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Portable Height Measurement: "How it's Development?"

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ABSTRACT

The purpose of this research is to develop a portable height measurement using ultrasonic sensor and Arduino Uno. The design and tools that have been made using two of ultrasonic sensor for height measurement. The component that as a ultrasonic sensor is HC-SR04 sensor. The proyotype can be fold to make it easy to pick up. The compare data have had the highest error with 0,41%. Which is the prototype can be use.

Keywords: *Height Measurement, HC-SR04, Arduino*

1 Introduction

The era of industrial revolution 4.0 is an era with information technology as a basic need in human life. Where this revolution focuses on digitalization and automation patterns in all aspects of human life. Technological developments and current lifestyles show that we are increasingly being chased by the current of globalization which makes practicality important (Azmy et al., 2020; Sumaeni et al., 2022).

We cannot stay away from technological developments that can be said to be useful in everyday life. Besides being able to make things easier, it can also help people get the job done. With the development of increasingly sophisticated and sophisticated technology and an increasingly modern way of life, it displays how useful something that is practical(Fariska et al., 2020) (Hairi & Meyzia, 2023).

Therefore, today's humans must be able to think critically and creatively in finding new ideas so they can innovate in the field of technology, such as making tools that help control lights with the help of technology that can make it easier to use (Fariska et al., 2020)(Sahal & Fauza, 2023).

It cannot be denied that the use of technology is also used in the health sector. Many of the tools used in medicine use the latest technology such as EMR and HER. The development of technology in medicine always goes along with time, one of which is a height measuring device (Hastutik et al., 2022).

A height measuring tool was developed by Rezky in 2015 to produce a tool that can measure body height but still having a large error. (Septian Akbar, 2015) uses Arduino Uno in the development he has carried out.

Therefore we must take advantage of currently developing technology to help improve the quality and welfare of human life. One such technology is the Microcontroller (Arduino). Arduino Uno is a microcontroller drive that can process digitally with the commands given and this microcontroller is the same as a microprocessor. The advantage is that it makes it easier to control the house with an intelligent system and Arduino Uno as the brain controlling the system (Widiana et al., 2019)(Ali & Irawan, 2023).

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2 Research Methodology

This research uses the ADDIE model with step shown in Figure 1.

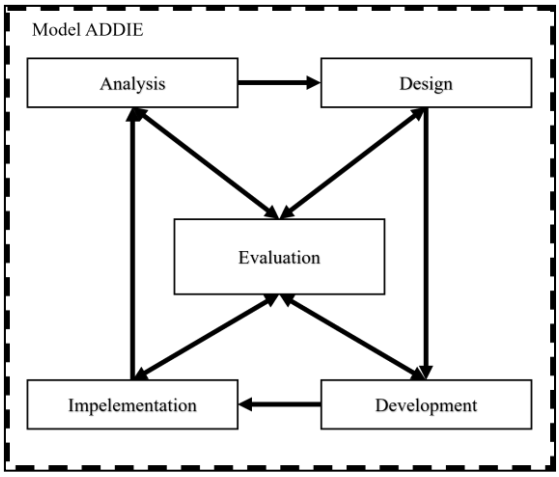

Figure 2. ADDIE Steps (Sugiyono, 2022)

The data needed in this research is qualitative data which obtained from testing the usability of the protoype that have been developed and compare it with a conventional tool(Irawan et al., 2023)(Saktioto et al., 2021).

3 Results and Discussion

The design step from ADDIE have resulting the circuit scheme of the prototype that shown on Figure 2 and the skecth of how to use the prototype that shown on Figure 3.

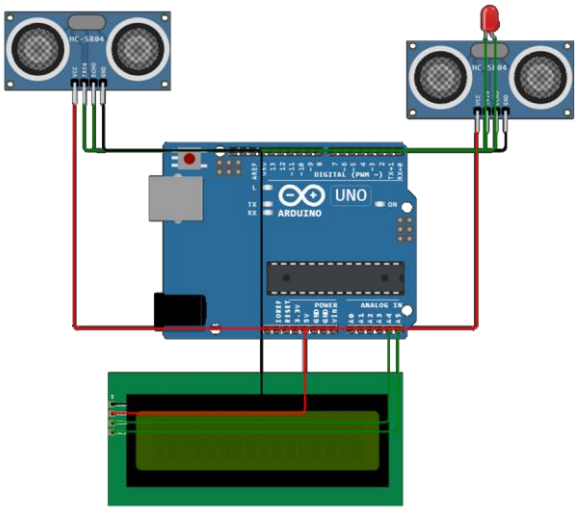

Figure 2. Scheme of the protoype

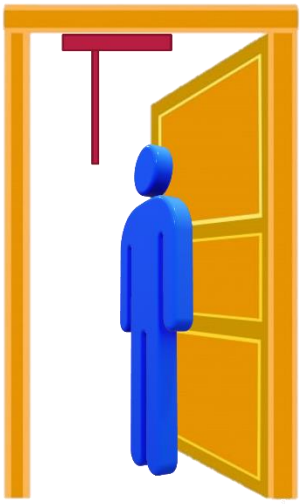

Figure 3. The sketch how to use the prototype

The final result of development of the prototype when its not used that shown on Figure 4.

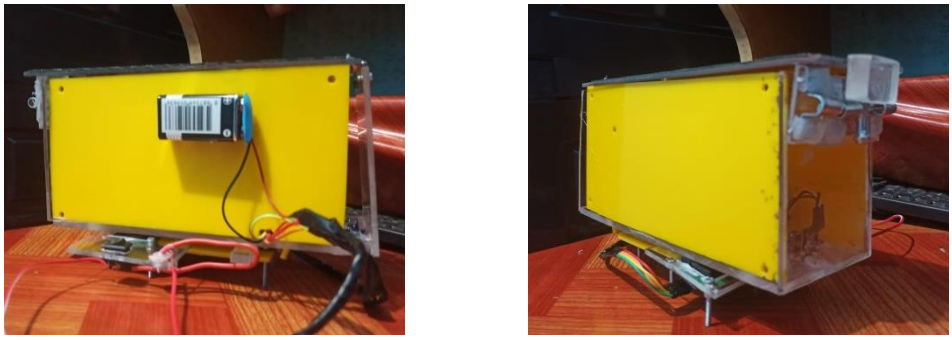

Figure 4. Final result of the prototype

When the prototype is used, it will look like in Figure 5.

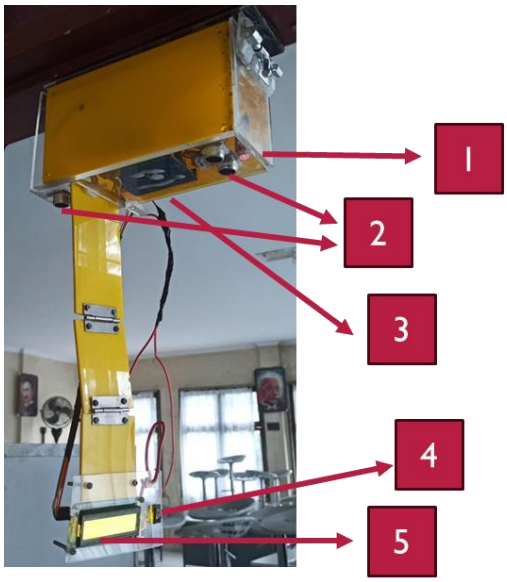

Figure 5. Used Prototype

Part of the protoptype is: 1) Laser Module; 2) HC-SR04 Ultrasonic Sensor; 3) Arduino Uno; 4) Switch on/off; 5) LCD 2x16. The code for this prototype can bee seen in Figure 6.

```
#include <LiquidCrystal_I2C.h>

//define I2C address.....
LiquidCrystal_I2C lcd(0x27,16,2);
const int triggerPin_1 = 9;
const int echoPin_1 = 8;
unsigned int duration_1;
unsigned int distance_1;
const int triggerPin_2 = 6;
const int echoPin_2 = 5;
unsigned int duration_2;
unsigned int distance_2;
int tb;

void setup() {
  pinMode(13, OUTPUT);
  digitalWrite(13, HIGH); // put your setu
  pinMode(triggerPin_1, OUTPUT);
  pinMode(echoPin_1, INPUT);
  pinMode(triggerPin_2, OUTPUT);
  pinMode(echoPin_2, INPUT);
  lcd.init();
  lcd.clear();
  lcd.backlight();

  lcd.setCursor(0,0);
  lcd.print("Pengukur Tinggi");
  lcd.setCursor(0,1);
  lcd.print("Badan Portable");
  Serial.begin(9600);

}

void loop() {
  readSensor_1();
  readSensor_2();
  tb = (distance_2 - distance_1);
  Serial.print("   ");
  Serial.print("Tinggi Badan =");
  Serial.print(tb);
  Serial.println(" ");
  delay(2000);

  lcd.clear();
  lcd.backlight();

  lcd.setCursor(0,0);
  lcd.print("Tinggi Badan:");

  lcd.setCursor(0,1);
  lcd.print(tb);// put your main coc
  lcd.setCursor(5,1);
  lcd.print("cm");

}
}

void readSensor_1() {
  digitalWrite(triggerPin_1, LOW);
  delayMicroseconds(2);
  digitalWrite(triggerPin_1, HIGH);
  delayMicroseconds(10);
  digitalWrite(triggerPin_1, LOW);
  duration_1 = pulseIn(echoPin_1, HIGH);
  distance_1 = (duration_1 /57);
  Serial.print("Sensor 1 = ");
  Serial.print(distance_1);
  Serial.println(" cm");
}
void readSensor_2() {
  digitalWrite(triggerPin_2, LOW);
  delayMicroseconds(2);
  digitalWrite(triggerPin_2, HIGH);
  delayMicroseconds(10);
  digitalWrite(triggerPin_2, LOW);
  duration_2 = pulseIn(echoPin_2, HIGH);
  distance_2 = (duration_2 /57);
  Serial.print("Sensor 2 = ");
  Serial.print(distance_2);
  Serial.println(" cm");
}
```

Figure 6. The Code for protoype

The data of height measurement using a protoype and conventional tool with the error percentage can be see on the Table 1 below.

Table 1: Data of Height Measurement Using A Prototype And Conventional Tool

No	Height Measurement using Prototype (m)	Height Measurement using Conventional Tool (m)	Error (%)
1	1.72	1.72	0
2	1.69	1.69	0
3	1.67	1.68	0.6
4	1.62	1.63	0.6
5	1.60	1.60	0
6	1.57	1.59	0.13
		Average	0.41

As we can see in Table 1, when the sample is shorter the error is higher with protoype average error is 0.41% which is low. When used, prototype will show the result with 2 second delay same as a code, so its need 2 second till get the final result of measurement. Its mean the prototype can be use as the heigh measurement.

4 Conclusion

Portable height measuring prototype has been successfully developed with 0.41% error. With that low error the prototype can be use as the height measurement. But because using of ultrasonic sensor, its need time to make a correct measurement. Future research could use distance sensors that are more accurate and effective.

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