

LAMPIRAN



LAMPIRAN I FOTO ALAT



Rangkaian Elektrik



Pengujian Alat pada Lahan



Sampel perbandingan tanaman krisan dengan cahaya tambahan dan tanpa cahaya tambahan



Sampel kuncup bunga krisan tanpa cahaya tambahan



Peletakan lampu pada lahan budidaya bunga krisan



LAMPIRAN II

Listing Program Arduino

Program Utama

```
#include <SPI.h>
#include <SD.h>
#include <Wire.h>
#include <Time.h>
#include <TimeAlarms.h>
#include <BH1750.h>
#include "RTCLib.h"
#include <LiquidCrystal_I2C.h>

#define MATIKAN 0
#define TERGANTUNG_CAHAYA 1

RTC_DS1307 rtc;
BH1750 lightMeter;
LiquidCrystal_I2C lcd(0x27, 16, 2);

int jmlLampuSedangOn=0;

const int PIN_CS = 10;

char NAMAFILE[] = "cahayam.csv";
int tahun, bulan, tanggal, jam, menit, detik;
int row=0;
int relay1=7;
int relay2=6;
int relay3=5;
int relay4=4;

void setup()
{
```



```
pinMode(relay1,OUTPUT);
pinMode(relay2,OUTPUT);
pinMode(relay3,OUTPUT);
pinMode(relay4,OUTPUT);

Serial.begin(9600);
lcd.begin();
lightMeter.begin();
if (! rtc.begin()) {
  Serial.println("Couldn't find RTC");
  while (1);
}

if (! rtc.isrunning()) {
  Serial.println("RTC is NOT running!");
  uint16_t lux = lightMeter.readLightLevel();
  DateTime now = rtc.now();
  rtc.adjust(DateTime(F(__DATE__), F(__TIME__)));
}

pinMode(PIN_CS, OUTPUT);

if (!SD.begin(PIN_CS))
{
  Serial.println("Problem di SD card!");
  return;
}

// Set Timer per dua detik
Alarm.timerRepeat(1, simpan_cahaya);

Serial.println("Siap menyimpan data cahaya!");
}
```

```

void loop()
{
  uint16_t lux = lightMeter.readLightLevel();
  DateTime now = rtc.now();

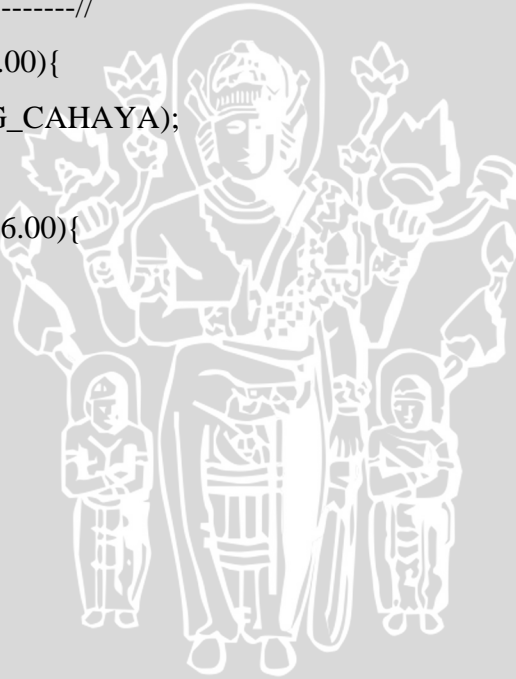
  tahun = now.year();
  jam = now.hour();
  bulan = now.month();
  tanggal = now.day();
  menit = now.minute();
  detik = now.second();

  //-----Mengatur relay-----//
  if (jam>=06.00 && jam<22.00){
    aturRelay(TERGANTUNG_CAHAYA);
  }
  else if (jam>=22.00 || jam<06.00){
    aturRelay(MATIKAN);
  }

  Alarm.delay(1000);
}

void simpan_cahaya()
{
  uint16_t lux = lightMeter.readLightLevel();
  DateTime now = rtc.now();
  // Hitung cahaya
  Serial.print(now.day(), DEC);
  Serial.print('/');
  Serial.print(now.month(), DEC);
  Serial.print('/');
  Serial.print(now.year(), DEC);

```



```
Serial.print(" ");  
Serial.print(now.hour(), DEC);  
Serial.print(':');  
Serial.print(now.minute(), DEC);  
Serial.print(':');  
Serial.print(now.second(), DEC);  
Serial.print(" ");  
Serial.print("Light: ");  
Serial.println(Lux);
```

```
lcd.setCursor(0, 0);  
lcd.print(now.hour(), DEC);  
lcd.print(':');  
lcd.print(now.minute(), DEC);  
lcd.print(':');  
lcd.print(now.second(), DEC);
```

```
lcd.setCursor(0, 1);  
lcd.print("Light: ");  
lcd.print(lux);  
lcd.print(" LUX ");  
delay (1000);
```

```
// Simpan ke file  
// 1. Buka file untuk penyimpanan data  
File fileCahaya = SD.open(NAMAFILE, FILE_WRITE);  
if (!fileCahaya)  
{  
  Serial.println("Tak dapat membuka file!");  
  return;  
}  
  
// 2. Tulis data ke SD card
```




```
fileCahaya.print(now.day(), DEC);
fileCahaya.print('/');
fileCahaya.print(now.month(), DEC);
fileCahaya.print('/');
fileCahaya.print(now.year(), DEC);
fileCahaya.print(",");
fileCahaya.print(now.hour(), DEC);
fileCahaya.print(':');
fileCahaya.print(now.minute(), DEC);
fileCahaya.print(':');
fileCahaya.print(now.second(), DEC);
fileCahaya.print(",");
fileCahaya.print("Cahaya :");
fileCahaya.print(",");

fileCahaya.println(Lux);

row++;
if (row>360)
{
  row=0;
}

// 3. Tutup file supaya data benar-benar disimpan
fileCahaya.close();
}

void aturRelay(uint8_t mode){
  uint16_t lux = lightMeter.readLightLevel();
  if (mode==MATIKAN){
    digitalWrite (relay1, LOW);
    digitalWrite (relay2, LOW);
    digitalWrite (relay3, LOW);
```



```
digitalWrite (relay4, LOW);
}
else if (mode==TERGANTUNG_CAHAYA){
  if (lux<400)
  {
    if (jmlLampuSedangOn < 4){
      jmlLampuSedangOn++;
    }
    nyalakanLampu(jmlLampuSedangOn);
  }
  else if (lux>500)
  {
    if (jmlLampuSedangOn > 0){
      jmlLampuSedangOn--;
    }
    nyalakanLampu(jmlLampuSedangOn);
  }
}

//-----//

void nyalakanLampu (uint8_t jmlLampu){
  uint16_t lux = lightMeter.readLightLevel();
  if (jmlLampu == 0){
    digitalWrite (relay1, LOW);
    digitalWrite (relay2, LOW);
    digitalWrite (relay3, LOW);
    digitalWrite (relay4, LOW);
  }
  else if (jmlLampu == 1){
    digitalWrite (relay1, HIGH);
    digitalWrite (relay2, LOW);
    digitalWrite (relay3, LOW);
  }
}
```

```
digitalWrite (relay4, LOW);
}
else if (jmlLampu == 2){
digitalWrite (relay1, HIGH);
digitalWrite (relay2, HIGH);
digitalWrite (relay3, LOW);
digitalWrite (relay4, LOW);
}
else if (jmlLampu == 3){
digitalWrite (relay1, HIGH);
digitalWrite (relay2, HIGH);
digitalWrite (relay3, HIGH);
digitalWrite (relay4, LOW);
}
else if (jmlLampu == 4 ){
digitalWrite (relay1, HIGH);
digitalWrite (relay2, HIGH);
digitalWrite (relay3, HIGH);
digitalWrite (relay4, HIGH);
}
}
```



LAMPIRAN III

Datasheet



Technical Note

Ambient Light Sensor IC Series

Digital 16bit Serial Output Type Ambient Light Sensor IC



BH1750FVI

No.09046EBT01

● Descriptions

BH1750FVI is an digital Ambient Light Sensor IC for I²C bus interface. This IC is the most suitable to obtain the ambient light data for adjusting LCD and Keypad backlight power of Mobile phone. It is possible to detect wide range at High resolution. (1 - 65535 lx).

● Features

- 1) I²C bus Interface (f / s Mode Support)
- 2) Spectral responsibility is approximately human eye response
- 3) Illuminance to Digital Converter
- 4) Wide range and High resolution. (1 - 65535 lx)
- 5) Low Current by power down function
- 6) 50Hz / 60Hz Light noise reject-function
- 7) 1.8V Logic input interface
- 8) No need any external parts
- 9) Light source dependency is little. (ex. Incandescent Lamp. Fluorescent Lamp. Halogen Lamp. White LED. Sun Light)
- 10) It is possible to select 2 type of I²C slave-address.
- 11) Adjustable measurement result for influence of optical window
(It is possible to detect min. 0.11 lx, max. 100000 lx by using this function.)
- 12) Small measurement variation (+/- 20%)
- 13) The influence of infrared is very small.

● Applications

Mobile phone, LCD TV, NOTE PC, Portable game machine, Digital camera, Digital video camera, Car navigation, PDA, LCD display

● Absolute Maximum Ratings

Parameter	Symbol	Limits	Units
Supply Voltage	V _{max}	4.5	V
Operating Temperature	T _{opr}	-40~85	°C
Storage Temperature	T _{stg}	-40~100	°C
SDA Sink Current	I _{max}	7	mA
Power Dissipation	P _d	260 [※]	mW

※ 70mm × 70mm × 1.6mm glass epoxy board. Derating in done at 3.47mW/°C for operating above Ta=25°C.

● Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Units
V _{cc} Voltage	V _{cc}	2.4	3.0	3.6	V
I ² C Reference Voltage	V _{DVI}	1.65	-	V _{cc}	V