```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
#include "RTClib.h"
RTC_DS1307 RTC;
LiquidCrystal_I2C lcd(0x27,16,2);


#define RELAY1  2
#define RELAY2  3
#define RELAY3  4
#define RELAY4  5


int relayState1 = HIGH;
int relayState2 = HIGH;
int relayState3 = HIGH;
int relayState4 = HIGH;


double g = 0;
int t = 0;
int l = 0;



  int analogInputbat = 0;
  float voutbat = 0.0;
  float vinbat = 0.0;
  float R1bat = 660000.0;    // !! resistance of R1 !!
  float R2bat = 300000.0;     // !! resistance of R2 !!
  int valuebat = 0; // variable to store the value

float vinbat2 = 0.0;


void setup()
{
Serial.begin(9600);
Wire.begin(); // Inicia el puerto I2C
RTC.begin(); // Inicia la comunicación con el RTC
lcd.init();                      // initialize the lcd
lcd.backlight();

lcd.home();



 pinMode(RELAY1, OUTPUT);
 pinMode(RELAY2, OUTPUT);
 pinMode(RELAY3, OUTPUT);
 pinMode(RELAY4, OUTPUT);

digitalWrite(RELAY1,HIGH);
digitalWrite(RELAY2,HIGH);
digitalWrite(RELAY3,HIGH);
digitalWrite(RELAY4,HIGH);


}



void loop()
{

DateTime now = RTC.now();

valuebat = analogRead(0);
voutbat = (valuebat * 4.7) / 1024.0;
vinbat = voutbat / (R2bat/(R1bat+R2bat));
```

```
// gileira

if(now.hour() >= 7 && now.hour() <= 18 && vinbat >= 12.18){
delay(3000);
valuebat = analogRead(0);
voutbat = (valuebat * 4.7) / 1024.0;
vinbat = voutbat / (R2bat/(R1bat+R2bat));
if(vinbat >= 12.2 && relayState1 == HIGH){
digitalWrite(RELAY1,LOW);
relayState1 = LOW;
double g = 1;
lcd.clear();
lcd.setCursor(0, 0);
lcd.print(now.hour(), DEC);
lcd.print(':');
lcd.print(now.minute(), DEC);
lcd.print("  ");
lcd.print("Bat:");
lcd.print(vinbat);
lcd.print("V");
lcd.setCursor(0, 1);
lcd.print("*g:");
lcd.print(g);
lcd.print(" ");
lcd.print("t:");
lcd.print(t);
lcd.print(" ");
lcd.print("l:");
lcd.print(l);
}
}
else if(now.hour() >= 7 && now.hour() <= 18 && vinbat <= 11.97){
delay(3000);
valuebat = analogRead(0);
voutbat = (valuebat * 4.7) / 1024.0;
vinbat = voutbat / (R2bat/(R1bat+R2bat));
if(vinbat <= 11.97){
double g = 0.5;
lcd.clear();
lcd.setCursor(0, 0);
lcd.print(now.hour(), DEC);
lcd.print(':');
lcd.print(now.minute(), DEC);
lcd.print("  ");
lcd.print("Bat:");
lcd.print(vinbat);
lcd.print("V");
lcd.setCursor(0, 1);
lcd.print("*g:");
lcd.print(g);
lcd.print(" ");
lcd.print("t:");
lcd.print(t);
lcd.print(" ");
lcd.print("l:");
lcd.print(l);
digitalWrite(RELAY1,LOW);
relayState1 = LOW;
delay(600000);
digitalWrite(RELAY1,HIGH);
relayState1 = HIGH;
delay(600000);
}
}
else if((now.hour() <= 7 || now.hour() >= 18) && vinbat >= 12.7){
delay(3000);
valuebat = analogRead(0);
voutbat = (valuebat * 4.7) / 1024.0;
vinbat = voutbat / (R2bat/(R1bat+R2bat));
if(vinbat >= 12.7 && relayState1 == HIGH){
digitalWrite(RELAY1,LOW);
relayState1 = LOW;
```

```
double g = 1;
lcd.clear();
lcd.setCursor(0, 0);
lcd.print(now.hour(), DEC);
lcd.print(':');
lcd.print(now.minute(), DEC);
lcd.print("  ");
lcd.print("Bat:");
lcd.print(vinbat);
lcd.print("V");
lcd.setCursor(0, 1);
lcd.print("*g:");
lcd.print(g);
lcd.print(" ");
lcd.print("t:");
lcd.print(t);
lcd.print(" ");
lcd.print("l:");
lcd.print(l);
}
}
else if((now.hour() <= 7 || now.hour() >= 18) && (vinbat >= 12 && vinbat <= 12.7)){
delay(3000);
valuebat = analogRead(0);
voutbat = (valuebat * 4.7) / 1024.0;
vinbat = voutbat / (R2bat/(R1bat+R2bat));
if(vinbat >= 12 && vinbat <= 12.7){
double g = 0.3;
lcd.clear();
lcd.setCursor(0, 0);
lcd.print(now.hour(), DEC);
lcd.print(':');
lcd.print(now.minute(), DEC);
lcd.print("  ");
lcd.print("Bat:");
lcd.print(vinbat);
lcd.print("V");
lcd.setCursor(0, 1);
lcd.print("*g:");
lcd.print(g);
lcd.print(" ");
lcd.print("t:");
lcd.print(t);
lcd.print(" ");
lcd.print("l:");
lcd.print(l);
digitalWrite(RELAY1,LOW);
relayState1 = LOW;
delay(400000);
digitalWrite(RELAY1,HIGH);
relayState1 = HIGH;
delay(600000);
}
}
else if((now.hour() <= 7 || now.hour() >= 18) && vinbat <= 12){
delay(3000);
valuebat = analogRead(0);
voutbat = (valuebat * 4.7) / 1024.0;
vinbat = voutbat / (R2bat/(R1bat+R2bat));
if(vinbat <= 12){
double g = 0.25;
lcd.clear();
lcd.setCursor(0, 0);
lcd.print(now.hour(), DEC);
lcd.print(':');
lcd.print(now.minute(), DEC);
lcd.print("  ");
lcd.print("Bat:");
lcd.print(vinbat);
lcd.print("V");
lcd.setCursor(0, 1);
lcd.print("*g:");
```

```
lcd.print(g);
lcd.print(" ");
lcd.print("t:");
lcd.print(t);
lcd.print(" ");
lcd.print("l:");
lcd.print(l);
digitalWrite(RELAY1,LOW);
relayState1 = LOW;
delay(300000);
digitalWrite(RELAY1,HIGH);
relayState1 = HIGH;
delay(900000);
}
}



// tomadas

if(now.hour() >= 11 && now.hour() <= 16 && vinbat >= 13.2){
delay(3000);
valuebat = analogRead(0);
voutbat = (valuebat * 4.7) / 1024.0;
vinbat = voutbat / (R2bat/(R1bat+R2bat));
  if(vinbat >= 13.2 && relayState2 == HIGH){
  digitalWrite(RELAY2,LOW);
  relayState2 = LOW;
  int t = 1;
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print(now.hour(), DEC);
  lcd.print(':');
  lcd.print(now.minute(), DEC);
  lcd.print("  ");
  lcd.print("Bat:");
  lcd.print(vinbat);
  lcd.print("V");
  lcd.setCursor(0, 1);
  lcd.print("g:");
  lcd.print(g);
  lcd.print(" ");
  lcd.print("*t:");
  lcd.print(t);
  lcd.print(" ");
  lcd.print("l:");
  lcd.print(l);
  }
  else if (vinbat <= 12.2){
    if(relayState2 == LOW){
    digitalWrite(RELAY2,HIGH);
    relayState2 = HIGH;
    int t = 0;
    lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print(now.hour(), DEC);
    lcd.print(':');
    lcd.print(now.minute(), DEC);
    lcd.print("  ");
    lcd.print("Bat:");
    lcd.print(vinbat);
    lcd.print("V");
    lcd.setCursor(0, 1);
    lcd.print("g:");
    lcd.print(g);
    lcd.print(" ");
    lcd.print("*t:");
    lcd.print(t);
    lcd.print(" ");
    lcd.print("l:");
    lcd.print(l);
    }
```

```
  }
}
else if (now.hour() >= 11 && now.hour() <= 16 && vinbat <= 12.2){
  if(relayState2 == LOW){
  digitalWrite(RELAY2,HIGH);
  relayState2 = HIGH;
  int t = 0;
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print(now.hour(), DEC);
  lcd.print(':');
  lcd.print(now.minute(), DEC);
  lcd.print("  ");
  lcd.print("Bat:");
  lcd.print(vinbat);
  lcd.print("V");
  lcd.setCursor(0, 1);
  lcd.print("g:");
  lcd.print(g);
  lcd.print(" ");
  lcd.print("*t:");
  lcd.print(t);
  lcd.print(" ");
  lcd.print("l:");
  lcd.print(l);
  }
 }
else if (now.hour() <= 11 || now.hour() >= 16){
  if(relayState2 == LOW){
  digitalWrite(RELAY2,HIGH);
  relayState2 = HIGH;
  int t = 0;
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print(now.hour(), DEC);
  lcd.print(':');
  lcd.print(now.minute(), DEC);
  lcd.print("  ");
  lcd.print("Bat:");
  lcd.print(vinbat);
  lcd.print("V");
  lcd.setCursor(0, 1);
  lcd.print("g:");
  lcd.print(g);
  lcd.print(" ");
  lcd.print("*t:");
  lcd.print(t);
  lcd.print(" ");
  lcd.print("l:");
  lcd.print(l);
  }
 }


// lampida rua

if((now.hour() <= 5 || now.hour() >= 19) && vinbat >= 12.8){
delay(3000);
valuebat = analogRead(0);
voutbat = (valuebat * 4.7) / 1024.0;
vinbat = voutbat / (R2bat/(R1bat+R2bat));
  if(vinbat >= 12.8 && relayState3 == HIGH){
  digitalWrite(RELAY3,LOW);
  relayState3 = LOW;
  int l = 1;
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print(now.hour(), DEC);
  lcd.print(':');
  lcd.print(now.minute(), DEC);
  lcd.print("  ");
  lcd.print("Bat:");
```

```
  lcd.print(vinbat);
  lcd.print("V");
  lcd.setCursor(0, 1);
  lcd.print("g:");
  lcd.print(g);
  lcd.print(" ");
  lcd.print("t:");
  lcd.print(t);
  lcd.print(" ");
  lcd.print("*l:");
  lcd.print(l);
  }
  else  if (vinbat <= 12.6){
    if(relayState3 == LOW){
    digitalWrite(RELAY3,HIGH);
    relayState3 = HIGH;
    int l = 0;
    lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print(now.hour(), DEC);
    lcd.print(':');
    lcd.print(now.minute(), DEC);
    lcd.print("  ");
    lcd.print("Bat:");
    lcd.print(vinbat);
    lcd.print("V");
    lcd.setCursor(0, 1);
    lcd.print("g:");
    lcd.print(g);
    lcd.print(" ");
    lcd.print("t:");
    lcd.print(t);
    lcd.print(" ");
    lcd.print("*l:");
    lcd.print(l);
    }
  }
}
else if ((now.hour() <= 5 || now.hour() >= 19) && vinbat <= 12.6){
  if(relayState3 == LOW){
  digitalWrite(RELAY3,HIGH);
  relayState3 = HIGH;
  int l = 0;
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print(now.hour(), DEC);
  lcd.print(':');
  lcd.print(now.minute(), DEC);
  lcd.print("  ");
  lcd.print("Bat:");
  lcd.print(vinbat);
  lcd.print("V");
  lcd.setCursor(0, 1);
  lcd.print("g:");
  lcd.print(g);
  lcd.print(" ");
  lcd.print("t:");
  lcd.print(t);
  lcd.print(" ");
  lcd.print("*l:");
  lcd.print(l);
  }
 }
else if (now.hour() >= 5 && now.hour() <= 19){
  if(relayState3 == LOW){
  digitalWrite(RELAY3,HIGH);
  relayState3 = HIGH;
  int l = 0;
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print(now.hour(), DEC);
  lcd.print(':');
```

```
  lcd.print(now.minute(), DEC);
  lcd.print("  ");
  lcd.print("Bat:");
  lcd.print(vinbat);
  lcd.print("V");
  lcd.setCursor(0, 1);
  lcd.print("g:");
  lcd.print(g);
  lcd.print(" ");
  lcd.print("t:");
  lcd.print(t);
  lcd.print(" ");
  lcd.print("*l:");
  lcd.print(l);
  }
 }




// wind

if(vinbat >= 13.66){
delay(3000);
valuebat = analogRead(0);
voutbat = (valuebat * 4.7) / 1024.0;
vinbat = voutbat / (R2bat/(R1bat+R2bat));
if(vinbat >= 13.66 && relayState4 == HIGH){
digitalWrite(RELAY4,LOW);
relayState4 = LOW;
double g = 1;
lcd.clear();
lcd.setCursor(0, 0);
lcd.print(now.hour(), DEC);
lcd.print(':');
lcd.print(now.minute(), DEC);
lcd.print(" ");
lcd.print("U:");
lcd.print(vinbat);
lcd.print("V");
lcd.setCursor(0, 1);
lcd.print("g:");
lcd.print(g);
lcd.print(" ");
lcd.print("t:");
lcd.print(t);
lcd.print(" ");
lcd.print("l:");
lcd.print(l);
}
}
else if(vinbat <= 13.4){
delay(3000);
valuebat = analogRead(0);
voutbat = (valuebat * 4.7) / 1024.0;
vinbat = voutbat / (R2bat/(R1bat+R2bat));
if(vinbat <= 13.4 && relayState4 == LOW){
  digitalWrite(RELAY4,HIGH);
relayState4 = HIGH;
double g = 0.5;
lcd.clear();
lcd.setCursor(0, 0);
lcd.print(now.hour(), DEC);
lcd.print(':');
lcd.print(now.minute(), DEC);
lcd.print(" ");
lcd.print("U:");
lcd.print(vinbat);
lcd.print("V");
lcd.setCursor(0, 1);
```

```
lcd.print("g:");
lcd.print(g);
lcd.print(" ");
lcd.print("t:");
lcd.print(t);
lcd.print(" ");
lcd.print("l:");
lcd.print(l);
}
}



delay(5000);
}
```