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LAMPIRAN A

```
#define pin_motor_2_a 4
#define pin_motor_2_b 5
#define pin_motor_3_a 6
#define pin_motor_3_b 7
#define pin_ultrasonic_1_trig 22
#define pin_ultrasonic_1_echo 23
#define pin_ultrasonic_2_trig 24
#define pin_ultrasonic_2_echo 25
#define pin_ultrasonic_3_trig 26
#define pin_ultrasonic_3_echo 27
#define pin_lamp_1 8
#define pin_lamp_2 9
#define pin_lamp_3 10
#define pin_dht_1 A0
#define pin_dht_2 A1
#define pin_dht_3 A2
#define TdsSensorPin A6
#define pin_fan_1 30
#define pin_fan_2 31
#define pin_fan_3 33
#define pin_pump 32
#define pin_buzzer 53
#include <Wire.h>
#include "TCA9548A.h"
TCA9548A I2CMux;
#include<LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27, 16, 2);
float bagi1, bagi2, bagi3;
// settingan
const int chamber1Height = 10;
const int chamber1Temp = 29;
const int chamber1Lux = 225;
const int chamber2Height = 10;
const int chamber2Temp = 29;
const int chamber2Lux = 330;
```

```

const int chamber3Height = 10;
const int chamber3Temp = 29;
const int chamber3Lux = 451;
float lastA1, lastA2, lastA3;
float lastT1, lastT2, lastT3;
// akhir settingan
int chamber1LuxPwm = 128;
int chamber2LuxPwm = 128;
int chamber3LuxPwm = 128;
void setup() {
  Serial.begin(9600);
  setupMotor();
  setupLamp();
  setupAmbient();
  setupTDS();
  setuprelay();
  setupBuzzer();
  buzzerBeep();
  I2CMux.openChannel(7);
  delay(1000);
  lcd.init();
  lcd.backlight();
  I2CMux.closeChannel(7);
  delay(100);
}
int lcdcase;
void loop() {
  pumpLoop();
  long lastPump = 0;
  bool pumpStatus = false;
  float tds = readTDS();
  delay(10);
  int us1 = ultrasonic1Get();
  delay(10);
  int us2 = ultrasonic2Get();
  delay(10);
  int us3 = ultrasonic3Get();
  delay(10);
  float t1 = dht1GetTemp();

```

```

delay(10);
float t2 = dht2GetTemp();
delay(10);
float t3 = dht3GetTemp();
if (t1 != 0)lastT1 = t1;
if (t2 != 0)lastT2 = t2;
if (t3 != 0)lastT3 = t3;
delay(10);
float a1 = ambient1Get();
delay(100);
float a2 = ambient2Get();
delay(100);
float a3 = ambient3Get();
delay(100);
if (a1 != 0)lastA1 = a1/2.6;
if (a2 != 0)lastA2 = a2/3.4;
if (a3 != 0)lastA3 = a3/4.6;
Serial.print("TDS = ");
Serial.print(tds);
Serial.print("\t");
//delay (3000);
Serial.print("U=");
Serial.print(us1);
Serial.print(" | ");
Serial.print(us2);
Serial.print(" | ");
Serial.print(us3);
Serial.print("\t");
// delay (3000);
Serial.print("T");
Serial.print(lastT1);
Serial.print(" | ");
Serial.print(lastT2);
Serial.print(" | ");
Serial.print(lastT3);
Serial.print("\t");
// delay (3000);
Serial.print("chy = ");
Serial.print(lastA1);

```

```

Serial.print(" | ");
Serial.print(lastA2);
Serial.print(" | ");
Serial.print(lastA3);
Serial.print("\t");
// delay (3000);
Serial.print("PWM = ");
Serial.print(chamber1LuxPwm);
Serial.print(" | ");
Serial.print(chamber2LuxPwm);
Serial.print(" | ");
Serial.print(chamber3LuxPwm);
Serial.print("\n");
if (ultrasonic1Get() > chamber1Height) {
  Serial.println("motor 1 down");
}
while (ultrasonic1Get() > chamber1Height) {
  delay(100);
  pumpLoop();
  motor1Down();
}
if (ultrasonic1Get() < chamber1Height) {
  Serial.println("motor 1 Up");
}
while (ultrasonic1Get() < chamber1Height) {
  delay(100);
  pumpLoop();
  motor1Up();
}
motor1Stop();
if (ultrasonic2Get() > chamber2Height) {
  Serial.println("motor 2 down");
}
while (ultrasonic2Get() > chamber2Height) {
  delay(100);
  pumpLoop();
  motor2Down();
}
if (ultrasonic2Get() < chamber2Height) {

```

```

    Serial.println("motor 2 Up");
}
while (ultrasonic2Get() < chamber2Height) {
    delay(100);
    pumpLoop();
    motor2Up();
}
motor2Stop();
if (ultrasonic3Get() > chamber3Height) {
    Serial.println("motor 3 down");
}
while (ultrasonic3Get() > chamber3Height) {
    delay(100);
    pumpLoop();
    motor3Down();
}
if (ultrasonic3Get() < chamber3Height) {
    Serial.println("motor 3 Up");
}
while (ultrasonic3Get() < chamber3Height) {
    delay(100);
    pumpLoop();
    motor3Up();
}
motor3Stop();
if (lastT1 > chamber1Temp) {
    relayFan1On();
} else {
    relayFan1Off();
}
if (lastT2 > chamber2Temp) {
    relayFan2On();
} else {
    relayFan2Off();
}
if (lastT3 > chamber3Temp) {
    relayFan3On();
} else {
    relayFan3Off();
}

```

```

}
if (lastA1 > chamber1Lux && chamber1LuxPwm > 0) {
    chamber1LuxPwm--;
}
if (lastA1 < chamber1Lux && chamber1LuxPwm < 255) {
    chamber1LuxPwm++;
}
if (lastA2 > chamber2Lux && chamber2LuxPwm > 0) {
    chamber2LuxPwm--;
}
if (lastA2 < chamber2Lux && chamber2LuxPwm < 255) {
    chamber2LuxPwm++;
}
if (lastA3 > chamber3Lux && chamber3LuxPwm > 0) {
    chamber3LuxPwm--;
}
if (lastA3 < chamber3Lux && chamber3LuxPwm < 255) {
    chamber3LuxPwm++;
}
analogWrite(pin_lamp_1, chamber1LuxPwm);
analogWrite(pin_lamp_2, chamber2LuxPwm);
analogWrite(pin_lamp_3, chamber3LuxPwm);
if (tds < 500) {
    buzzerBeep();
}
I2CMux.openChannel(7);
delay(500);
lcd.clear();
switch (lcdcase) {
    case 0:
        lcd.setCursor(0, 0); //kolom dan baris
        lcd.print("Ultrasonik");
        lcd.setCursor(0, 1);
        lcd.print("|");
        lcd.print(us1);
        lcd.print("|");
        lcd.print(us2);
        lcd.print("|");
        lcd.print(us3);

```



```

    lcdcase++;
    break;
case 1:
    lcd.setCursor(0, 0); //kolom dan baris
    lcd.print("suhu");
    lcd.setCursor(0, 1);
    lcd.print(lastT1);
    lcd.print("|");
    lcd.print(lastT2);
    lcd.print("|");
    lcd.print(lastT3);
    lcdcase++;
    break;
case 2:
    lcd.setCursor(0, 0); //kolom dan baris
    lcd.print("cahaya");
    lcd.print("|");
    lcd.print(lastA1);
    lcd.print("|");
    lcd.setCursor(0, 1);
    lcd.print(lastA2);
    lcd.print("|");
    lcd.print(lastA3);
    lcdcase++;
    break;
case 3:
    lcd.setCursor(0, 0); //kolom dan baris
    lcd.print("PWM");
    lcd.setCursor(0, 1);
    lcd.print(chamber1LuxPwm);
    lcd.print("|");
    lcd.print(chamber2LuxPwm);
    lcd.print("|");
    lcd.print(chamber1LuxPwm);
    lcdcase++;
    break;
case 4:
    lcd.setCursor(0, 0); //kolom dan baris
    lcd.print("TDS = ");

```

```

    lcd.print(tds);
    lcdcase = 0;
    break;
}
delay(100);
I2CMux.closeChannel(7);
}
long lastPump = 0;
bool pumpStatus = false;
void pumpLoop() {
    delay(10);
    if (millis() > lastPump + 100 && !pumpStatus) {
        relayPumpOff();
        lastPump = millis();
        pumpStatus = !pumpStatus;
    }
    if (millis() > lastPump + 10000 && pumpStatus) {
        relayPumpOn();
        lastPump = millis();
        pumpStatus = !pumpStatus;
    }
}
void serialEvent() {
    String data = Serial.readStringUntil('\n');
    Serial.println(data);
    if (data.indexOf("s") != -1) {
        motor1Stop();
        motor2Stop();
        motor3Stop();
        lamp1Set(0);
        lamp2Set(0);
        lamp3Set(0);
    } else if (data.indexOf("m1u") != -1) {
        motor1Up();
    } else if (data.indexOf("m1d") != -1) {
        motor1Down();
    } else if (data.indexOf("m2u") != -1) {
        motor2Up();
    } else if (data.indexOf("m2d") != -1) {

```

```
motor2Down();
} else if (data.indexOf("m3u") != -1) {
    motor3Up();
} else if (data.indexOf("m3d") != -1) {
    motor3Down();
} else {
    int value = data.toInt();
    lamp1Set(value);
    lamp2Set(value);
    lamp3Set(value);
}
```


LAMPIRAN B

Pengujian sensor bh 1750 dan snsor DHT 22 Hari 1

```
COM6
Send
sensor 3 Dp
TES = 812.89 00 = 12 | 10 | 10  T = 29.20 | 29.20 | 29.20  L = 902.90 | 907.90 | 970.90  RH% = 44 | 40 | 24
sensor 5 Dp
TES = 497.89 00 = 10 | 10 | 10  T = 29.20 | 29.20 | 29.20  L = 902.90 | 970.90 | 970.90  RH% = 45 | 41 | 29
sensor 3 Dp
TES = 504.81 00 = 10 | 10 | 10  T = 29.70 | 29.70 | 29.20  L = 942.90 | 900.90 | 970.90  RH% = 46 | 40 | 24
TES = 806.49 00 = 0 | 10 | 0 T = 29.70 | 29.70 | 29.20  L = 902.90 | 906.47 | 928.90  RH% = 47 | 41 | 28
sensor 2 slow
TES = 504.81 00 = 12 | 10 | 10  T = 29.70 | 29.70 | 29.20  L = 907.90 | 970.90 | 970.90  RH% = 46 | 40 | 24
TES = 504.81 00 = 10 | 10 | 10  T = 27.99 | 27.99 | 29.00  L = 949.17 | 975.90 | 906.47  RH% = 45 | 39 | 29
sensor 2 Dp
TES = 504.81 00 = 9 | 11 | 9 T = 27.99 | 29.70 | 29.00  L = 949.17 | 941.47 | 970.90  RH% = 44 | 39 | 30
TES = 904.21 00 = 10 | 10 | 10  T = 27.20 | 29.70 | 29.20  L = 906.47 | 900.90 | 906.47  RH% = 45 | 39 | 33
TES = 490.59 00 = 10 | 10 | 10  T = 27.20 | 29.70 | 29.20  L = 939.17 | 845.90 | 970.90  RH% = 44 | 39 | 33
TES = 504.81 00 = 10 | 10 | 10  T = 27.20 | 29.70 | 29.20  L = 949.17 | 970.90 | 900.90  RH% = 45 | 39 | 28
TES = 810.44 00 = 0 | 10 | 10  T = 27.20 | 29.70 | 29.20  L = 933.23 | 840.90 | 900.90  RH% = 44 | 39 | 33
TES = 826.26 00 = 9 | 9 | 9 T = 27.20 | 29.70 | 29.20  L = 902.90 | 906.47 | 906.47  RH% = 45 | 39 | 33
Autoscroll  Show timestamps Nonline 9600 baud Clear output
```

Chamber 1





Chamber 2



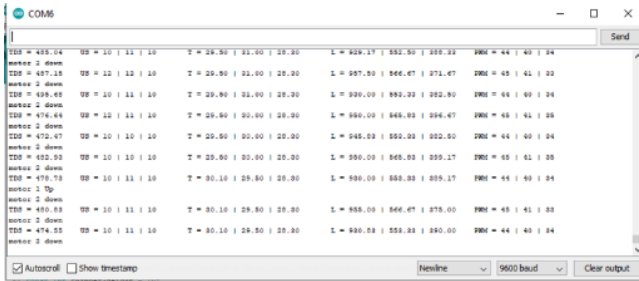


Chamber 3





Hari 2



Chamber 1



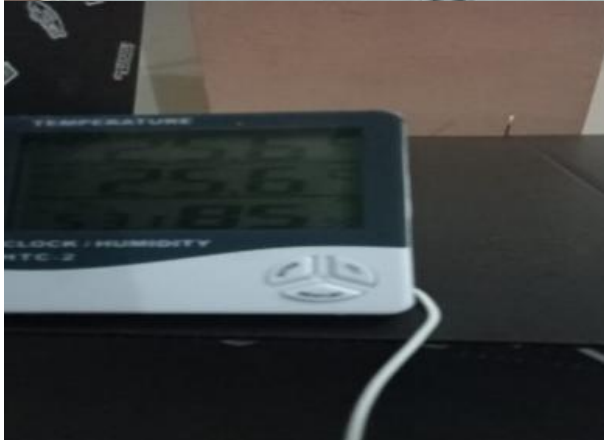


Chamber 2





Chamber 3



Hari 3

Section	TS	US	T	L	PRR
motor 2 down	506.49	10 10 10	28.70 27.40 29.20	941.67 961.67 900.63	44 30 32
	506.49	10 10 10	28.69 28.80 29.20	992.50 945.03 932.03	45 30 32
	502.18	10 10 10	28.69 28.80 29.20	910.83 949.17 948.23	44 30 32
motor 1 down	506.49	10 10 10	28.69 28.80 29.20	948.83 946.67 900.63	45 30 32
	504.31	10 10 10	27.90 28.60 29.20	949.17 940.00 900.00	44 30 32
	504.31	10 10 10	27.90 28.60 29.20	946.07 954.17 977.50	44 30 32
motor 2 up	506.49	10 10 10	28.69 28.60 29.20	940.00 945.83 900.00	45 30 32
	502.18	11 12 10	29.10 29.20 29.20	947.50 952.50 979.17	44 30 32
	502.67	11 0 10	29.10 29.20 29.20	954.17 941.67 946.67	42 30 32
motor 1 up	512.98	11 10 10	29.10 29.20 29.20	992.50 957.50 970.33	44 40 34
	497.93	10 10 10	29.10 29.20 29.20	918.33 970.50 900.63	45 41 35

Chamber 1



Chamber 2



Chamber 3



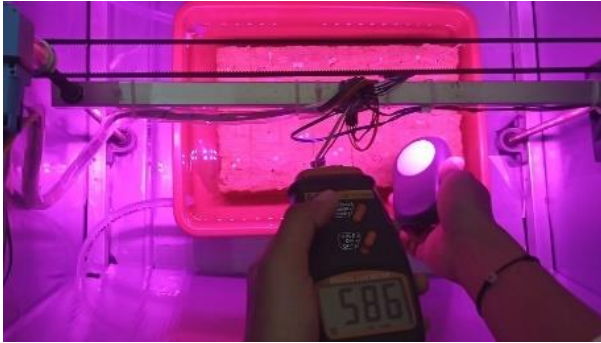
Hari 4:

COM6									
TDS = 485.04	US = 10 11 10	T = 29.50 31.00 28.30	L = 929.17 852.50 389.33	PHN = 44 40 34					
motor 2 down									
TDS = 487.15	US = 12 12 10	T = 29.50 31.00 28.30	L = 987.50 566.67 371.67	PHN = 45 41 33					
motor 2 down									
TDS = 495.48	US = 10 11 10	T = 29.50 31.00 28.30	L = 920.00 853.33 382.50	PHN = 44 40 34					
motor 2 down									
TDS = 476.64	US = 12 11 10	T = 29.50 30.00 28.20	L = 950.00 569.83 396.67	PHN = 45 41 35					
motor 2 down									
TDS = 472.47	US = 10 10 10	T = 29.50 30.00 28.20	L = 948.83 553.33 382.50	PHN = 44 40 34					
motor 2 down									
TDS = 482.59	US = 10 10 10	T = 29.50 30.00 28.20	L = 950.00 569.83 399.17	PHN = 45 41 35					
motor 2 down									
TDS = 478.73	US = 10 11 10	T = 30.10 29.50 28.20	L = 920.00 553.33 389.17	PHN = 44 40 34					
motor 1 Up									
motor 2 down									
TDS = 480.83	US = 10 11 10	T = 30.10 29.50 28.20	L = 955.00 566.67 375.00	PHN = 45 41 33					
motor 2 down									
TDS = 474.55	US = 10 11 10	T = 30.10 29.50 28.20	L = 920.83 553.33 390.00	PHN = 44 40 34					
motor 2 down									

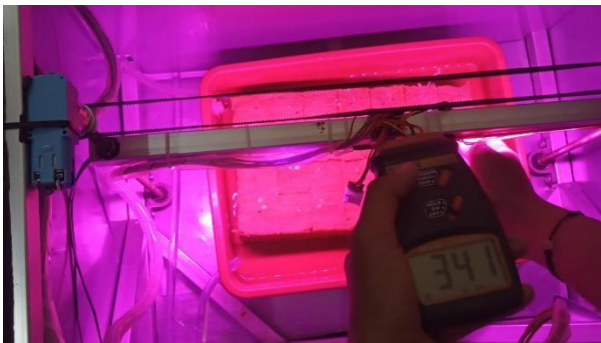
Chamber 1

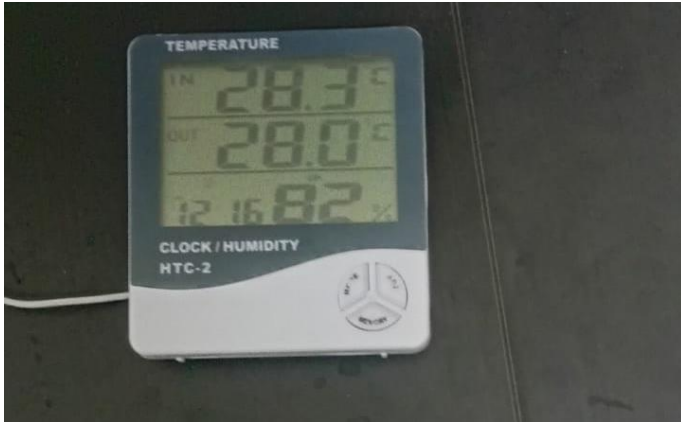


Chamber 2



Chamber 3





Hari 5

```

COM6
-----
motor 1 Up
motor 2 down
motor 2 Up
TDS = 480.83   US = 10 | 10 | 10   T = 28.80 | 28.70 | 28.10   L = 948.33 | 580.00 | 393.33   PRM = 43 | 41 | 33
TDS = 480.83   US = 10 | 10 | 10   T = 28.80 | 28.70 | 28.80   L = 933.33 | 566.67 | 375.03   PRM = 42 | 40 | 32
TDS = 474.58   US = 10 | 0 | 10   T = 28.80 | 28.70 | 28.80   L = 955.03 | 561.67 | 386.67   PRM = 43 | 39 | 33
TDS = 472.47   US = 11 | 9 | 10   T = 28.80 | 28.70 | 28.80   L = 933.33 | 567.50 | 375.00   PRM = 42 | 40 | 32
TDS = 480.83   US = 10 | 10 | 10   T = 28.80 | 28.70 | 28.80   L = 955.03 | 556.67 | 393.33   PRM = 43 | 39 | 33
TDS = 472.47   US = 10 | 10 | 10   T = 28.20 | 28.70 | 28.80   L = 924.17 | 566.67 | 375.03   PRM = 42 | 40 | 32
TDS = 480.83   US = 10 | 10 | 10   T = 28.20 | 28.70 | 28.80   L = 955.03 | 597.50 | 386.67   PRM = 43 | 39 | 33
TDS = 472.47   US = 10 | 10 | 10   T = 28.20 | 28.70 | 28.80   L = 933.33 | 566.67 | 375.00   PRM = 42 | 40 | 32
TDS = 482.93   US = 10 | 10 | 10   T = 28.80 | 28.70 | 28.80   L = 958.03 | 557.50 | 393.33   PRM = 43 | 39 | 33
TDS = 470.40   US = 11 | 10 | 10   T = 29.50 | 28.70 | 28.80   L = 933.33 | 569.33 | 381.67   PRM = 42 | 40 | 32
TDS = 476.64   US = 10 | 0 | 10   T = 29.50 | 28.70 | 28.80   L = 919.17 | 540.00 | 385.00   PRM = 43 | 39 | 33
TDS = 472.47   US = 10 | 9 | 10   T = 28.80 | 28.70 | 28.80   L = 949.17 | 556.67 | 387.50   PRM = 44 | 40 | 32
TDS = 480.83   US = 10 | 10 | 10   T = 30.70 | 28.70 | 28.80   L = 936.67 | 561.67 | 379.17   PRM = 43 | 41 | 33
motor 1 down
motor 2 Up
    
```

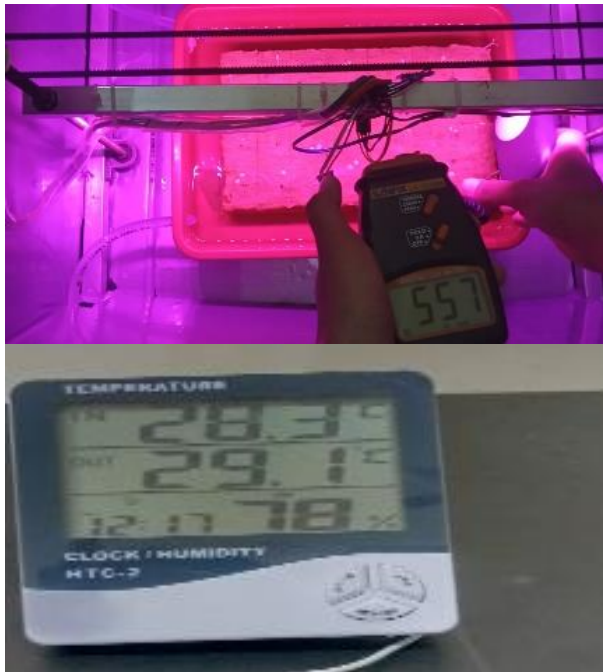
Autoscroll Show timestamp Newline 9600 baud Clear output

Chamber 1

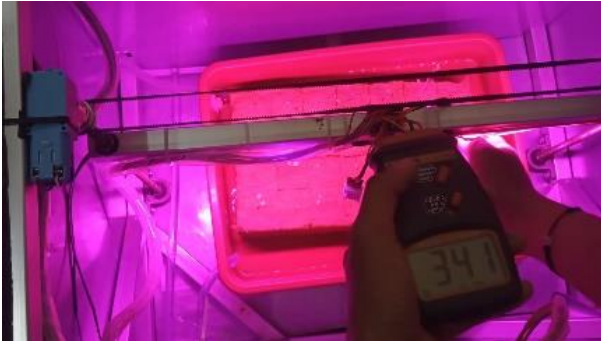




Chamber 2



Chamber 3



Hari 6

COM6						
motor 2 down						
TDS = 484.25	US = 10 11 10	T = 27.70 25.80 26.90	L = 951.67 558.33 852.50	PRM = 43 29 22		
motor 2 down						
motor 2 Up						
TDS = 440.32	US = 10 9 10	T = 27.90 25.80 26.90	L = 909.17 576.67 375.83	PRM = 42 40 32		
TDS = 439.94	US = 10 10 7	T = 27.90 25.80 26.90	L = 935.83 592.50 303.33	PRM = 43 29 32		
TDS = 459.79	US = 10 10 10	T = 27.90 25.80 26.90	L = 942.50 552.50 265.00	PRM = 44 40 22		
IDS = 467.07	US = 10 9 10	T = 27.90 25.80 26.90	L = 820.83 559.17 326.67	PRM = 45 41 32		
motor 1 down						
TDS = 438.94	US = 10 9 10	T = 27.90 25.80 26.90	L = 948.33 566.67 375.83	PRM = 44 40 32		
TDS = 438.94	US = 10 12 10	T = 27.90 25.80 26.90	L = 932.50 560.00 307.50	PRM = 43 29 32		
motor 1 down						
IDS = 436.25	US = 10 10 10	T = 27.90 25.80 26.90	L = 941.67 549.17 349.17	PRM = 44 40 32		
TDS = 438.94	US = 12 9 10	T = 24.20 25.10 26.90	L = 948.33 561.67 307.50	PRM = 42 39 32		
motor 1 Up						
TDS = 464.35	US = 10 10 10	T = 24.20 25.10 26.90	L = 956.67 570.00 370.00	PRM = 44 40 32		
TDS = 436.25	US = 10 10 6	T = 24.20 25.10 26.90	L = 920.83 561.67 852.50	PRM = 43 29 32		
motor 1 down						
motor 2 down						

Chamber 1

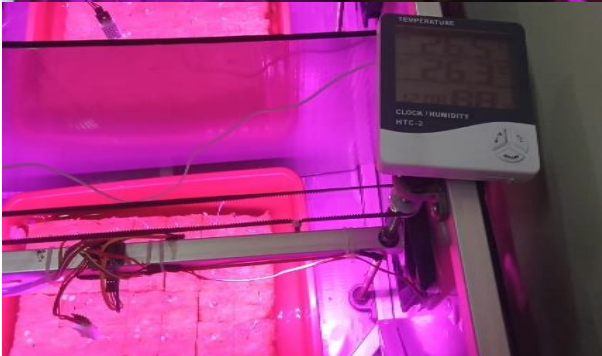


Chamber 2





Chamber 3



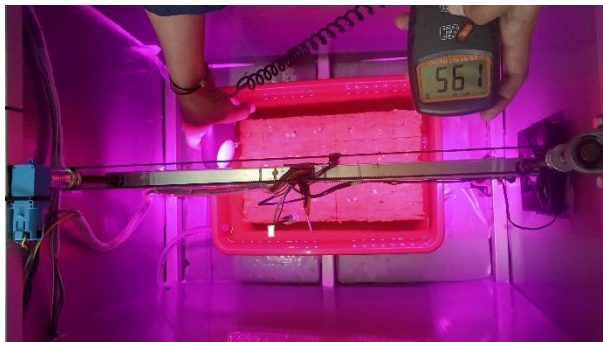
Hari 7

CCMS										
sensor 3 Up										
TES = 312.89	OD = 11 10 10	T = 29.29 29.29 29.29	L = 902.99 907.99 979.99	SRMS = 44 40 94						
sensor 1 Up										
TES = 497.29	OD = 10 10 10	T = 29.29 29.29 29.29	L = 902.99 979.99 979.99	SRMS = 40 41 99						
sensor 2 Up										
TES = 504.31	OD = 10 10 10	T = 29.79 29.79 29.29	L = 942.99 969.99 979.99	SRMS = 46 40 94						
TES = 806.49	OD = 9 10 10	T = 29.79 29.79 29.29	L = 982.99 996.47 929.99	SRMS = 47 41 99						
TES = 504.91	OD = 11 10 10	T = 29.79 29.79 29.29	L = 989.99 999.99 979.99	SRMS = 46 40 94						
sensor 1 down										
TES = 504.91	OD = 10 10 10	T = 29.99 29.79 29.99	L = 969.99 979.99 996.47	SRMS = 45 39 99						
sensor 2 Up										
TES = 804.41	OD = 9 10 10	T = 29.99 29.79 29.99	L = 989.99 996.47 979.99	SRMS = 44 39 99						
TES = 804.31	OD = 10 10 10	T = 29.29 29.79 29.29	L = 986.47 969.99 996.47	SRMS = 40 39 99						
TES = 499.59	OD = 10 10 10	T = 29.29 29.79 29.29	L = 939.99 949.99 979.99	SRMS = 44 39 99						
TES = 804.31	OD = 10 10 10	T = 29.29 29.79 29.29	L = 969.99 979.99 999.99	SRMS = 40 39 99						
TES = 810.86	OD = 9 10 10	T = 29.29 29.79 29.29	L = 939.99 949.99 999.99	SRMS = 44 39 99						
TES = 906.99	OD = 9 9 10	T = 29.29 29.79 29.29	L = 989.99 996.47 996.47	SRMS = 45 39 99						

Chamber 1



Chamber 2



Chamber 3



Hari 8



Chamber 1



Chamber 2



Chamber 3



Chamber 1



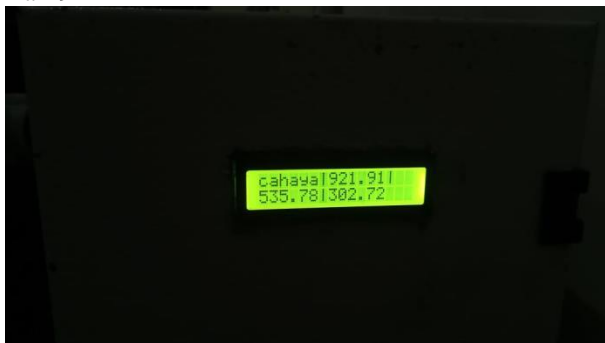
Chamber 2



Chamber 3



Hari 9



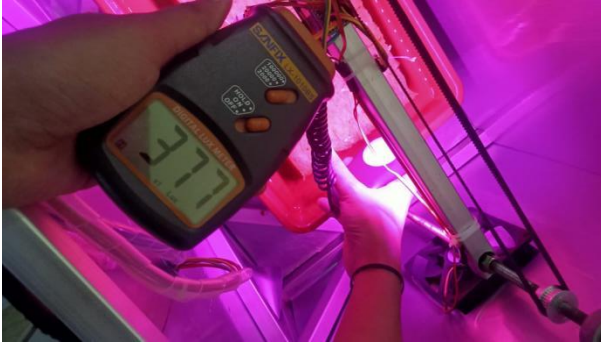
Chamber 1



Chamber 2



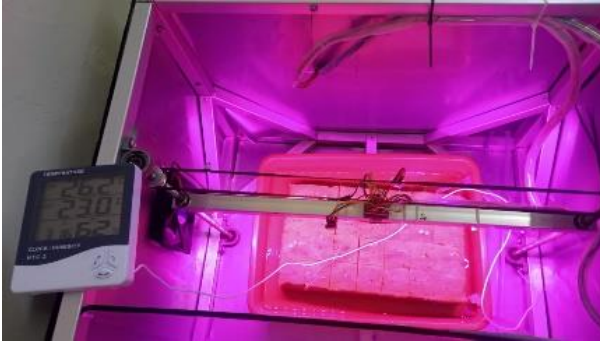
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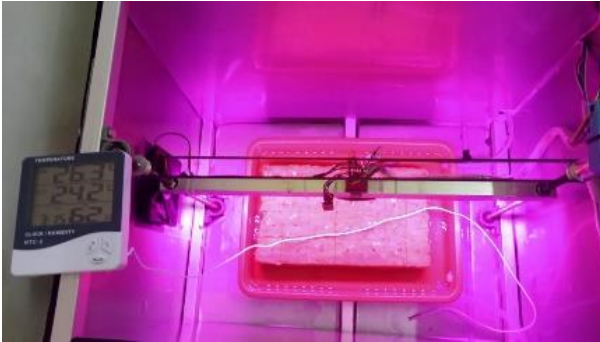
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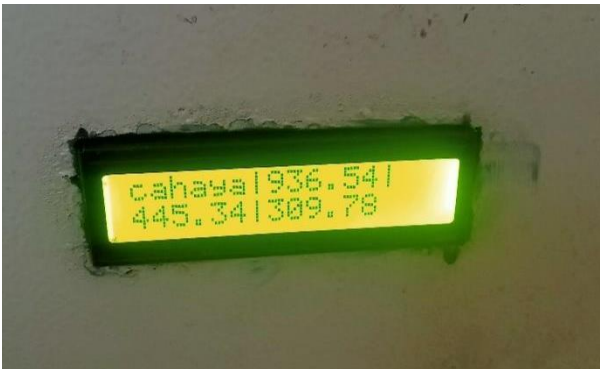
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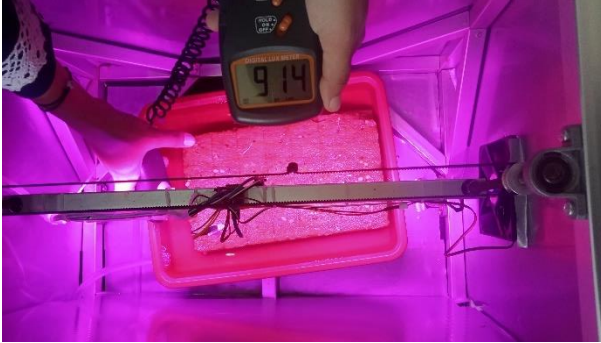
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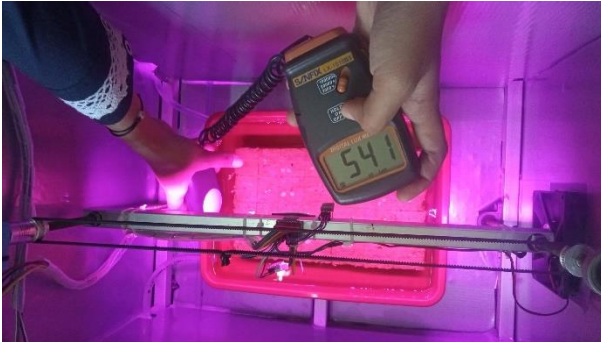
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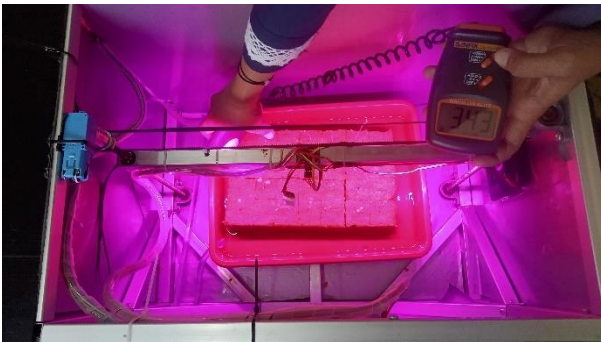
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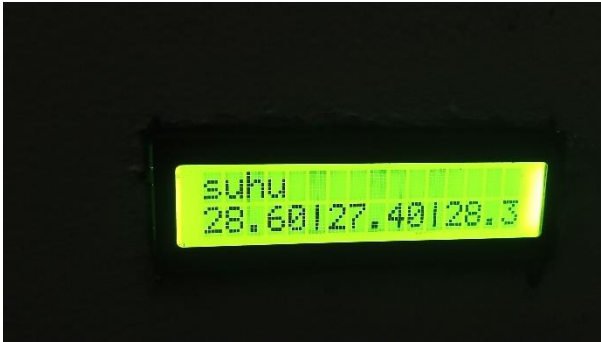


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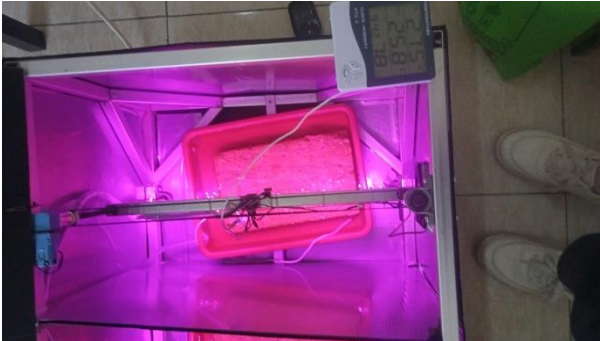


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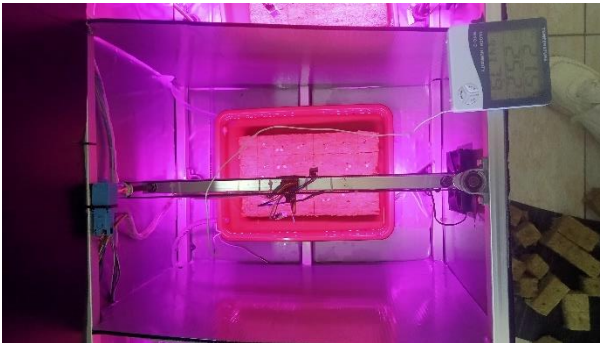




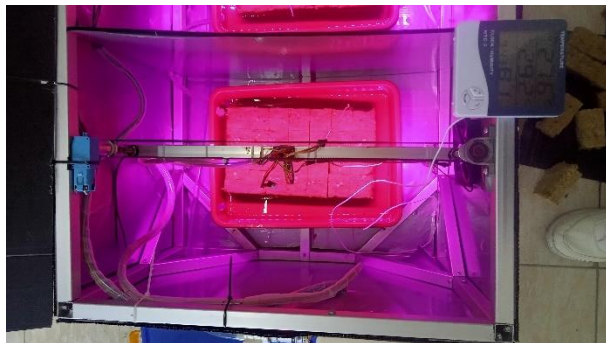
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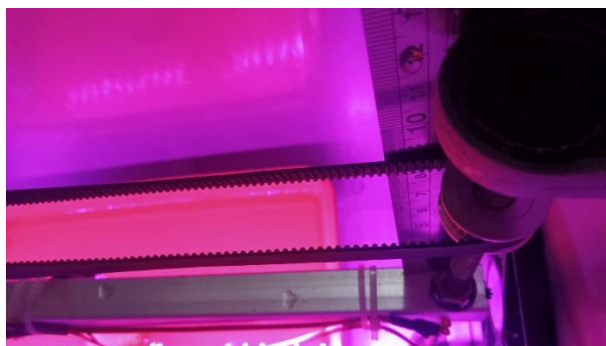
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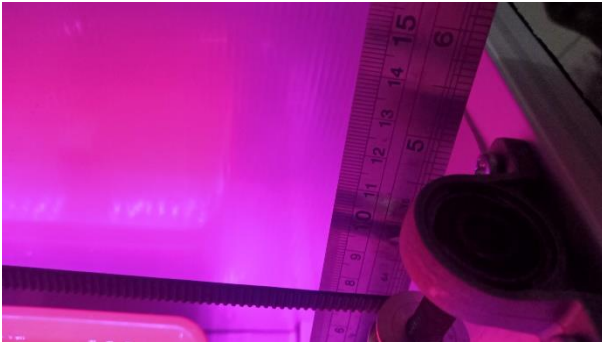
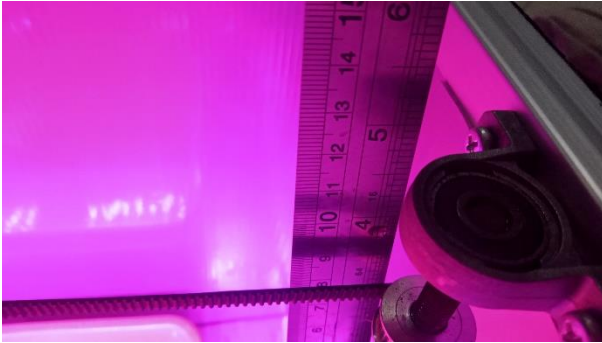


Chamber 3



Pengujian sensor ultrasonik





Pengujian sensor TDS







BIODATA PENULIS



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Motto : Jadikan hari kemarin sebagai pembelajaran,
dan jadikan hari esok sebagai harapan.

Riwayat pendidikan

- SD Negeri Mernek 03 Tahun 2008-2014
- SMP Negeri 2 Maos Tahun 2014-2017
- SMA Negeri 1 Maos Tahun 2017-2020
- Politeknik Negeri Cilacap Tahun 2020-2023

Penulis telah mengikuti sidang Tugas Akhir pada tanggal 16 Agustus 2023 sebagai salah satu persyaratan untuk gelar Ahli Madya (A.Md).