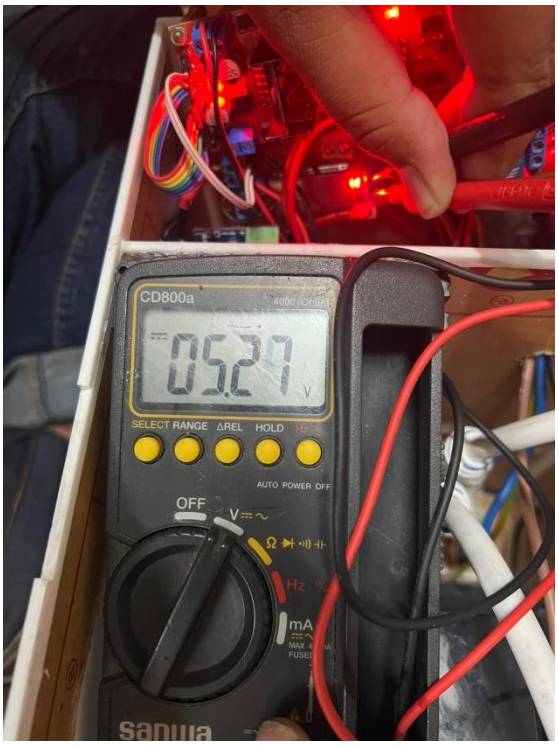
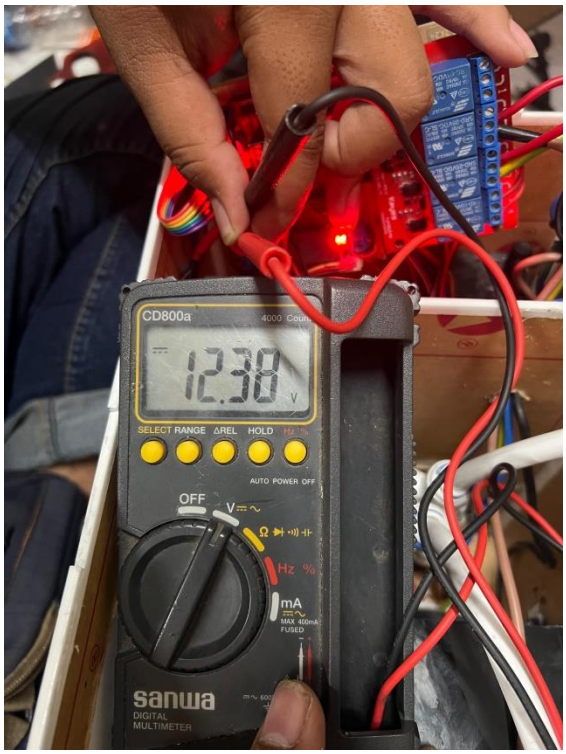
LAMPIRAN

Lampiran 1 Hasil pengukuran UBEC



Lampiran 2 Hasil pengukuran *power supply*



Lampiran 3 Hasil pengujian keseluruhan

No	Pilihan Suhu Air (°C)	Percobaan ke -	Waktu (S)	Banyak Air (ML)	Suhu Output (°C)	Error (%)
1	Normal (30)	1	15	391	30	0
		2	15	391	30	0
		3	15	392	30	0
		4	15	392	30	0
		5	15	391	30	0
		6	15	392	30	0
		7	15	391	30	0
		8	15	391	30	0
		9	15	392	30	0
		10	15	392	30	0
2	Hangat (35)	1	20	392	34,5	2,85
		2	20	391	34,5	2,85
		3	20	391	34,5	2,85
		4	20	391	34,5	2,85
		5	20	392	34,5	2,85
		6	20	392	34,5	2,85
		7	20	391	34,5	2,85
		8	20	392	34,5	2,85
		9	20	392	34,5	2,85
		10	20	392	34,5	2,85
3	Teh (66)	1	45	391	65,5	1,5
		2	45	392	65,5	1,5
		3	45	392	65,5	1,5
		4	45	391	65,5	1,5
		5	45	391	65,5	1,5
		6	45	392	65,5	1,5
		7	45	391	65,5	1,5
		8	45	391	65,5	1,5
		9	45	391	65,5	1,5
		10	45	391	65,5	1,5
4	Susu (70)	1	49	392	69,5	1,42
		2	49	392	69,5	1,42
		3	49	391	69,5	1,42
		4	49	392	69,5	1,42
		5	49	392	69,5	1,42
		6	49	391	69,5	1,42
		7	49	392	69,5	1,42
		8	49	392	69,5	1,42
		9	49	391	69,5	1,42
		10	49	391	69,5	1,42
5	Kopi	1	75	392	94,5	1,07

	(95)	2	75	392	94,5	1,07
		3	75	392	94,5	1,07
		4	75	392	94,5	1,07
		5	75	391	94,5	1,07
		6	75	391	94,5	1,07
		7	75	392	94,5	1,07
		8	75	392	94,5	1,07
		9	75	392	94,5	1,07
		10	75	391	94,5	1,07

Lampiran 4 Hasil Pengukuran Suhu Air 35°C



Lampiran 5 Hasil Pengukuran Suhu Air 66°C



Lampiran 6 Hasil Pengukuran Suhu Air 70°C



Lampiran 7 Hasil Pengukuran Suhu Air 95°C



Lampiran 8 Program Alat *FAST HEATING* DISPENSER

```
#include "data_pixel.h"

void setup(void) {
  Serial.begin(9600);
  delay(250);
  setupRelay();
  delay(250);
  setupMotor();
  delay(250);

  uint16_t ID = tft.readID();
  if (ID == 0xD3D3) ID = 0x9486;
  tft.begin(ID);
  tft.setRotation(1);
```

```
  delay(250);
  awalan();
  delay(1000);
}

void loop(void) {
  bacaTS();
  temp = readThermocouple();
  cekSuhu();
  switch (Pilihan) {
    case 'a':
      Serial.println("a");
      motorNormal_ON();
      tampilkanProcessing();
      break;
    case 'b':
      Serial.println("b");
      motorSuhu_ON(9);
      motorSuhu_OFF();
      while (temp < SuhuHangat) {  //35
        Serial.println("b1");
        temp = readThermocouple();
        cekSuhu();
        Heater1_ON();
        Heater2_ON();
        delay(250);
      }
      Heater1_OFF();
      Heater2_OFF();
      Pilihan = 'T';
      break;
    case 'c':
      Serial.println("c");
      motorSuhu_ON(9);
      motorSuhu_OFF();
      while (temp < SuhuTeh) {
        Serial.println("c1");
        temp = readThermocouple();
        cekSuhu();
        Heater1_ON();
        Heater2_ON();
        delay(250);
      }
      Heater1_OFF();
      Heater2_OFF();
      Pilihan = 'T';
```

```
    break;
  case 'd':
    Serial.println("d");
    motorSuhu_ON(9);
    motorSuhu_OFF();
    while (temp < SuhuSusu) {
      Serial.println("d1");
      temp = readThermocouple();
      cekSuhu();
      Heater1_ON();
      Heater2_ON();
      delay(250);
    }
    Heater1_OFF();
    Heater2_OFF();
    Pilihan = 'T';
    break;
  case 'e':
    Serial.println("e");
    motorSuhu_ON(9);
    motorSuhu_OFF();
    while (temp < SuhuKopi) {
      Serial.println("e1");
      temp = readThermocouple();
      cekSuhu();
      Heater1_ON();
      Heater2_ON();
      delay(250);
    }
    delay(10000);
    Heater1_OFF();
    Heater2_OFF();
    Pilihan = 'T';
    break;
  case 'X':
    Serial.println("x");
    motorNormal_OFF();
    motorSuhu_OFF();
    Solenoid_OFF();
    break;
  case 'T':
    Serial.println("t");
    delay(1000);
    Solenoid_ON();
    tampilkanProcessing();
    break;
```

```
  }
  delay(250);
}

#include <SPI.h>
#include <Adafruit_GFX.h>
#include <MCUFRIEND_kbv.h>
MCUFRIEND_kbv tft;
#include <TouchScreen.h>
#define MINPRESSURE 200
#define MAXPRESSURE 1000

#define MAX6675_CS   53
#define MAX6675_SO   50
#define MAX6675_SCK  52
// MAX6675 thermocouple(thermoCLK, thermoCS, thermoDO);

float temp = 0;
int status = 0;
float temperature_read;
uint32_t start, stop;
char Pilihan = 'X';

const int XP = 6, XM = A2, YP = A1, YM = 7;
const int TS_LEFT = 920, TS_RT = 200, TS_TOP = 870, TS_BOT = 200;

TouchScreen ts = TouchScreen(XP, YP, XM, YM, 300);
Adafruit_GFX_Button Btn_Normal, Btn_Hangat, Btn_Teh, Btn_Susu,
Btn_Kopi, Stopper;

int pixel_x, pixel_y;

#define BLACK 0x0000
#define BLUE 0x001F
#define RED 0xF800
#define GREEN 0x07E0
#define CYAN 0x07FF
#define MAGENTA 0xF81F
#define YELLOW 0xFFE0
#define WHITE 0xFFFF

float dataSensor = 0.00;
float SuhuKopi = 100.00;
float SuhuSusu = 85.00;
float SuhuTeh = 84.00;
float SuhuHangat = 35.00;
```

```
int RELAY_PIN1 = 41;  // Pin Relay 1
int RELAY_PIN2 = 39;  // Pin Relay 2
int RELAY_PIN3 = 37;  // Pin Relay 3
int ENA_PIN = 23;     //pin PWM
int IN1_PIN = 25;     //pin input motor 1
int IN2_PIN = 27;     //pin input motor 1
int ENB_PIN = 29;     //pin PWM
int IN3_PIN = 31;     //pin input motor 2
int IN4_PIN = 33;     //pin input motor 2


void setupMotor() {
  pinMode(ENA_PIN, OUTPUT);
  pinMode(IN1_PIN, OUTPUT);
  pinMode(IN2_PIN, OUTPUT);
  pinMode(ENB_PIN, OUTPUT);
  pinMode(IN3_PIN, OUTPUT);
  pinMode(IN4_PIN, OUTPUT);
}
void motorNormal_ON() {
  digitalWrite(IN3_PIN, LOW);
  digitalWrite(IN4_PIN, HIGH);
  analogWrite(ENB_PIN, 255);
}
void motorNormal_OFF() {
  digitalWrite(IN3_PIN, LOW);
  digitalWrite(IN4_PIN, LOW);
  analogWrite(ENB_PIN, 0);
}
void motorSuhu_ON(int d) {
  digitalWrite(IN1_PIN, LOW);
  digitalWrite(IN2_PIN, HIGH);
  analogWrite(ENA_PIN, 255);
  for (int y = 0; y < d; y++) {
    tampilkanWaiting();
    delay(1000);
  }
}
void motorSuhu_OFF() {
  digitalWrite(IN1_PIN, LOW);
  digitalWrite(IN2_PIN, HIGH);
  analogWrite(ENA_PIN, 0);
}

void setupRelay() {
```

```
  pinMode(RELAY_PIN1, OUTPUT);
  pinMode(RELAY_PIN2, OUTPUT);
  pinMode(RELAY_PIN3, OUTPUT);
}
void Solenoid_ON() {
  digitalWrite(RELAY_PIN3, HIGH);
}
void Solenoid_OFF() {
  digitalWrite(RELAY_PIN3, LOW);
}
void Heater1_ON() {
  digitalWrite(RELAY_PIN1, LOW);
}
void Heater1_OFF() {
  digitalWrite(RELAY_PIN1, HIGH);
}
void Heater2_ON() {
  digitalWrite(RELAY_PIN2, LOW);
}
void Heater2_OFF() {
  digitalWrite(RELAY_PIN2, HIGH);
}


void awalan() {
  tft.fillScreen(BLACK);
  Btn_Normal.initButton(&tft, 95, 40, 180, 35, WHITE, CYAN, BLACK,
"Normal", 2);
  Btn_Hangat.initButton(&tft, 95, 80, 180, 35, WHITE, CYAN, BLACK,
"Hangat 35", 2);
  Btn_Teh.initButton(&tft, 95, 120, 180, 35, WHITE, CYAN, BLACK,
"Teh (66)", 2);
  Btn_Susu.initButton(&tft, 95, 160, 180, 35, WHITE, CYAN, BLACK,
"Susu (70)", 2);
  Btn_Kopi.initButton(&tft, 95, 200, 180, 35, WHITE, CYAN, BLACK,
"Kopi (95)", 2);
  Stopper.initButton(&tft, 250, 120, 110, 200, WHITE, CYAN, BLACK,
"STOP", 3);
  Btn_Normal.drawButton(false);
  Btn_Hangat.drawButton(false);
  Btn_Teh.drawButton(false);
  Btn_Susu.drawButton(false);
  Btn_Kopi.drawButton(false);
  Stopper.drawButton(false);
}
bool Touch_getXY(void) {
```

```
  TSPoint p = ts.getPoint();
  pinMode(YP, OUTPUT);
  pinMode(XM, OUTPUT);
  digitalWrite(YP, HIGH);
  digitalWrite(XM, HIGH);
  bool pressed = (p.z > MINPRESSURE && p.z < MAXPRESSURE);
  if (pressed) {
    pixel_x = map(p.y, TS_LEFT, TS_RT, 0, tft.width());
    pixel_y = map(p.x, TS_TOP, TS_BOT, 0, tft.height());
    // Serial.print("Px = ");
    // Serial.print(p.x);
    // Serial.print(" - Py = ");
    // Serial.print(p.y);
    // Serial.print("  ||  pixel_x = ");
    // Serial.print(pixel_x);
    // Serial.print(" - pixel_y = ");
    // Serial.println(pixel_y);
  }
  return pressed;
}

void bacaTS() {
  bool down = Touch_getXY();
  Btn_Normal.press(down && Btn_Normal.contains(pixel_x, pixel_y));
  Btn_Hangat.press(down && Btn_Hangat.contains(pixel_x, pixel_y));
  Btn_Teh.press(down && Btn_Teh.contains(pixel_x, pixel_y));
  Btn_Susu.press(down && Btn_Susu.contains(pixel_x, pixel_y));
  Btn_Kopi.press(down && Btn_Kopi.contains(pixel_x, pixel_y));
  Stopper.press(down && Stopper.contains(pixel_x, pixel_y));
  if (Btn_Normal.justReleased())
    Btn_Normal.drawButton();
  if (Btn_Hangat.justReleased())
    Btn_Hangat.drawButton();
  if (Btn_Teh.justReleased())
    Btn_Teh.drawButton();
  if (Btn_Susu.justReleased())
    Btn_Susu.drawButton();
  if (Btn_Kopi.justReleased())
    Btn_Kopi.drawButton();
  if (Stopper.justReleased()) {
    Stopper.drawButton();
    awalan();
  }
  if (Btn_Normal.justPressed()) {
    Btn_Normal.drawButton(true);
    Pilihan = 'a';
```

```
  }
  if (Btn_Hangat.justPressed()) {
    Btn_Hangat.drawButton(true);
    Pilihan = 'b';
  }
  if (Btn_Teh.justPressed()) {
    Btn_Teh.drawButton(true);
    Pilihan = 'c';
  }
  if (Btn_Susu.justPressed()) {
    Btn_Susu.drawButton(true);
    Pilihan = 'd';
  }
  if (Btn_Kopi.justPressed()) {
    Btn_Kopi.drawButton(true);
    Pilihan = 'e';
  }
  if (Stopper.justPressed()) {
    Stopper.drawButton(true);
    Pilihan = 'X';
  }
}
void tampilkanWaiting() {
  tft.fillRect(5, 22, 180, 200, MAGENTA);
  tft.setTextSize(2);
  tft.setTextColor(BLACK);
  tft.setCursor(35, 35);
  tft.print("  Waiting");
  for (int u = 60; u < 220; u = u + 20) {
    tft.setCursor(80, u);
    tft.print(" - ");
    delay(100);
  }
}
void tampilkanProcessing() {
  tft.fillRect(5, 22, 180, 200, MAGENTA);
  tft.setTextSize(2);
  tft.setTextColor(BLACK);
  tft.setCursor(35, 35);
  tft.print("Processing");
  for (int u = 60; u < 220; u = u + 20) {
    tft.setCursor(80, u);
    tft.print(" v ");
    delay(100);
  }
}
```

```
void cekSuhu(){
  Serial.print(temp);
  Serial.print(" = ");
  Serial.print(SuhuHangat);
  Serial.print(" | ");
  Serial.print(SuhuTeh);
  Serial.print(" | ");
  Serial.print(SuhuSusu);
  Serial.print(" | ");
  Serial.print(SuhuKopi);
  Serial.println("");
}
```

Lampiran 9 Tampilan LCD Touchscreen



Lampiran 10 Tabel Referensi *Thermocouple Type* K

REOTEMP INSTRUMENTS

ITS-90 Table for Type K Thermocouple (Ref Junction 0°C) http://reotemp.com

°C	0	1	2	3	4	5	6	7	8	9	10
	Thermoelectric Voltage in mV										
0	0.000	0.039	0.079	0.119	0.158	0.198	0.238	0.277	0.317	0.357	0.397
10	0.397	0.437	0.477	0.517	0.557	0.597	0.637	0.677	0.718	0.758	0.798
20	0.798	0.838	0.879	0.919	0.960	1.000	1.041	1.081	1.122	1.163	1.203
30	1.203	1.244	1.285	1.326	1.366	1.407	1.448	1.489	1.530	1.571	1.612
40	1.612	1.653	1.694	1.735	1.776	1.817	1.858	1.899	1.941	1.982	2.023
50	2.023	2.064	2.106	2.147	2.188	2.230	2.271	2.312	2.354	2.395	2.436
60	2.436	2.478	2.519	2.561	2.602	2.644	2.685	2.727	2.768	2.810	2.851
70	2.851	2.893	2.934	2.976	3.017	3.059	3.100	3.142	3.184	3.225	3.267
80	3.267	3.308	3.350	3.391	3.433	3.474	3.516	3.557	3.599	3.640	3.682
90	3.682	3.723	3.765	3.806	3.848	3.889	3.931	3.972	4.013	4.055	4.096
100	4.096	4.138	4.179	4.220	4.262	4.303	4.344	4.385	4.427	4.468	4.509
110	4.509	4.550	4.591	4.633	4.674	4.715	4.756	4.797	4.838	4.879	4.920
120	4.920	4.961	5.002	5.043	5.084	5.124	5.165	5.206	5.247	5.288	5.328
130	5.328	5.369	5.410	5.450	5.491	5.532	5.572	5.613	5.653	5.694	5.735

Activate Windows
Go to Settings to activate Windows.

BIOGRAFI



Arga Dias Apriansyah lahir pada tanggal 24 April 2003 di Surabaya, Jawa Timur, Indonesia. Dalam perjalanan pendididikannya mengampuh Sekolah Dasar di SDN JWS 1 Surabaya, kemudian Sekolah Menengah Pertama di SMPN 13 Surabaya, dan Sekolah Menengah Kejuruan di SMKN 3 Surabaya. Kemudian dilanjut menempuh pendidikan Diploma 3 (DIII) di jurusan Teknologi Listrik Fakultas Vokasi Universitas 17 Agustus 1945 Surabaya. Pada masa perkuliahan penulis aktif dalam kegiatan akademik maupun non akademik. Setelah menempuh pendidikan dengan mendapatkan gelar Ahli Madya Teknik (A.Md.T) maka saya akan melanjutkan pendidikan ke jenjang selanjutnya guna mendapatkan ilmu dan pengalaman yang lebih dan bermanfaat.

Informasi Penulis

- Nama : Arga Dias Apriansyah
- Motto : Tetap Berusaha Jangan Mudah Menyerah
- Phone : 085808798919
- Alamat : Jl Jemurwonosari Gang IAIN No 29 B

Latar Belakang Pendidikan Formal

- Sekolah Dasar : SDN JWS 1 Surabaya
- Sekolah Menengah Pertama : SMPN 13 Surabaya
- Sekolah Menengah Kejuruan : SMKN 3 Surabaya
- Perguruan Tinggi : Universitas 17 Agustus 1945 Surabaya

Riwayat Organisasi

- UKM Robotika
- Himpunan Mahasiswa
- Kontes Robot Indonesia (Divisi KRAI 2022,2023,2024 dan KRTMI 2023)