LAMPIRAN A

PROGRAM ARDUINO

```
#define kanan 0
#define kiri 180
#define depan 85
#include <Servo.h>
Servo servo1;
Servo servo2;
int jaki, jaka, balik;
int sw = 0;
const int pingPin = 7;
const int relay = 8;
const int wow = 2;

void setup()
{
  digitalWrite(2,HIGH); // pull up
  Serial.begin(9600); // initialize serial communication:
  servo1.attach(3);  // SERVO DEPAN ( ULTRASONIC )
  servo2.attach(5);  // SERVO BELAKANG (KIPAS ANGIN)
  servo1.write(depan);
  servo2.write(depan);
  pinMode(relay,OUTPUT);  // PIN 8 SEBAGAI OUTPUT KE RELAY
  balik = 0;
}

long ukur(){
  long duration, cm;
  pinMode(pingPin, OUTPUT);
  digitalWrite(pingPin, LOW);
  delayMicroseconds(2);
  digitalWrite(pingPin, HIGH);
  delayMicroseconds(5);
  digitalWrite(pingPin, LOW);
  pinMode(pingPin, INPUT);
  duration = pulseIn(pingPin, HIGH);
  cm = microsecondsToCentimeters(duration);
  return (cm);
}

void henti(){
  if ( sw == 1 ) {
    digitalWrite(relay,LOW);
```

```
  }
}

void jalan(){
 if ( sw == 0 ) {
   digitalWrite(relay,HIGH);
   sw = 1;
 }
}

void loop()
{
 delay(500);

 long hasil;
 hasil=ukur();
 Serial.print(hasil);
 Serial.print("cm");
 Serial.println();
 delay(500);
 Serial.println("awal");


 // ************************************************//
 //************************************************//
 // JIKA HASIL < 100  ( DEPAN )

 if (hasil < 100 && balik == 0) {
   servo1.write(kiri);
   delay(1000);
   jaki = ukur();

   servo1.write(kanan);
   delay(2000);
   jaka = ukur();
   delay(500);

   Serial.print(jaki);
   Serial.print(" ");
   Serial.print(jaka);
   Serial.println();

   servo1.write(depan);
```

```
// BAGIAN KANAN
// jaka = jarak kanan
// jaki = jarak kiri

if (( jaka > jaki ) &&  (jaka >= 50) && (balik == 0)){

  servo2.write(20); //kiri dari depan
  Serial.println("kanan");
  delay(4000);
  servo2.write(85);
  servo1.write(kiri);
  delay(5000);
  balik = 1;

}

if (jaka >= 50 && balik == 1) {
  delay(500);
  long hasil;
  hasil=ukur();
  Serial.print(hasil);
  Serial.print("cmmmmmmmm");
  Serial.println();
  delay(500);

  if (hasil >= 50 && balik == 1){

    servo2.write(150);
    delay(4000);
    servo2.write(85);
    servo1.write(depan);
    Serial.println("kiriwakaka");
    delay(3000);
    balik =0;
  }

  while (hasil < 50 && balik == 1) {
    Serial.println("masukwhile");
    servo1.write(kiri);
    delay(500);
    long hasilkiri;
    hasilkiri=ukur();
    Serial.print(hasilkiri);
    Serial.print("cmmmmmmmm");
    Serial.println();
    delay(500);
```

```
    // baca depan
    servo1.write(depan);
    delay(500);
    long hasildepan;
    hasildepan=ukur();
    Serial.print(hasildepan);
    Serial.print("cmmmmmmmmdepan");
    Serial.println();
    delay(500);

    if (hasilkiri >= 50 && balik == 1){

      servo2.write(150);
      delay(4000);
      servo2.write(85);
      servo1.write(depan);
      Serial.println("kiriwhile");
      delay(3000);
      balik =0;
    }

    if (hasilkiri < 50 && hasildepan < 50 ) {
      henti();
      servo1.write(depan);
      servo2.write(85);
      Serial.println("hentiwhile");
      balik =0;
    }

    if ( digitalRead(wow) == 0 && balik == 1) {
      henti();
      Serial.println("wowhenti");
      servo1.write(depan);
      servo2.write(85);
      balik = 0;
    }
  }
}

// BAGIAN KIRI
// jaka = jarak kanan
// jaki = jarak kiri

if ((jaki > jaka ) && ( jaki >= 50) && (balik == 0)){

  servo2.write(150); //kanan dari depan
```

```
  Serial.println("kiri");
  delay(4000);
  servo2.write(85);
  servo1.write(kanan);
  delay(5000);
  balik = 2;
 }

 if (jaki >= 50 && balik == 2) {
  delay(500);
  long hasil;
  hasil=ukur();
  Serial.print(hasil);
  Serial.print("cmmmmmmmm");
  Serial.println();
  delay(500);

  if (hasil >= 50 && balik == 2){

   servo2.write(20);
   delay(4000);
   servo2.write(85);
   servo1.write(depan);
   Serial.println("kananwakaka");
   delay(3000);
   balik =0;
  }

  while (hasil < 50 && balik == 2){
   Serial.println("masukwhile");
   servo1.write(kanan);
   delay(500);
   long hasilkanan;
   hasilkanan=ukur();
   Serial.print(hasilkanan);
   Serial.print("cmmmmmmmm");
   Serial.println();
   delay(500);

   // baca depan
   servo1.write(depan);
   delay(500);
   long hasildepan;
   hasildepan=ukur();
   Serial.print(hasildepan);
   Serial.print("cmmmmmmmmmdepan");
```

```
    Serial.println();
    delay(500);


    if (hasilkanan >= 50 && balik == 2){

      servo2.write(20);
      delay(4000);
      servo2.write(85);
      servo1.write(depan);
      Serial.println("kananwhile");
      delay(3000);
      balik =0;
     }

    if (hasilkanan < 50 && hasildepan < 50 ) {
      henti();
      servo1.write(depan);
      servo2.write(85);
      Serial.println("hentiwhile");
      balik =0;
     }



    if ( digitalRead(wow) == 0 && balik == 2){
      henti();
      Serial.println("wowhenti");
      servo1.write(depan);
      servo2.write(85);
      balik = 0;
     }
   }
 }

// JIKA  KIRI DAN KANAN SAMA
// MAKA KE KANAN

if (( jaki == jaka ) && (jaki >= 50) && (jaka >= 50 && (balik == 0))) {
  // kiri dan kanan sama
  Serial.println("kiri dan kanan sama");
  servo2.write(20); //kiri dari depan
  Serial.println("kanan");
  delay(4000);
  servo2.write(85);
  servo1.write(kiri);
  delay(5000);
```

```
  balik = 1;

}

if (jaka >= 50 && balik == 1) {
  delay(500);
  long hasil;
  hasil=ukur();
  Serial.print(hasil);
  Serial.print("cmmmmmmmm");
  Serial.println();
  delay(500);

  if (hasil >= 50 && balik == 1){

    servo2.write(150);
    delay(4000);
    servo2.write(85);
    servo1.write(depan);
    Serial.println("kiriwakaka");
    delay(3000);
    balik =0;
  }

  while (hasil < 50 && balik == 1) {
    Serial.println("masukwhile");
    servo1.write(kiri);
    delay(500);
    long hasilkiri;
    hasilkiri=ukur();
    Serial.print(hasilkiri);
    Serial.print("cmmmmmmmmm");
    Serial.println();
    delay(500);


    // baca depan
    servo1.write(depan);
    delay(500);
    long hasildepan;
    hasildepan=ukur();
    Serial.print(hasildepan);
    Serial.print("cmmmmmmmmmdepan");
    Serial.println();
    delay(500);
```

```
    if (hasilkiri >= 50 && balik == 1){

      servo2.write(150);
      delay(4000);
      servo2.write(85);
      servo1.write(depan);
      Serial.println("kiriwhile");
      delay(3000);
      balik =0;
     }

    if (hasilkiri < 50 && hasildepan < 50 ) {
      henti();
      servo1.write(depan);
      servo2.write(85);
      Serial.println("hentiwhile");
      balik =0;
     }


    if ( digitalRead(wow) == 0 && balik == 1) {
      henti();
      Serial.println("wowhenti");
      servo1.write(depan);
      servo2.write(85);
      balik = 0;
     }
    }
   }

  if (jaki < 50 &&  jaka < 50  && (balik == 0)) {
    henti();
  }
}

//*****************************************
//*****************************************
//*****************************************


// push button
if (digitalRead(wow) == 0 && balik == 0) {
  Serial.println("masukwowawal");
  servo1.write(kiri);
  delay(1000);
  jaki = ukur();
```

```
servo1.write(kanan);
delay(2000);
jaka = ukur();
delay(500);

Serial.print(jaki);
Serial.print(" ");
Serial.print(jaka);
Serial.println();

servo1.write(depan);

// BAGIAN KANAN
// jaka = jarak kanan
// jaki = jarak kiri
// dalam push button


 if (( jaka > jaki ) &&  (jaka >= 50) && (balik == 0)){

 servo2.write(20); //kiri dari depan
 Serial.println("kanan");
 delay(4000);
 servo2.write(85);
 servo1.write(kiri);
 delay(5000);
 balik = 1;

}

if (jaka >= 50 && balik == 1) {
 delay(500);
 long hasil;
 hasil=ukur();
 Serial.print(hasil);
 Serial.print("cmmmmmmmmm");
 Serial.println();
 delay(500);

 if (hasil >= 50 && balik == 1){

  servo2.write(150);
  delay(4000);
  servo2.write(85);
  servo1.write(depan);
  Serial.println("kiriwakaka");
```

```
  delay(3000);
  balik =0;
}

while (hasil < 50 && balik == 1) {
  Serial.println("masukwhile");
  servo1.write(kiri);
  delay(500);
  long hasilkiri;
  hasilkiri=ukur();
  Serial.print(hasilkiri);
  Serial.print("cmmmmmmmm");
  Serial.println();
  delay(500);



  // baca depan
  servo1.write(depan);
  delay(500);
  long hasildepan;
  hasildepan=ukur();
  Serial.print(hasildepan);
  Serial.print("cmmmmmmmmmdepan");
  Serial.println();
  delay(500);

  if (hasilkiri >= 50 && balik == 1){

    servo2.write(150);
    delay(4000);
    servo2.write(85);
    servo1.write(depan);
    Serial.println("kiriwhile");
    delay(3000);
    balik =0;
  }

  if (hasilkiri < 50 && hasildepan < 50 ) {
    henti();
    servo1.write(depan);
    servo2.write(85);
    Serial.println("hentiwhile");
    balik =0;
  }
```

```
    if ( digitalRead(wow) == 0 && balik == 1) {
      henti();
      Serial.println("wowhenti");
      servo1.write(depan);
      servo2.write(85);
      balik = 0;
    }
  }
}


// BAGIAN KIRI
// jaka = jarak kanan
// jaki = jarak kiri
// dalam push button

if ((jaki > jaka ) && ( jaki >= 50) && (balik == 0)){

  servo2.write(150); //kanan dari depan
  Serial.println("kiri");
  delay(4000);
  servo2.write(85);
  servo1.write(kanan);
  delay(5000);
  balik = 2;
}

if (jaki >= 50 && balik == 2) {
  delay(500);
  long hasil;
  hasil=ukur();
  Serial.print(hasil);
  Serial.print("cmmmmmmmmm");
  Serial.println();
  delay(500);

  if (hasil >= 50 && balik == 2){

    servo2.write(20);
    delay(4000);
    servo2.write(85);
    servo1.write(depan);
    Serial.println("kananwakaka");
    delay(3000);
    balik =0;
  }
```

```
while (hasil < 50 && balik == 2){
 Serial.println("masukwhile");
 servo1.write(kanan);
 delay(500);
 long hasilkanan;
 hasilkanan=ukur();
 Serial.print(hasilkanan);
 Serial.print("cmmmmmmmm");
 Serial.println();
 delay(500);


 // baca depan
 servo1.write(depan);
 delay(500);
 long hasildepan;
 hasildepan=ukur();
 Serial.print(hasildepan);
 Serial.print("cmmmmmmmmdepan");
 Serial.println();
 delay(500);


 if (hasilkanan >= 50 && balik == 2){

   servo2.write(20);
   delay(4000);
   servo2.write(85);
   servo1.write(depan);
   Serial.println("kananwhile");
   delay(3000);
   balik =0;
 }
 if (hasilkanan < 50 && hasildepan < 50 ) {
  henti();
  servo1.write(depan);
  servo2.write(85);
  Serial.println("hentiwhile");
  balik =0;
 }


 if ( digitalRead(wow) == 0 && balik == 2){
  henti();
  Serial.println("wowhenti");
  servo1.write(depan);
```

```
      servo2.write(85);
      balik = 0;
     }
   }
 }

// JIKA  KIRI DAN KANAN SAMA
// MAKA KE KANAN
// dalam push button

if (( jaki == jaka ) && (jaki >= 50) && (jaka >= 50 && (balik == 0))) {
  // kiri dan kanan sama
  Serial.println("kiri dan kanan sama");
  servo2.write(20); //kiri dari depan
  Serial.println("kanan");
  delay(4000);
  servo2.write(85);
  servo1.write(kiri);
  delay(5000);
  balik = 1;

}

if (jaka >= 50 && balik == 1) {
  delay(500);
  long hasil;
  hasil=ukur();
  Serial.print(hasil);
  Serial.print("cmmmmmmmmm");
  Serial.println();
  delay(500);


  if (hasil >= 50 && balik == 1){

    servo2.write(150);
    delay(4000);
    servo2.write(85);
    servo1.write(depan);
    Serial.println("kiriwakaka");
    delay(3000);
    balik =0;
  }
  while (hasil < 50 && balik == 1) {
    Serial.println("masukwhile");
    servo1.write(kiri);
```

```
delay(500);
long hasilkiri;
hasilkiri=ukur();
Serial.print(hasilkiri);
Serial.print("cmmmmmmmm");
Serial.println();
delay(500);




// baca depan
servo1.write(depan);
delay(500);
long hasildepan;
hasildepan=ukur();
Serial.print(hasildepan);
Serial.print("cmmmmmmmmmdepan");
Serial.println();
delay(500);




if (hasilkiri >= 50 && balik == 1){

  servo2.write(150);
  delay(4000);
  servo2.write(85);
  servo1.write(depan);
  Serial.println("kiriwhile");
  delay(3000);
  balik =0;
}

if (hasilkiri < 50 && hasildepan < 50 ) {
  henti();
  servo1.write(depan);
  servo2.write(85);
  Serial.println("hentiwhile");
  balik =0;
}


if ( digitalRead(wow) == 0 && balik == 1) {
  henti();
  Serial.println("wowhenti");
  servo1.write(depan);
```

```
      servo2.write(85);
      balik = 0;
     }
   }
  }


  if (jaki < 50 &&  jaka < 50  && (balik == 0)) {
    henti();
  }
 }


 else{
   servo1.write(depan);
   servo2.write(85);
   jalan();
  }

}

long microsecondsToCentimeters(long microseconds)
{
 // The speed of sound is 340 m/s or 29 microseconds per centimeter.
 // The ping travels out and back, so to find the distance of the
 // object we take half of the distance travelled.
 return microseconds / 29 / 2;
}
```
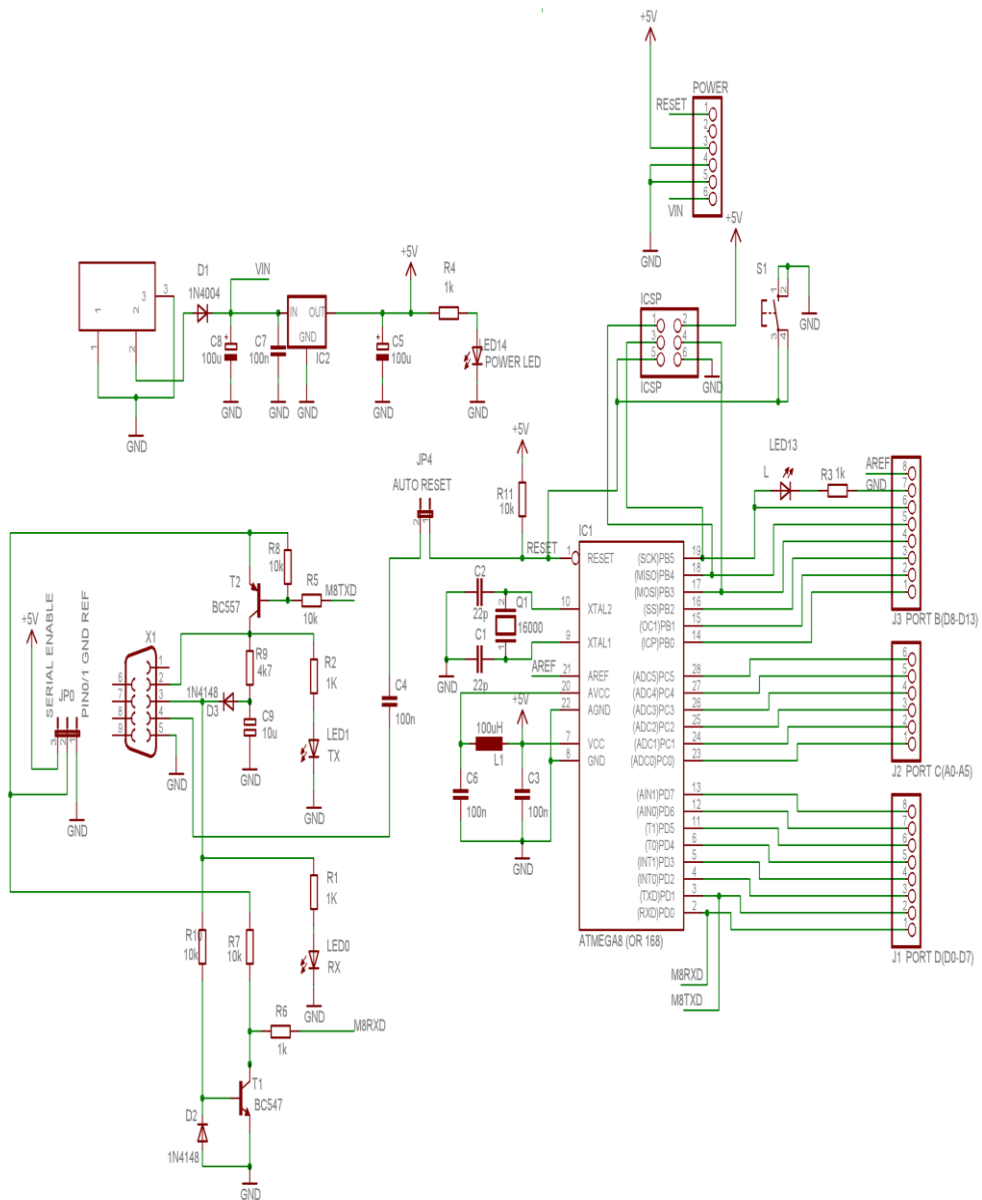
LAMPIRAN B

RANGKAIAN SKEMATIK ARDUINO

ELMARINO

LAMPIRAN C
RANGKAIAN SKEMATIK ALAT