LAMPIRAN I

FOTO ALAT

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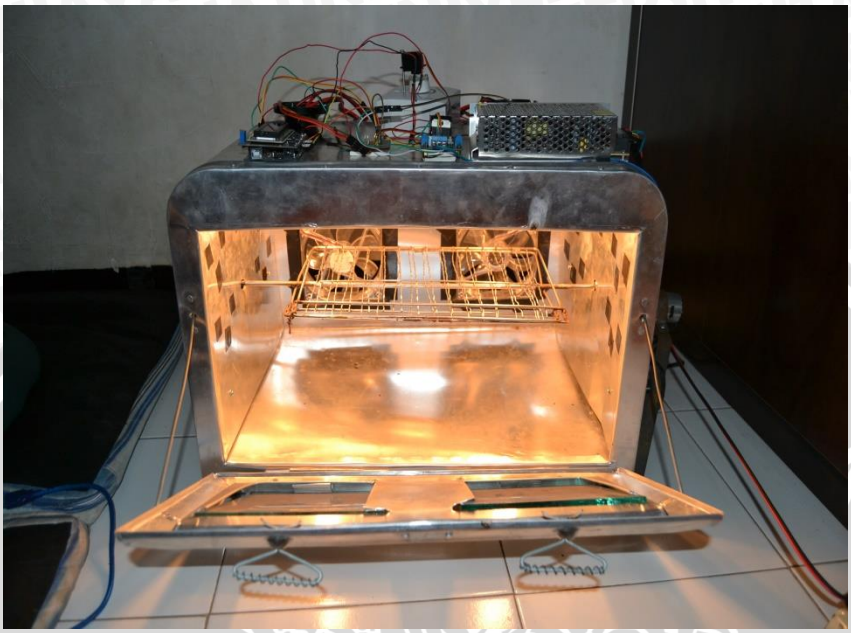
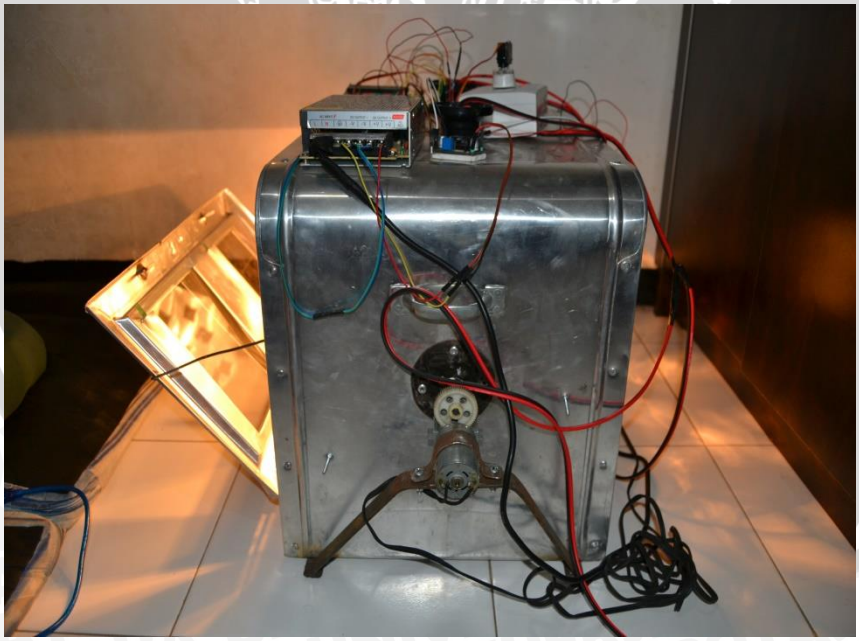


Gambar 1. Model Miniatur *Oven* Sistem Pengaturan Suhu Pengeringan Ikan Asin Manyung (jambal roti) Tampak Depan Tutup Terbuka



Gambar 2. Model Miniatur *Oven* Sistem Pengaturan Suhu Pengeringan Ikan Asin Manyung (jambal roti) Tampak Samping Tutup Terbuka

LAMPIRAN II

LISTING PROGRAM

Program Utama

```
#include <Servo.h>
#include <OneWire.h>
#include <DallasTemperature.h>
#include <LiquidCrystal.h>
#define RS  8
#define EN  9
#define D4  4
#define D5  5
#define D6  6
#define D7  7
#define pinKipas 3
#define IN_A 15
#define IN_B 16
#define ONE_WIRE_BUS 53
OneWire oneWire(ONE_WIRE_BUS);
LiquidCrystal lcd(RS, EN, D4, D5, D6, D7);
DallasTemperature sensors(&oneWire);

Servo myservo; // objek servo yang dikontrol
float suhu;
double
setPoint,error,dError,sError,lError,dTime,output,errorTop,errorBot,kP,kI,kD;
unsigned long now,lTime;
unsigned long time; // deklarasi data untuk pemberhentian sistem
int deg; // variabel servo


void setup()
{
   lcd.begin(16,2);
   lcd.setCursor(2,0);
   lcd.print("Starting up");
      myservo.attach(52); // servo pada pin 52
      pinMode(IN_A, OUTPUT);pinMode(IN_B, OUTPUT);
      digitalWrite(IN_A, HIGH);digitalWrite(IN_B, LOW);

Serial.begin(9600); // analog input
sensors.begin();
```

```
suhu = 0;
error = 0;
dError = 0;
sError = 0;
lError = 0;
dTime = 0;
output = 0;

/*parameter yang di set*/

setPoint = 40;
kP = 9,42;
kI = 0,362;
kD = 61,23;
}
void loop()
{
  lcd_display();
  delay(900);

  sensors.requestTemperatures();
  suhu = sensors.getTempCByIndex(0);
  time = millis(); // untuk menghentikan sistem
/*perhitungan*/
  now = millis();
  dTime =(double) (now-lTime);
//menghitung nilai error
  error = setPoint-suhu;
//kalkulasi sinyal PID
  sError =(sError+error);
  dError = (error-lError);
//Rumus pid
  output = (kP*error)+((kI*sError)*(dTime/1000))+((kD*dError)/(dTime/1000));

//sinyal PID sebagai perintah untuk aktuator dan pembatas

     if (output < 0) // belum mencapai setpoint
     {
      myservo.write(deg++);   //sudut semakin besar
      digitalWrite(pinKipas, LOW);
       digitalWrite(IN_A, LOW);
        if(deg >= 160)
        myservo.write (160);
```

```
      }

      else if (output > 0)// melebihi setpoint
      {
       myservo.write (deg--);  //sudut semakin kecil
        digitalWrite(pinKipas, HIGH);
        digitalWrite(IN_A, HIGH);
          if (deg <= 0)
          myservo.write (0);
      }

      else if (output=0)
      {
      myservo.write(160);
      }

lError = error;
lTime = now;

       Serial.println(sensors.getTempCByIndex(0));
       delay (3000);

       if (time >= 100800000)
       {
         myservo.write (180);
}
}
void lcd_display()
{
   lcd.setCursor(0,0);
   lcd.print("SUHU = ");
   lcd.setCursor(7,0);
   lcd.print(sensors.getTempCByIndex(0));
   lcd.setCursor(12,0);
   lcd.print("\337C");
}
```

LAMPIRAN III

DATASHEET