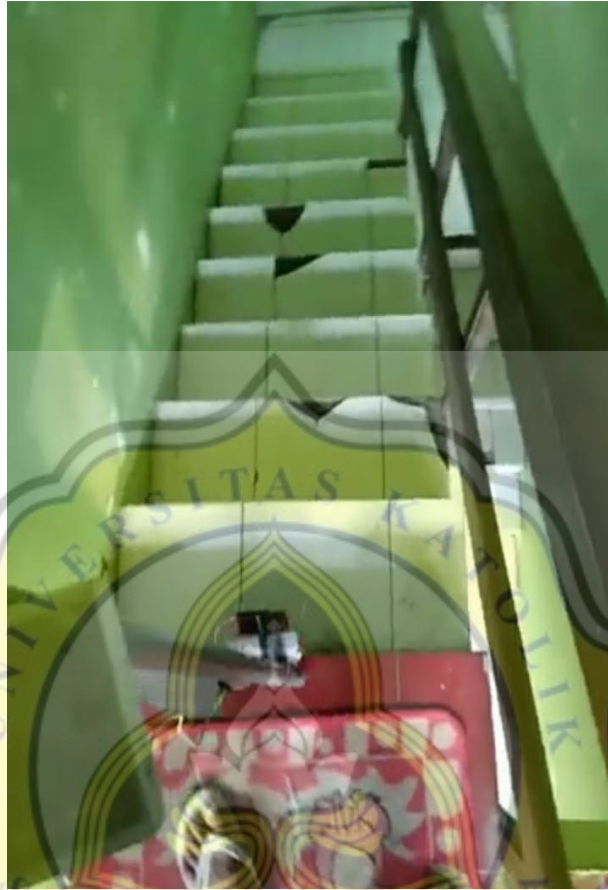


Figure 5.2.2.1.2. Down the Stairs Test

Based on table 5.2.2.1.1 above, it was tested with 100 test scenarios with a test distance of more than 133 cm or " ≥ 133 cm", using an ultrasonic sensor. The test is carried out in 2 stages, namely testing is carried out on 50 scenarios when walking through a ditch or hole following the picture in 5.2.2.1.1 and 50 scenarios when going down stairs, the following picture is in 5.2.2.1.2. However, when passing through the trench there were a few obstacles during the test so the test was replaced by passing through the hole.