Lampiran

1. Coding Mikrokontroler

```
#include <DS3231.h>        // Memanggil RTC3231 Library
#include <Wire.h>          // i2C Conection Library
#include <LiquidCrystal_I2C.h> // Memanggil i2C LCD Library
#include <Button.h>        // Memanggil library Push Button
#include "GravityTDS.h"

#define DN_PIN 2   // Decrease Button Down
#define UP_PIN 3   // Increase Button Up
#define SET_PIN 4  // Setup Button Settings Jam
#define ALR_PIN 5  // Setup Button Alarm
#define PULLUP true
#define INVERT true
#define DEBOUNCE_MS 20
#define REPEAT_FIRST 500
#define REPEAT_INCR 100

#define TdsSensorPin A1
GravityTDS gravityTds;

#define trigPin 7
#define echoPin 6

#define ledAman 8
#define led1 9
#define led2 10
#define led3 11

float temperature = 25,tdsValue = 0;


unsigned long pulseTime = 0;
Button btnUP(UP_PIN, PULLUP, INVERT, DEBOUNCE_MS);
```

```
Button btnDN(DN_PIN, PULLUP, INVERT, DEBOUNCE_MS);
Button btnSET(SET_PIN, PULLUP, INVERT, DEBOUNCE_MS);
Button btnALR(ALR_PIN, PULLUP, INVERT, DEBOUNCE_MS);
enum {WAIT, INCR, DECR};
uint8_t STATE;
int count;
int lastCount = -1;
unsigned long rpt = REPEAT_FIRST;

LiquidCrystal_I2C lcd(0x27, 2, 1, 0, 4, 5, 6, 7, 3, POSITIVE);
uint8_t dgrsChar[8] = {0x4, 0xa, 0x4, 0x0, 0x0, 0x0, 0x0, 0x0};

DS3231  rtc(SDA, SCL);
Time  t;

uint32_t targetTime = 0;
uint8_t conv2d(const char* p) {
  uint8_t v = 0;
  if ('0' <= *p && *p <= '9')
    v = *p - '0';
  return 10 * v + *++p - '0';
}

uint8_t hh = 0, mm = 0, ss = 0, dd = 0, bb = 0, dy = 0;
int yy = 0;
String Day = "  ";
uint8_t alarmHH = 9, alarmMM = 30;
int alarmLONG = 5;
uint8_t setMode = 0, setAlarm = 0, alarmMode = 0;

void setup() {
  Serial.begin(115200);

 gravityTds.setTemperature(temperature);  // set the temperature and execute
    temperature compensation
   gravityTds.update(); //sample and calculate
   tdsValue = gravityTds.getTdsValue(); // then get the value
   Serial.print(tdsValue,0);
```

```arduino
  Serial.println("ppm");
  lcd.setCursor(0, 3);
  lcd.print("TDS Value:");
  lcd.setCursor(0, 4);
  lcd.print(tdsValue,0);
  lcd.print(" PPM");
  delay(1000);
  lcd.clear();

pinMode(trigPin, OUTPUT);
pinMode(echoPin, INPUT);

pinMode(ledAman, OUTPUT);
pinMode(led1, OUTPUT);
pinMode(led2, OUTPUT);
pinMode(led3, OUTPUT);


pinMode (13, OUTPUT);
lcd.begin(20, 4);
lcd.setBacklightPin(3, POSITIVE);
lcd.setBacklight(HIGH);
rtc.begin();
lcd.createChar(0, dgrsChar);
lcd.setCursor (0, 0);
lcd.print(F("    Sistem    "));
lcd.setCursor (0, 1);
lcd.print(F("   Hidroponik   "));
delay (2000); lcd.clear();
digitalWrite(13, HIGH);
delay (300);
digitalWrite(13, LOW);
delay (300);
digitalWrite(13, HIGH);
delay (300);
digitalWrite(13, LOW);
```

```
   gravityTds.setPin(TdsSensorPin);
   gravityTds.setAref(5.0);  //reference voltage on ADC, default 5.0V on Arduino
    UNO
   gravityTds.setAdcRange(1024);  //1024 for 10bit ADC;4096 for 12bit ADC
   gravityTds.begin();  //initialization

 //  rtc.setDOW  (MINGGU);
 //  rtc.setTime (23, 59, 55);      // Set Jam, Menit, Detik
 //  rtc.setDate (14, 3, 2017);      // Set Tgl, Bulan, Tahun
}

void loop() {

 digitalWrite(trigPin, HIGH);
 delayMicroseconds(10);
 digitalWrite(trigPin, LOW);

 pulseTime = pulseIn(echoPin, HIGH);

 lcd.setCursor(0,3);
 lcd.print("Jarak = ");
 lcd.print(pulseTime / 58, DEC);
 lcd.print(" cm");
 lcd.setCursor(4,3);


 long duration, distance;
 digitalWrite(trigPin, LOW);
 delayMicroseconds(2);
 digitalWrite(trigPin, HIGH);
 delayMicroseconds(10);
 digitalWrite(trigPin, LOW);
 duration = pulseIn(echoPin, HIGH);
 distance = (duration/2) / 29.1;

pinMode(trigPin, OUTPUT);
 pinMode(echoPin, INPUT);
```

```
  pinMode(ledAman, OUTPUT);
  pinMode(led1, OUTPUT);
  pinMode(led2, OUTPUT);
  pinMode(led3, OUTPUT);

  if (distance >= 16)
  {
   digitalWrite(ledAman, HIGH);
    digitalWrite(led1, LOW);
    digitalWrite(led2, LOW);
    digitalWrite(led3,LOW);
  }
  else {
   digitalWrite(ledAman,LOW);
  }

  if (distance <= 19)
  {
    digitalWrite(led1,  HIGH);
    digitalWrite(led2,  LOW);
    digitalWrite(led3,LOW);
  }

  if (distance < 17) {
    digitalWrite(led2, HIGH);
    digitalWrite(led1, LOW);
    digitalWrite(led3,LOW);
  }

  if (distance < 9)
  {
   digitalWrite(led3,  HIGH);
   digitalWrite(led2,  LOW);
   digitalWrite(led1, LOW);
}

  delay(500);
```

```
t = rtc.getTime();
Day = rtc.getDOWStr(FORMAT_SHORT);

if (setMode == 0) {
  if (((rtc.getDOWStr(FORMAT_SHORT)) == "SEN")) {
    dy = 1;
  }
  if (((rtc.getDOWStr(FORMAT_SHORT)) == "SEL")) {
    dy = 2;
  }
  if (((rtc.getDOWStr(FORMAT_SHORT)) == "RAB")) {
    dy = 3;
  }
  if (((rtc.getDOWStr(FORMAT_SHORT)) == "KAM")) {
    dy = 4;
  }
  if (((rtc.getDOWStr(FORMAT_SHORT)) == "JUM")) {
    dy = 5;
  }
  if (((rtc.getDOWStr(FORMAT_SHORT)) == "SAB")) {
    dy = 6;
  }
  if (((rtc.getDOWStr(FORMAT_SHORT)) == "MIN")) {
    dy = 7;
  }
  hh = t.hour, DEC;
  mm = t.min,  DEC;
  ss = t.sec,  DEC;
  dd = t.date, DEC;
  bb = t.mon,  DEC;
  yy = t.year, DEC;
}

if (setAlarm < 2) {
  lcd.setCursor(2, 0);
  if (setMode == 0)
    lcd.print((rtc.getDOWStr(FORMAT_SHORT))); // Hari
  else {
```

```
  lcd.setCursor(2, 0);
  lcd.print(Day); // Hari
  lcd.setCursor(2, 0);
 }
 if (dy == 1) {                    // hari
  lcd.print("SEN");
 }
 else if (dy == 2) {
  lcd.print("SEL");
 }
 else if (dy == 3) {
  lcd.print("RAB");
 }
 else if (dy == 4) {
  lcd.print("KAM");
 }
 else if (dy == 5) {
  lcd.print("JUM");
 }
 else if (dy == 6) {
  lcd.print("SAB");
 }
 else if (dy == 7) {
  lcd.print("MIN");
 }

 lcd.setCursor(5, 0);
 lcd.print(", ");

 if (dd < 10) {                    // Tanggal
  lcd.print(F("0"));
 }
 lcd.print(dd); lcd.print(F(" "));


 if (bb == 1) {                    // Bulan
  lcd.print("JAN ");
 }
```

```
else if (bb == 2) {
 lcd.print("FEB ");
}
else if (bb == 3) {
 lcd.print("MAR ");
}
else if (bb == 4) {
 lcd.print("APR ");
}
else if (bb == 5) {
 lcd.print("MEI ");
}
else if (bb == 6) {
 lcd.print("JUN ");
}
else if (bb == 7) {
 lcd.print("JUL ");
}
else if (bb == 8) {
 lcd.print("AUG ");
}
else if (bb == 9) {
 lcd.print("SEP ");
}
else if (bb == 10) {
 lcd.print("OKT ");
}
else if (bb == 11) {
 lcd.print("NOV ");
}
else if (bb == 12) {
 lcd.print("DES ");
}
lcd.print(yy); lcd.print(F("  "));        // Tahun

lcd.setCursor(2, 1);
if (hh < 10) {                    // Jam
 lcd.print(F("0"));
```

```
  }
  lcd.print(hh); lcd.print(F(":"));
  if (mm < 10) {
   lcd.print(F("0"));                    // Menit
  }
  lcd.print(mm); lcd.print(F(":"));
  if (ss < 10) {                   // Detik
   lcd.print(F("0"));
  }
  lcd.print(ss); lcd.print(F(" "));        //
  lcd.print(rtc.getTemp() - 2);           //
  lcd.print((char)0);                 // Temperatur
  lcd.print(F("C"));                  //
  lcd.print(F(" "));                  //

  if (rtc.getTemp() > 40) {
   lcd.setCursor(0, 0);
   digitalWrite(13, HIGH);
   lcd.print(" Suhu Terlalu Panas ");
   delay (500);                     // Notifikasi Suhu Tinggi
   lcd.setCursor(0, 0);
   digitalWrite(13, LOW);
   lcd.print("                ");
   delay (500);
  }
 }

 if ((hh == 0 && mm == 0 && ss == 0) || (hh == 1 && mm == 0 && ss == 0) ||
  (hh == 2 && mm == 0 && ss == 0) ||
  (hh == 3 && mm == 0 && ss == 0) || (hh == 4 && mm == 0 && ss == 0) ||
  (hh == 5 && mm == 0 && ss == 0) ||
  (hh == 6 && mm == 0 && ss == 0) || (hh == 7 && mm == 0 && ss == 0) ||
  (hh == 8 && mm == 0 && ss == 0) ||
  (hh == 9 && mm == 0 && ss == 0) || (hh == 10 && mm == 0 && ss == 0) ||
  (hh == 11 && mm == 0 && ss == 0) ||
  (hh == 12 && mm == 0 && ss == 0) || (hh == 13 && mm == 0 && ss == 0) ||
  (hh == 14 && mm == 0 && ss == 0) ||
  (hh == 15 && mm == 0 && ss == 0) || (hh == 16 && mm == 0 && ss == 0) ||
```

```
  (hh == 17 && mm == 0 && ss == 0) ||
   (hh == 18 && mm == 0 && ss == 0) || (hh == 19 && mm == 0 && ss == 0) ||
  (hh == 20 && mm == 0 && ss == 0) ||
   (hh == 21 && mm == 0 && ss == 0) || (hh == 22 && mm == 0 && ss == 0) ||
  (hh == 23 && mm == 0 && ss == 0)) {
  digitalWrite(13, HIGH);
  delay (300);                       // Buzzer Berbunyi Otomastis Setiap Jam
  digitalWrite(13, LOW);
  delay (300);
  digitalWrite(13, HIGH);
  delay (300);
  digitalWrite(13, LOW);
  delay (100);
 }


 }

 setupClock();
 Alarm (alarmHH, alarmMM, alarmLONG);

 if (setAlarm < 2 && setMode != 0) {
  delay (100);
 }
 if (setAlarm < 2 && setMode == 1) {
  lcd.setCursor(2, 0);            // Set Hari Cursor
  lcd.print(F("  "));
  delay(100);
 }
 if (setAlarm < 2 && setMode == 2) {
  lcd.setCursor(7, 0);           // Set Tanggal Cursor
  lcd.print(F(" "));
  delay(100);
 }
 lcd.setCursor(10, 0);
 if (setAlarm < 2 && setMode == 3) {    // Set Bulan Cursor
  lcd.print(F("   "));
  delay(100);
 }
```

```cpp
    if (setAlarm < 2 && setMode == 4) {
     lcd.setCursor(14, 0);            // Set Tahun Cursor
     lcd.print(F("  "));
     delay(100);
    }
    if (setAlarm < 2 && setMode == 5) {
     lcd.setCursor(2, 1);            // Set Jam Cursor
     lcd.print(F("  "));
     delay(100);
    }
    if (setAlarm < 2 && setMode == 6) {
     lcd.setCursor(5, 1);            // Set Menit Cursor
     lcd.print(F("  "));
     delay(100);
    }
    if (setAlarm < 2 && setMode == 7) {
     lcd.setCursor(8, 1);            // Set detik Cursor
     lcd.print(F("  "));
     delay(100);
    }

    if (setMode == 0 && setAlarm != 0  && setAlarm != 1) {
     delay (100);
    }

    //  if (setMode == 0 && setAlarm == 1) {
    //    lcd.clear();
    //    lcd.setCursor(0, 0);            // Notifikasi Alarm OFF
    //    lcd.print(F("   Alarm OFF    "));
    //    delay(1500);
    //    setMode = 0;
    //  }

    if (setMode == 0 && setAlarm == 2) {
     lcd.setCursor(11, 0);                   // Set Alarm Jam Cursor
     lcd.print(F("  "));
     delay(100);
    }
```

```arduino
  if (setMode == 0 && setAlarm == 3) {
   lcd.setCursor(14, 0);                        // Set Alarm Menit Cursor
   lcd.print(F(" "));
   delay(100);
  }
  if (setMode == 0 && setAlarm == 4 && alarmLONG > 9) {
   lcd.setCursor(11, 1);                        // Set Lama Alarm Cursor
   lcd.print(F(" "));
   delay(100);
  }
  if (setMode == 0 && setAlarm == 4 && alarmLONG < 10) {
   lcd.setCursor(11, 1);                        // Set Lama Alarm Cursor
   lcd.print(F(" "));
   delay(100);
  }

  Serial.print (setMode);
  Serial.print (" ");
  Serial.println (setAlarm);
}

void setupClock (void) {
 btnUP.read();
 btnDN.read();
 btnSET.read();
 btnALR.read();

 if (setMode == 8) {
  lcd.setCursor (0, 0);
  lcd.print (F("  PENGATURAN JAM   "));
  lcd.setCursor (0, 1);
  lcd.print (F("     DI SIMPAN      "));
  digitalWrite(13, HIGH);
  delay (300);
  digitalWrite(13, LOW);
  delay (2000);
  rtc.setDOW  (dy);
  rtc.setTime (hh, mm, ss);         // Simpan Pengaturan Jam ke RTC
```

```
  rtc.setDate (dd, bb, yy);
  lcd.clear();
  setMode = 0;
}

if (setAlarm == 5) {
  lcd.setCursor (0, 0);
  lcd.print (F("  ALARM DISIMPAN  "));
  lcd.setCursor (0, 1);
  if (alarmHH < 10) {
    lcd.print(F("0"));
  }
  lcd.print (alarmHH);
  lcd.print (F(":"));
  if (alarmMM < 10) {              // Alarm disimpan
    lcd.print(F("0"));
  }
  lcd.print (alarmMM);
  lcd.print (F(" LAMA ALARM "));
  lcd.print(alarmLONG); lcd.print(F("M"));
  digitalWrite(13, HIGH);
  delay (300);
  digitalWrite(13, LOW);
  delay (3000);
  lcd.clear();
  setAlarm = 0;
  alarmMode = 1;
}

if (setAlarm > 0) {
  alarmMode = 0;
}
switch (STATE) {

  case WAIT:
    if (btnSET.wasPressed())
    {
      setMode = setMode + 1;
```

```
    }
    if (btnALR.wasPressed())
    {
      setAlarm = setAlarm + 1;
    }
    if (btnUP.wasPressed())
      STATE = INCR;
    else if (btnDN.wasPressed())
      STATE = DECR;
    else if (btnUP.wasReleased())
      rpt = REPEAT_FIRST;
    else if (btnDN.wasReleased())
      rpt = REPEAT_FIRST;
    else if (btnUP.pressedFor(rpt)) {
      rpt += REPEAT_INCR;
      STATE = INCR;
    }
    else if (btnDN.pressedFor(rpt)) {
      rpt += REPEAT_INCR;
      STATE = DECR;
    }
    break;

  case INCR:
    if (setAlarm < 2 && setMode == 1 && dy < 7)dy = dy + 1;
    if (setAlarm < 2 && setMode == 2 && dd < 31)dd = dd + 1;
    if (setAlarm < 2 && setMode == 3 && bb < 12)bb = bb + 1;
    if (setAlarm < 2 && setMode == 4 && yy < 2050)yy = yy + 1;
    if (setAlarm < 2 && setMode == 5 && hh < 23)hh = hh + 1;
    if (setAlarm < 2 && setMode == 6 && mm < 59)mm = mm + 1;
    if (setAlarm < 2 && setMode == 7 && ss < 59)ss = ss + 1;
    if (setMode == 0 && setAlarm == 2 && alarmHH < 23)alarmHH = alarmHH
    + 1;
    if (setMode == 0 && setAlarm == 3 && alarmMM < 59)alarmMM =
    alarmMM + 1;
    if (setMode == 0 && setAlarm == 4 && alarmLONG < 59)alarmLONG =
    alarmLONG + 1;
    STATE = WAIT;
```

```
        break;

    case DECR:
     if (setAlarm < 2 && setMode == 1 && dy > 0)dy = dy - 1;
     if (setAlarm < 2 && setMode == 2 && dd > 0)dd = dd - 1;
     if (setAlarm < 2 && setMode == 3 && bb > 0)bb = bb - 1;
     if (setAlarm < 2 && setMode == 4 && yy > 2000)yy = yy - 1;
     if (setAlarm < 2 && setMode == 5 && hh > 0)hh = hh - 1;
     if (setAlarm < 2 && setMode == 6 && mm > 0)mm = mm - 1;
     if (setAlarm < 2 && setMode == 7 && ss > 0)ss = ss - 1;
     if (setMode == 0 && setAlarm == 2 && alarmHH > 0)alarmHH = alarmHH -
     1;
     if (setMode == 0 && setAlarm == 3 && alarmMM > 0)alarmMM = alarmMM
     - 1;
     if (setMode == 0 && setAlarm == 4 && alarmLONG > 0)alarmLONG =
     alarmLONG - 1;
     STATE = WAIT;
     break;
  }
}
void Alarm (uint8_t alarmHH, uint8_t alarmMM, int alarmLONG) {

 if (alarmMode == 1 && hh == alarmHH && (mm - alarmMM >= 0 ) && (mm -
   alarmMM <= alarmLONG )) {
  digitalWrite(13, HIGH);        // Menyalakan Alarm
  delay (500);
  digitalWrite (13, LOW);
  delay (500);
  if (ss % 2 == 0) {
   lcd.noBacklight();
  }
  else {
   lcd.backlight ();
  }

  btnALR.read();
  if (btnALR.wasPressed())
  {
```

```
      alarmMode = 0;
      lcd.backlight();
    }
  }
  else {
    digitalWrite (13, LOW);
    lcd.backlight();
  }
  if (setMode == 0 && setAlarm != 0 && setAlarm != 1) {
    lcd.setCursor (0, 0);
    lcd.print(F("Set Alarm  "));              // Menampilkan Set Jam Alarm
    if (alarmHH < 10) {
      lcd.print(F("0"));
    }
    lcd.print (alarmHH); lcd.print(F(":"));
    if (alarmMM < 10) {                       // Menampilkan Set Menit Alarm
      lcd.print(F("0"));
    }
    lcd.print (alarmMM); lcd.print(F(" WIB"));
    lcd.setCursor (0, 1);
    lcd.print(F("Lama Alarm "));              // Menampilkan Set Lama Alarm
    if (alarmLONG < 10) {
      lcd.print(F("0"));
    }
    lcd.print(alarmLONG); lcd.print(F(" Menit"));
  }
}
```