

LAMPIRAN

Lampiran-1 Program Alat

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#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27,20,4);

#define sensorPH A3 //sambungkan kabel hitam (output) ke pin A3
#define sensorMoisture A0
#define Relay1 3 //pompa pupuk
#define Relay2 4 //pompa AIR
int adcMst, Mst=100;
float pH = 7.0, teg;
unsigned long lastT1=0, previousT1=0, limitT1=10000;
unsigned long lastT2=0, previousT2=0, limitT2=10000;

int buf[10],temp;
unsigned long int adcPH;
float Rerata_adcPH;
bool sTP=false, sTA=false;

void setup() {
    Serial.begin(9600);
    lcd.init(); // initialize the lcd
    lcd.backlight(); // open the backlight
    analogReference(EXTERNAL); //use AREF for reference voltage
    digitalWrite(Relay1,1);
    digitalWrite(Relay2,1);
    pinMode(Relay1,OUTPUT);
    pinMode(Relay2,OUTPUT);

    //lcd.setCursor(0,0); lcd.print(" pH = ");
    //lcd.setCursor(0,1); lcd.print(" MS = %");
}

void loop() {
    for(byte i=0; i<10; i++){ //Get 30 sample
        buf[i]=analogRead(sensorPH);
        delay(300);
    }

    for(int i=0; i<9; i++){ //sort the analog from small to large{
        for(int j=i+1; j<10; j++){
            if(buf[i]>buf[j]){
                temp=buf[i];
                buf[i]=buf[j];
                buf[j]=temp;
            }
        }
    }

    for(byte i=2; i<8; i++){
        Serial.println(" data["+String(i)+"]= "+ String(buf[i]));
    }
}
```

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    adcPH=0;
    for(int i=2; i<8; i++) { adcPH+=buf[i]; } //jumlahkan 6 data
    tengah
    Serial.println("jumlah Data = "+String(adcPH));

    Rerata_adcPH=adcPH/6.0; //hitung rata-rata
    teg=3.3*(Rerata_adcPH/1023);
    Serial.println("Rerata Data = "+String(Rerata_adcPH));

    adcMst = analogRead(sensorMoisture);

    //rumus didapat berdasarkan datasheet
    pH = (-0.0139*Rerata_adcPH)+9.7851;
    if(adcMst<400) adcMst=400; if(adcMst>920) adcMst=920;
    Mst=map(adcMst,400,920,100,0);
    Serial.println("pH = "+String(pH));
    Serial.println("MS = "+String(Mst)+" %");

    lcd.setCursor(0,0); lcd.print("adcPH= ");
    lcd.print(Rerata_adcPH,0);
    lcd.setCursor(12,0); lcd.print("V= "); lcd.print(teg,2);

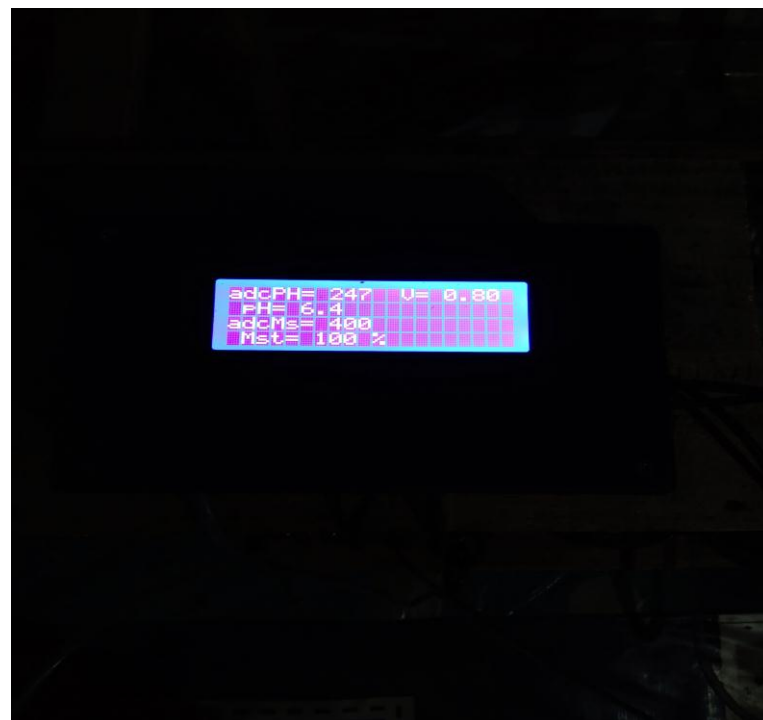
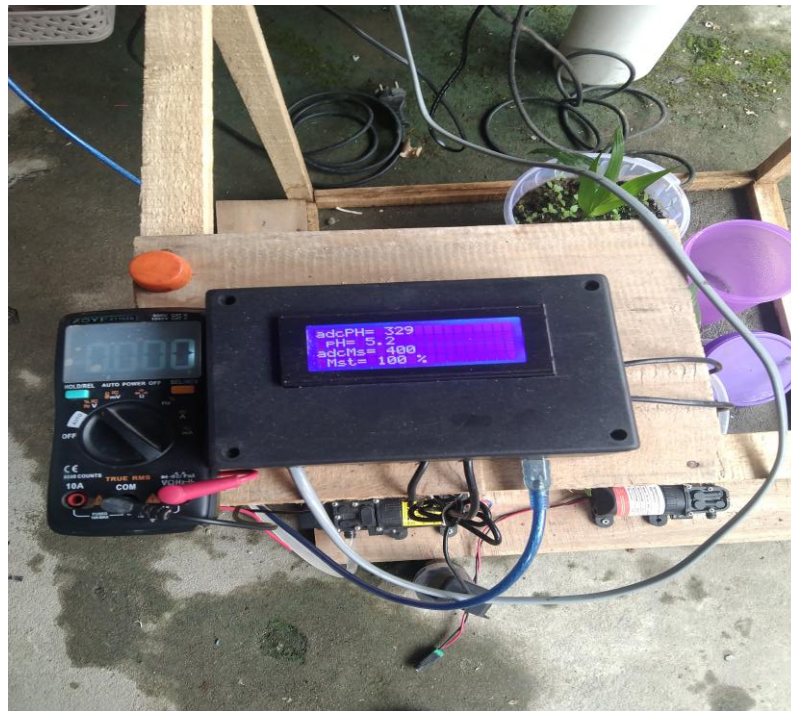
    lcd.setCursor(0,1); lcd.print(" pH= "); lcd.print(pH,1);
    lcd.setCursor(0,2); lcd.print("adcMs= "); lcd.print(adcMst);
    lcd.setCursor(0,3); lcd.print(" Mst= "); lcd.print(Mst);
    lcd.print(" %");

    if(pH<4.0 && !sTP) {
        sTP=1;
        digitalWrite(Relay1,0); //pompa pupuk ON
        delay(1000);
        digitalWrite(Relay1,1); //pompa pupuk OFF
        previousT1=millis();
    }
    lastT1=millis();
    if(lastT1-previousT1>limitT1 && sTP) sTP=0;

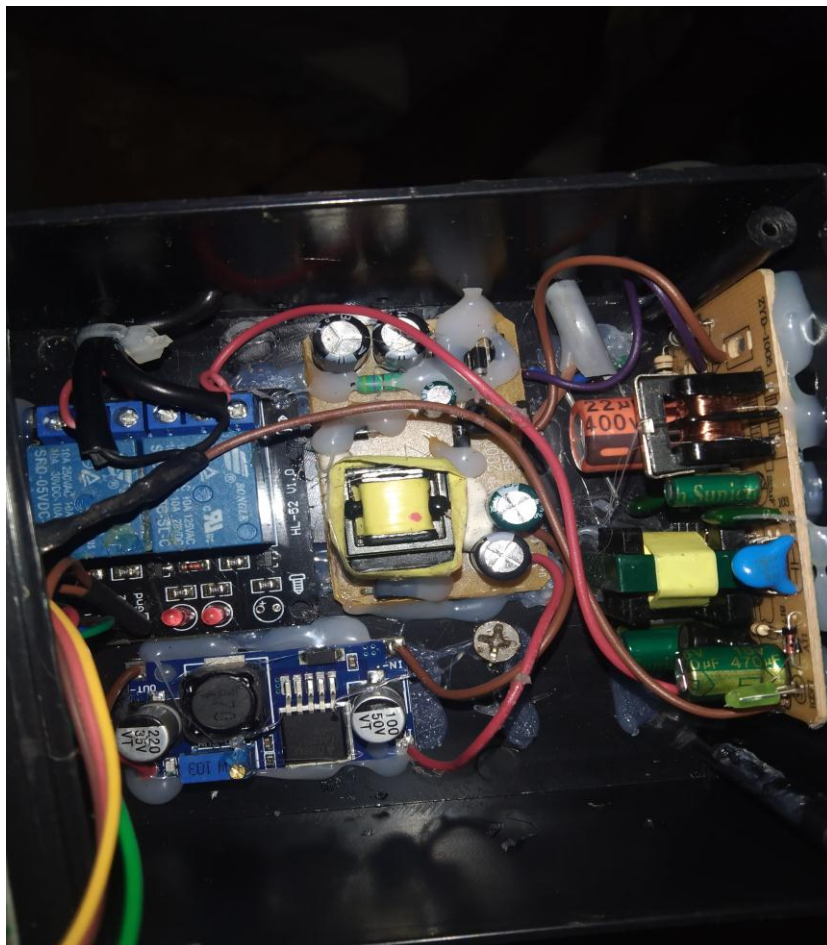
    if(Mst<80 && !sTA) {
        sTA=1;
        digitalWrite(Relay2,0); //pompa AIR ON
        delay(1000);
        digitalWrite(Relay2,1); //pompa AIR OFF
        previousT2=millis();
    }
    lastT2=millis();
    if(lastT2-previousT2>limitT2 && sTA) sTA=0;
}

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Lampiran-2 Dokumentasi Pengujian Alat



Lampirn-1 Rangkaian Alat Dalam Box



Lampiran-2 Pengujian Sensor pH Tanah dan Kelembaban



Lampiran-3 Pengukuran Kalibrasi pH Tanah



