

UNIVERSITAS BRAWIJAYA

LAMPIRAN I

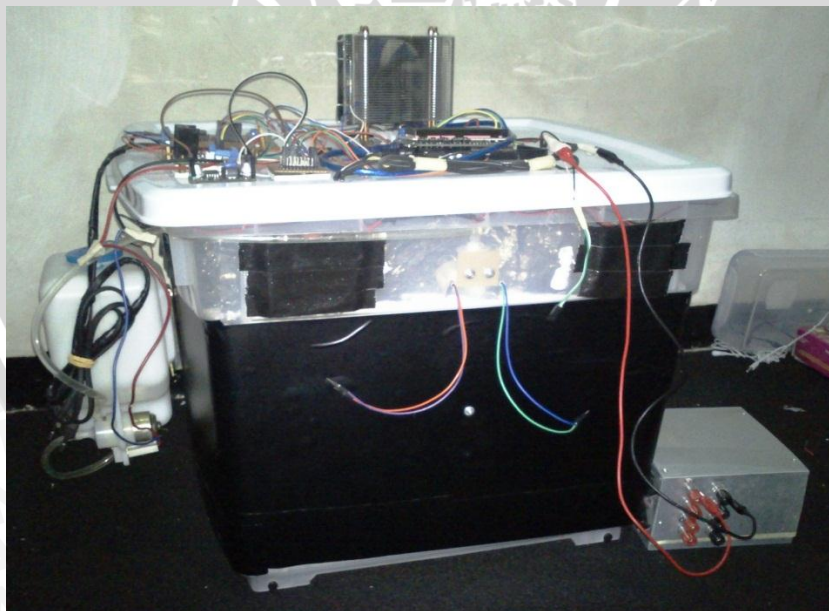
FOTO ALAT



## FOTO ALAT



**Gambar 1. Model Miniatur *Box* Sistem Pengendalian Suhu dan Kelembaban ekstraksi Metode Maserasi Minyak Atsiri Melati Tampak Samping Tutup Terbuka**



**Gambar 2. Model Miniatur *Box* Sistem Pengendalian Suhu dan Kelembaban ekstraksi Metode Maserasi Minyak Atsiri Melati Tampak Samping Tutup Tertutup**



UNIVERSITAS BRAWIJAYA

LAMPIRAN II  
LISTING PROGRAM

## Program Utama

```
#include <SHT1x.h>
#include <LiquidCrystal.h>
#define RS 8
#define EN 9
#define D4 4
#define D5 5
#define D6 6
#define D7 7

#define dataPin 53
#define clockPin 52

#define pwmPompa 2
#define pinKipas 3
#define IN_A 15
#define IN_B 16
#define IN_C 17
#define IN_D 18
#define pinLampu 19

#define on 1
#define off 0

SHT1x sht1x(dataPin, clockPin);
LiquidCrystal lcd(RS, EN, D4, D5, D6, D7);
float temp_c, temp_f, humidity;

double set_point=0,set_point_suhu=0, PID=0;
double Kp=0,Ki=0,Kd=0;
double Error=0, Error1=0, sError=0, dError=0, lError=0;
double now=0, dTime=0, lTime=0;
```



```
void setup()
{
  set_point=45;
  set_point_suhu=27;
  Kp=6.5259;
  Ki=10;
  Kd=1.0205;

  lcd.begin(16,2);
  lcd.setCursor(2,0);
  lcd.print("Starting up");
  Serial.begin(9600); // Open serial connection to report values to host
  Serial.println("Starting up");
  pinMode(IN_A, OUTPUT);pinMode(IN_B, OUTPUT);
  digitalWrite(IN_A, HIGH);digitalWrite(IN_B, LOW);
  pinMode(IN_C,OUTPUT);pinMode(IN_D,OUTPUT);digitalWrite(IN_C,
HIGH);digitalWrite(IN_D, LOW);
  pinMode(pinLampu, OUTPUT);digitalWrite(pinLampu, LOW);

  lampu(on);kipas(on);
}

void loop()
{
  read_sensor();
  lcd_display();
  serial_display();delay(900);
  delay(100);

  kipas(off);
```

```
calculate();
if(PID>255)
{pompa(255);}
else if(PID>0)
{pompa(PID);}
else
{pompa(0);}

if(humidity>47)
{
if(temp_c<set_point_suhu)
{lampu(on);}
else
{lampu(off);}
}
else
{
lampu(off);
}
}

void calculate()
{
now=millis();
if(!Time!=0){dTime =(double)(now-Time);}

humidity=(double)humidity;
Error=set_point-humidity;

sError += Error;
dError -= IError;

PID = (Kp*Error) + (((Ki/10)*sError)*(dTime/1000)) +((Kd*dError)/(dTime/1000));
if(PID<=0){PID=0;}
```

```
else{PID+=50;}
```

```
PID=(int)PID;
```

```
LError = Error;
```

```
ITime = now;
```

```
}
```

```
void pompa(int pwm)
```

```
{
```

```
  analogWrite(pwmPompa, pwm);
```

```
}
```

```
void kipas(int saklar)
```

```
{
```

```
  if(saklar==on)
```

```
  {
```

```
    digitalWrite(pinKipas, HIGH);
```

```
    digitalWrite(IN_C, HIGH);
```

```
  }
```

```
  else
```

```
  {
```

```
    digitalWrite(pinKipas, LOW);
```

```
    digitalWrite(IN_C, LOW);
```

```
  }
```

```
}
```

```
void lampu(int saklar)
```

```
{
```

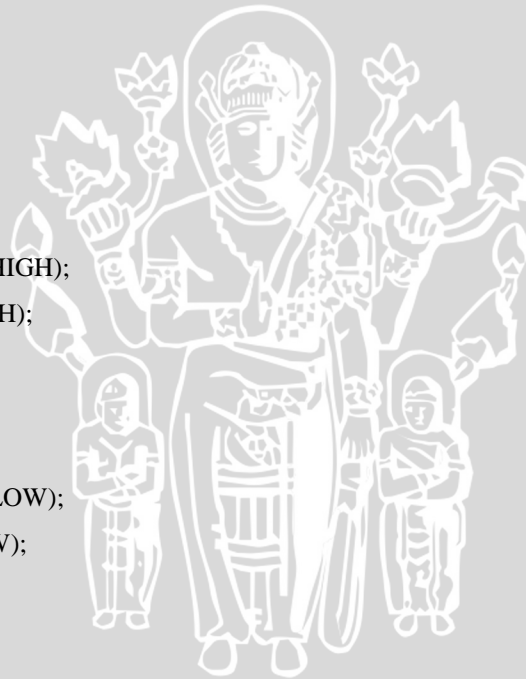
```
  if(saklar==on) digitalWrite(pinLampu, HIGH);
```

```
  else digitalWrite(pinLampu, LOW);
```

```
}
```

```
void read_sensor()
```

```
{
```



```
temp_c = sht1x.readTemperatureC();
humidity = sht1x.readHumidity();
}
void lcd_display()
{
  lcd.setCursor(0,0);
  lcd.print("Temp  = ");
  lcd.setCursor(11,0);
  lcd.print(temp_c);

  lcd.setCursor(0,1);
  lcd.print("Humidity = ");
  lcd.setCursor(11,1);
  lcd.print(humidity);
}
void serial_display()
{
  Serial.print("SP Suhu: ");
  Serial.print(set_point_suhu, DEC);
  Serial.print("C /");

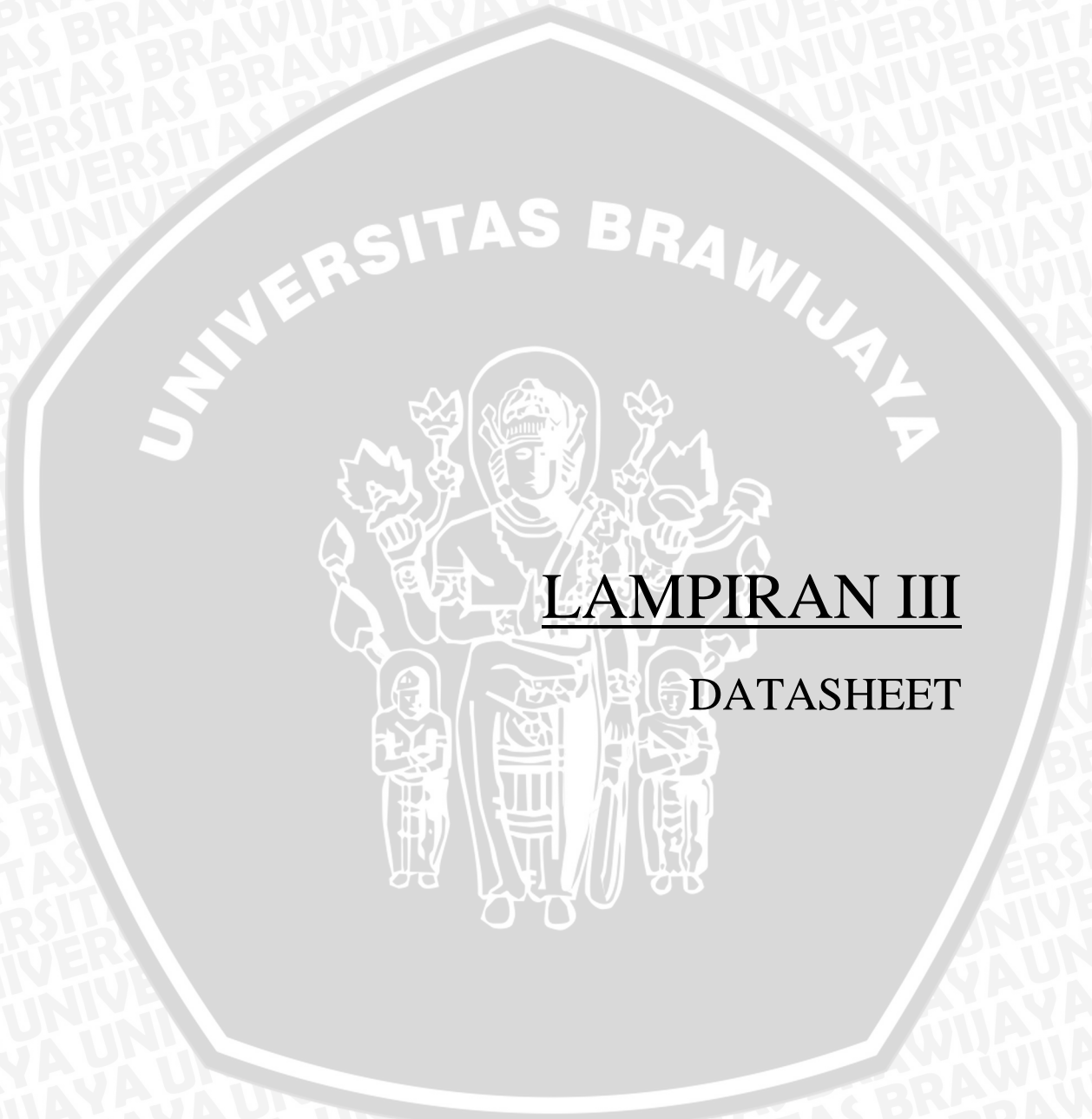
  Serial.print("Suhu: ");
  Serial.print(temp_c, DEC);
  Serial.print("C /");

  Serial.print("SP Humidity: ");
  Serial.print(set_point, DEC);
  Serial.println("%");

  Serial.print("Humidity: ");
  Serial.print(humidity, DEC);
  Serial.println("% \n");
}
```







LAMPIRAN III

DATASHEET