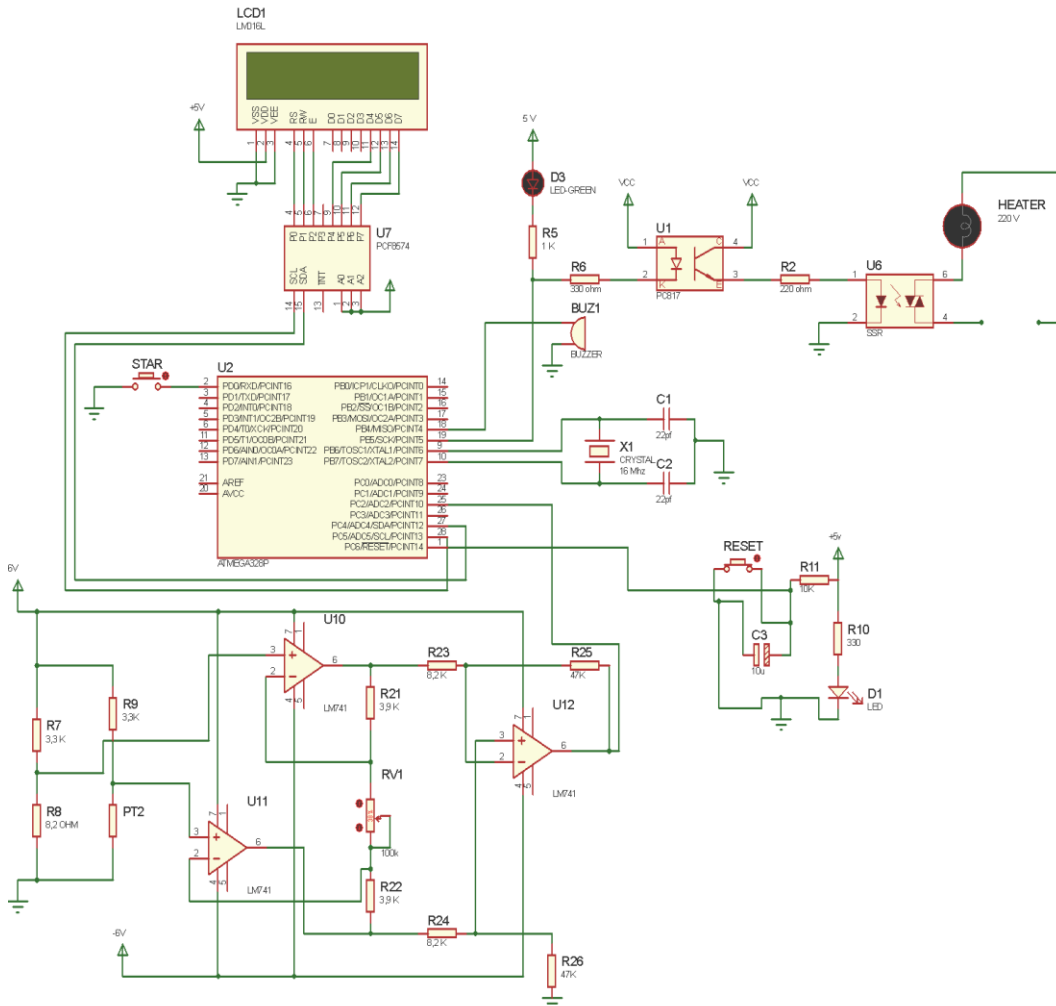


## LAMPIRAN

### 1. Rangkaian Keseluruhan



### 2. Hasil Perhitungan Pada Modul Tugas Akhir

#### a. Perhitungan Suhu 121°C pertama

1) Rata-rata  $\frac{\text{Jumlah nilai data}}{\text{Banyak data}}$

$$\frac{120.1+120.3+120.3+120.3+121.3+121.3+121.3+121.5+121.3+121.3}{10} = 120.9$$

#### 2) Koreksi

Koreksi= Rata Rata alat – rata rata kalibrator

$$= 121,3- 120,9$$

$$= 0,4$$

3) *Error*

$$\begin{aligned} \text{Error (\%)} &: \frac{\text{Rata rata alat} - \text{rata rata kalibrator}}{\text{Rata rata alat}} \times 100\% \\ &= \frac{121,3 - 120,9}{121,3} \times 100\% = 0,329\% \end{aligned}$$

### b. Perhitungan Suhu 121°C kedua

1) Rata-rata  $\frac{\text{Jumlah nilai data}}{\text{Banyak data}}$

$$\frac{121.1+121.3+121.1+121.3+121.4+121.3+121.3+121.3+121.4+121.3}{10} = 121.20$$

2) Koreksi

Koreksi= Rata Rata alat – rata rata kalibrator

$$= 121,34 - 121,20$$

$$= 0,14$$

3) *Error*

$$\begin{aligned} \text{Error (\%)} &: \frac{\text{Rata rata alat} - \text{rata rata kalibrator}}{\text{Rata rata alat}} \times 100\% \\ &= \frac{121,34 - 121,20}{121,34} \times 100\% = 0,115\% \end{aligned}$$

### c. Perhitungan Timer 15 menit(900 detik)

1) Rata-rata  $\frac{\text{Jumlah nilai data}}{\text{Banyak data}}$

$$\frac{904+903+904+902+903+903+904+902+904+904}{10} = 903,3$$

2) Koreksi

Koreksi= nilai terukur – nilai yang dikehendaki

$$= 903,3 - 900$$

$$= 3,3$$

3) *Error*

$$\begin{aligned} \text{Error (\%)} &: \frac{\text{data setting} - \text{rata rata}}{\text{data setting}} \times 100\% \\ &= \frac{900 - 903,3}{900} \times 100\% = 0,36\% \end{aligned}$$

### 3. Pembuatan Program Keseluruhan

```
#include <Wire.h>
#include <Event.h>
#include <Timer.h>
#include <LiquidCrystal_I2C.h>
const int Asts = 0 ;
const int RELAY_ENABLE=11;
const int BUZZER_ENABLE=12;
int pb=1;
int x;
float v;
float kpa;
float bar;
//timer
int S = 0; // count seconds
int M = 13; // count minutes

int A; // baca push button
int B;
int a=0;
```

```
const int heater = 13;// pin digital 1

float V;

float temp;

float Rx;

float C =79.489;

float slope = 14.187;

float R0=100.0;

float alpha=0.00385;

int kunci=0;

int Vin = A2;

Timer t;

LiquidCrystal_I2C lcd(0x27,16,2); // Set the LCD I2C address

unsigned long sebelum=0;

const long interval=100;

void setup()
{
  Serial.begin(9600);

  lcd.init();

  lcd.backlight();

  lcd.setCursor (3,0);

  lcd.print("AUTOCLAVE");

  lcd.setCursor (5,1);

  lcd.setCursor (0,0);
```

```
delay(2000);

lcd.print("FILDZAH ALIFAH KHOIRINA");
lcd.setCursor (0,1);
lcd.print("20163010044");
delay(2000);
lcd.setCursor (0,0);
lcd.print("TRI HARDONO");
lcd.print("  ");
lcd.setCursor (0,1);
lcd.print("20163010063");
delay(2000);
lcd.clear();

pinMode(Asts,INPUT_PULLUP);
pinMode(pb,INPUT_PULLUP);
pinMode(RELAY_ENABLE, OUTPUT);
pinMode(BUZZER_ENABLE, OUTPUT);
pinMode(Vin,INPUT);
pinMode (heater, OUTPUT);
digitalWrite(heater, LOW);

digitalWrite(RELAY_ENABLE,LOW);
digitalWrite(BUZZER_ENABLE,LOW);

t.every(100,takeReading);

}
```

```
void loop()
{
  A= digitalRead(Asts);
  t.update();

  //tampil tekanan
  lcd.setCursor(0, 0);
  lcd.print(bar,1 );
  lcd.print(" ");
  lcd.print("bar");
  lcd.print(" ");

  //tampil suhu
  lcd.setCursor(0, 1);
  lcd.print(temp);
  lcd.print(" ");
  lcd.print("C");
  lcd.print(" ");

  //tampil timer
  lcd.setCursor(11,0);
  lcd.print ("TIMER");
  lcd.setCursor(11,1);
  lcd.print(M);
  lcd.print(" ");
  lcd.setCursor(13,1);
```

```
lcd.print(":");  
  lcd.setCursor(14,1);  
  lcd.print(S);  
  lcd.print(" ");  
  
  preasure();  
  
  if(A == LOW)  
  {  
    a = 1;  
    B = 0;  
  }  
  if(a==0)  
  {  
    digitalWrite(heater, HIGH);  
  }  
  
  if(a == 1)  
  {  
    if (temp >= 121)  
    {  
      digitalWrite(heater, HIGH); //maka 'ledSaya' menyala  
    }  
    else  
    {  
      digitalWrite(heater, LOW); //apabila tidak ada, maka 'ledSaya' mati  
    }  
  }
```

```
if(bar>=1.1)
{
  kunci=1;
}
if(kunci==1)
{
  timer();
}
}

if(B == 1)
{
  a=0;
  digitalWrite(heater, HIGH);
  digitalWrite(BUZZER_ENABLE, HIGH);
  digitalWrite(RELAY_ENABLE, HIGH);
  delay(300000); //gatau bener apa engga
  digitalWrite(BUZZER_ENABLE, LOW);
  digitalWrite(RELAY_ENABLE, LOW);

}
}

void timer()
{
  if(kunci==1)
```



```
{  
    unsigned long currentMillis = millis();  
    if(currentMillis-sebelum>=interval)  
    {  
        sebelum=currentMillis;  
        S--;  
    }  
}  
else {}  
  
if(S<0)  
{  
    M--;  
    S=59;  
}  
if(M<0)  
{  
    B=1;  
    kunci=0;  
    S=0;  
    M=0;  
    //lcd.clear();  
}  
}  
void preasure()  
{
```

```
x = analogRead(A1);  
v = x*(5.0/1023.0);  
kpa = ((v/5.0)-0.04)/0.0012858;  
kpa = kpa - 95.09;  
bar = (float)(kpa*0.01);  
  
if ( bar <0)  
{  
kpa = 0.0;  
bar= bar * -1;  
}  
delay(474);  
}  
  
void takeReading()  
{  
V = (analogRead(Vin)/1023.0)*5.0;  
Rx = V*slope+C;  
temp= (Rx/R0-1.0)/alpha;  
delay(474)  
}
```

#### 4. Foto kegiatan bimbingan tugas akhir



