LAMPIRAN

Lampiran 1

Sensor ultrasonic

```
  // integrasi pin arduino, sensor ping , relay dan driver motor
const int trigPin1 = 4; // sensor depan
const int echoPin1 = 5;
const int trigPin2 = 2; // sensor kanan
const int echoPin2 = 3;
const int trigPin3 = 6; // sensor kiri
const int echoPin3 = 7;
int batasDepan = 20;
int batasDekatDepan =15;
int batasTembok = 20;
int batasDekatTembok=15;
//////////////////////////////////////////////////////////////////
long duration1;
long duration2;
long duration3;
int distance1;
int distance2;
int distance3;
//////////////////////////////////////////////////////////////////
```

```
int jarak_dekat_depan = 15;
int jarak_jauh_depan = 20;
int jarak_dekat_tembok = 15;
int jarak_jauh_tembok = 12;
int sensor_depan;
int sensor_kanan;
int sensor_kiri;
int motor_stop();
// Motor 1
int dir1PinA = 13;
int dir2PinA = 12;
int speedPinA = 11;
int kecepatan_1=150;
// Motor 2
int dir1PinB = 9;
int dir2PinB = 8;
int speedPinB = 10;
int kecepatan_2=255;


void setup() {
// konfiguarasi sensor
```

```
pinMode(trigPin1, OUTPUT);
pinMode(trigPin2, OUTPUT);
pinMode(trigPin3, OUTPUT);
pinMode(echoPin1, INPUT);
pinMode(echoPin2, INPUT);
pinMode(echoPin3, INPUT);
// konfigurasi driver motor
pinMode(dir1PinA,OUTPUT);
pinMode(dir2PinA,OUTPUT);
pinMode(speedPinA,OUTPUT);
pinMode(dir1PinB,OUTPUT);
pinMode(dir2PinB,OUTPUT);
// konfigurasi relay
pinMode(A1,OUTPUT);
pinMode(A0,OUTPUT);

Serial.begin(9600);
}
void berhenti(){
// program pergerakan motor
// Motor 1 Forward
analogWrite(speedPinA, kecepatan_1);//Sets speed variable via PWM
```

```
digitalWrite(dir1PinA, LOW);
digitalWrite(dir2PinA, LOW);
// Motor 2 Forward
analogWrite(speedPinB, kecepatan_2);
digitalWrite(dir1PinB, LOW);
digitalWrite(dir2PinB, LOW);
}

void maju(){
// Motor 1 Forward
analogWrite(speedPinA, kecepatan_1);//Sets speed variable via PWM
digitalWrite(dir1PinA, LOW);
digitalWrite(dir2PinA, HIGH);
// Motor 2 Forward
analogWrite(speedPinB, kecepatan_2);
digitalWrite(dir1PinB, LOW);
digitalWrite(dir2PinB, HIGH);
}

void mundur(){
// Motor 1 Inverse
```

```
analogWrite(speedPinA, kecepatan_1);//Sets speed variable via PWM

digitalWrite(dir1PinA, HIGH);

digitalWrite(dir2PinA, LOW);

// Motor 2 Inverse

analogWrite(speedPinB, kecepatan_2);

digitalWrite(dir1PinB, HIGH);

digitalWrite(dir2PinB, LOW);

}


void belok_kiri(){

  // Motor 1 Forward

analogWrite(speedPinA, kecepatan_1);//Sets speed variable via PWM

digitalWrite(dir1PinA, LOW);

digitalWrite(dir2PinA, HIGH);

// Motor 2 Inverse

analogWrite(speedPinB, kecepatan_2);

digitalWrite(dir1PinB, HIGH);

digitalWrite(dir2PinB, LOW);

}


void belok_kanan()
```

```
{
// Motor 1 Inverse
analogWrite(speedPinA, kecepatan_1);//Sets speed variable
via PWM
digitalWrite(dir1PinA, HIGH);
digitalWrite(dir2PinA, LOW);
// Motor 2 Forward
analogWrite(speedPinB, kecepatan_2);
digitalWrite(dir1PinB, LOW);
digitalWrite(dir2PinB, HIGH);
}

void loop() {
////////////////////////////////////////////////////////////////////////////////
////////////
// sensor depan
//ndigitalWrite(trigPin1, LOW);
//delayMicroseconds(2);
//digitalWrite(trigPin1, HIGH);
//delayMicroseconds(10);
//digitalWrite(trigPin1, LOW);
//duration1 = pulseIn(echoPin1, HIGH);
//distance1= duration1*0.034/2;
```

```
//sensor_depan = distance1;
//Serial.print("front: ");
//Serial.println(distance1);
//delay(250);
////////////////////////////////////////////////////////////////////////////////////////////
// sensor kanan dirubah menjadi sensor depan
digitalWrite(trigPin2, LOW);
delayMicroseconds(2);
digitalWrite(trigPin2, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin2, LOW);
duration2 = pulseIn(echoPin2, HIGH);
distance2= duration2*0.034/2;
sensor_depan = distance2;
Serial.print("right: ");
Serial.println(distance2);
delay(20);
////////////////////////////////////////////////////////////////////////////////////////////
// sensor kiri
digitalWrite(trigPin3, LOW);
delayMicroseconds(2);
```

```
digitalWrite(trigPin3, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin3, LOW);
duration3 = pulseIn(echoPin3, HIGH);
distance3= duration3*0.034/2;
sensor_kiri = distance3;
//Serial.print("left: ");
//Serial.println(distance3);
delay(20);
////////////////////////////////////////////////////////////////////////////////
////////////
//PROGRAM UTAMA//
//START
Main:

 if (sensor_depan < batasDekatDepan)
 {
   delay(500);
   mundur();
   delay(1000);
   berhenti();
   delay(500);
```

```
  belok_kanan();
  delay(1000);
    maju();
    delay(1000);
 // goto Main;
 }


 if(sensor_kiri > batasDekatTembok && sensor_kiri <
batasTembok)
 {
  maju();
  delay(200);
 //  goto Main;
 }
 if (sensor_kiri < batasDekatTembok)
 { berhenti();
  delay(250);
  belok_kanan();
  delay(200);
 maju();
 delay(300);
  // goto Main;
```

```
  }
  if (sensor_kiri > batasTembok)
  { berhenti();
    delay(250);
    belok_kiri();
    delay(200);
    maju();
    delay(300);
   // goto Main;
  }

}
```

Lampiran 2

Mobile bluetoot

```
#define dir1PinA 13 //L298n Motor Driver pins.

#define dir2PinA 12

#define dir1PinB 9

#define dir2PinB 8

#define speedPinA 11

#define speedPinB 10

#define LED 13

#define siram A1

int command; //Int to store app command state.

int Speed = 204; // 0 - 255.

int Speedsec;

int buttonState = 0;

int lastButtonState = 0;

int Turnradius = 0; //Set the radius of a turn, 0 - 255 Note:the robot will malfunction if this is higher than int Speed.

int brakeTime = 45;

int brkonoff = 1; //1 for the electronic braking system, 0 for normal.

void setup() {

  pinMode(dir1PinA, OUTPUT);

  pinMode(dir2PinA, OUTPUT);
```

```
  pinMode(dir1PinB, OUTPUT);
  pinMode(dir2PinB, OUTPUT);
  pinMode(speedPinA, OUTPUT);
  pinMode(speedPinB , OUTPUT);
  pinMode(speedPinA,HIGH);
  pinMode(speedPinB,HIGH);
  pinMode(LED, OUTPUT); //Set the LED pin.
  pinMode(siram,OUTPUT);
  digitalWrite(siram,HIGH);
  Serial.begin(9600);  //Set the baud rate to your Bluetooth
module.
}

void loop() {
  if (Serial.available() > 0) {
    command = Serial.read();
    Stop(); //Initialize with motors stoped.
    switch (command) {
      case 'F':
        forward();
        break;
      case 'B':
        back();
```

```
  break;
case 'L':
  left();
  break;
case 'R':
  right();
  break;


case '0':
  Speed = 100;
  break;
case '1':
  Speed = 140;
  break;
case '2':
  Speed = 153;
  break;
case '3':
  Speed = 165;
  break;
case '4':
```

```
  Speed = 178;
  break;
case '5':
  Speed = 191;
  break;
case '6':
  Speed = 204;
  break;
case '7':
  Speed = 216;
  break;
case '8':
  Speed = 229;
  break;
case '9':
  Speed = 242;
  break;
case 'q':
  Speed = 255;
  break;
case 'w':
digitalWrite(siram,HIGH);
```

```
      break;


      case 'W':
      digitalWrite(siram,LOW);
      break;
        }
    Speedsec = Turnradius;
    if (brkonoff == 1) {
      brakeOn();
    } else {
      brakeOff();
    }
  }
}


void forward() {
// Motor 1 Forward
analogWrite(speedPinA, Speed);//Sets speed variable via
PWM
digitalWrite(dir1PinA, LOW);
digitalWrite(dir2PinA, HIGH);
// Motor 2 Forward
analogWrite(speedPinB, Speed);
```

```
digitalWrite(dir1PinB, LOW);
digitalWrite(dir2PinB, HIGH);
}

void back() {
 {
// Motor 1 Inverse
analogWrite(speedPinA, Speed);//Sets speed variable via PWM
digitalWrite(dir1PinA, HIGH);
digitalWrite(dir2PinA, LOW);
// Motor 2 Inverse
analogWrite(speedPinB, Speed);
digitalWrite(dir1PinB, HIGH);
digitalWrite(dir2PinB, LOW);
}

}

void left() {
 // Motor 1 Forward
analogWrite(speedPinA, Speed);//Sets speed variable via PWM
```

```
digitalWrite(dir1PinA, LOW);
digitalWrite(dir2PinA, HIGH);
// Motor 2 Inverse
analogWrite(speedPinB, Speed);
digitalWrite(dir1PinB, HIGH);
digitalWrite(dir2PinB, LOW);
}

void right() {
 // Motor 1 Inverse
analogWrite(speedPinA, Speed);//Sets speed variable via PWM
digitalWrite(dir1PinA, HIGH);
digitalWrite(dir2PinA, LOW);
// Motor 2 Forward
analogWrite(speedPinB, Speed);
digitalWrite(dir1PinB, LOW);
digitalWrite(dir2PinB, HIGH);
}

void Stop() {
analogWrite(speedPinA, Speed);//Sets speed variable via PWM
```

```
digitalWrite(dir1PinA, LOW);
digitalWrite(dir2PinA, LOW);
// Motor 2 Forward
analogWrite(speedPinB, Speed);
digitalWrite(dir1PinB, LOW);
digitalWrite(dir2PinB, LOW);
}

void brakeOn() {
  //Here's the future use: an electronic braking system!
  // read the pushbutton input pin:
  buttonState = command;
  // compare the buttonState to its previous state
  if (buttonState != lastButtonState) {
    // if the state has changed, increment the counter
    if (lastButtonState == 'F') {
      if (buttonState == 'S') {
        back();
        delay(brakeTime);
        Stop();
      }
    }
```

```
  if (lastButtonState == 'B') {
    if (buttonState == 'S') {
      forward();
      delay(brakeTime);
      Stop();
    }
  }
  if (lastButtonState == 'L') {
    if (buttonState == 'S') {
      right();
      delay(brakeTime);
      Stop();
    }
  }
  if (lastButtonState == 'R') {
    if (buttonState == 'S') {
      left();
      delay(brakeTime);
      Stop();
    }
  }
}
```

```
  // save the current state as the last state,
  //for next time through the loop
  lastButtonState = buttonState;
}
void brakeOff() {


}
```

Lampiran 3

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ENDORSEMENT LETTER
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This letter is to certify that the abstract of the thesis below

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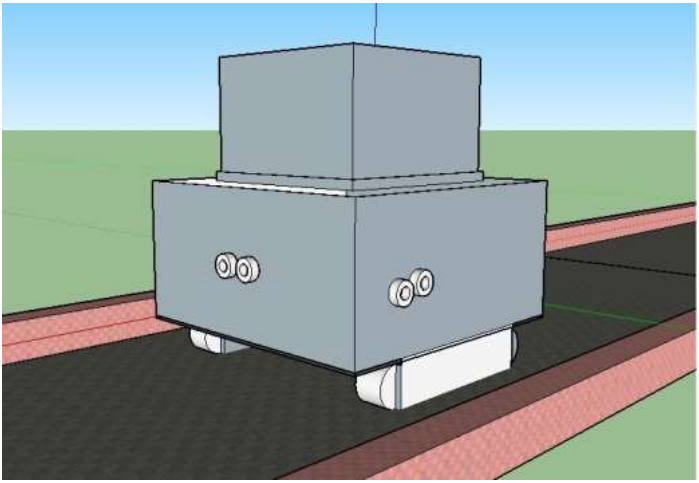
has been endorsed by Pusat Bahasa *UMSurabaya* for further approval by the examining committee of the faculty.

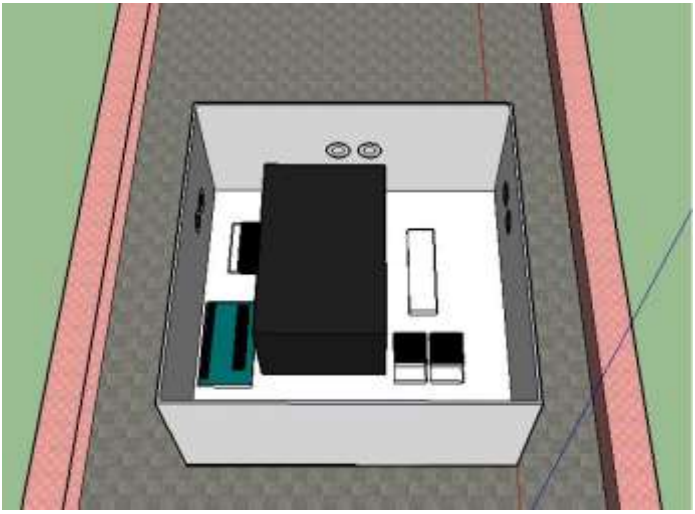
Surabaya, 03 August 2018
Chair,

Wasdi Hamsia, M.Pd

Lampiran 4

Desain Robot





Lampiran 5

Mobile Robot