

ภาคผนวก ค

โปรแกรมไมโครคอนโทรลเลอร์ Arduino

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//-----  
#include <unicon.h>  
  
int i;  
  
int sample = 200;  
  
int sound_alarm = 19;  
  
int light_alarm =20;  
  
int level =0;  
  
int current_leakage =3;  
  
int sensorPin_current = A0;  
  
float sensor_current[200];  
  
float mean_V,mean_I;  
  
float Irms,Vrms,Irms_sum,Vrms_sum;  
  
int sw_start = 30;  
  
//-----  
  
void setup() {  
    pinMode(sound_alarm, OUTPUT);  
    pinMode(light_alarm, OUTPUT);  
    setTextSize(2);  
    setTextColor(GLCD_GREEN);  
    glcd(0,2,"LEAKAGE");  
    glcd(1,2,"CURRENT");  
    Serial.begin(9600);  
}  
  
//-----  
  
void show_mode()  
{  
    glcdRect(0,0,120,40,GLCD_RED);  
    glcdRect(0,45,120,60,GLCD_YELLOW);  
    glcdRect(0,106,120,100,GLCD_RED);  
    setTextSize(2);  
}
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        setTextColor(GLCD_YELLOW);
        glcd(3,2,"CURRENT");
        glcd(4,1,"%f mA",Irms);
        glcd(7,2,"LEVEL");
        glcd(7,8,"%d  ",level);
    }
//-----
void sampling_current()
{
    for( i=0;i<sample;i++)
    {
        sensor_current[i] = analogRead(sensorPin_current);
        delayMicroseconds(278);
    }
}
//-----
void print_data()
{
    for (i=0;i<sample;i++){
        Serial.print("data_current =\t");Serial.print(sensor_current[i],3);
    }
}
//-----
void loop()
{
    int j,k,l;
    show_mode();
    mean_I = 0;
    for (l=0;l<5;l++)
    {

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for(k=0;k<10;k++)
{
    sampling_current();
    for (j=0;j<sample;j++){
        sensor_current[j]= (5.00/1023.00)*sensor_current[j];
        mean_V+=sensor_current[j];
    }
    mean_V = mean_V/sample;
    for (j=0;j<sample;j++){
        sensor_current[j]= (sensor_current[j]-mean_V);
        sensor_current[j]= sensor_current[j]*sensor_current[j];
        Vrms += sensor_current[j];
    }
    Vrms = Vrms/sample;
    Vrms = sqrt(Vrms);
    Vrms_sum += Vrms;
}

Vrms = Vrms_sum/10;
Vrms_sum = 0;
Serial.print("Vrms_mean =\t"); Serial.println(Vrms,3);
if(Vrms <= 0.075)
{
    Irms = (62827*pow(Vrms,3))-(11490*pow(Vrms,2))+(987.02*Vrms)-16.556;
}

if(Vrms >0.075)
{
    Irms = (258.0845*Vrms)- 0.4438;
}
Irms_sum += Irms;

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    }
    Irms = Irms_sum/5;
    if(Irms<3.80)
    {
        Irms = 2.3063*Irms-4.0;
    }
    Irms_sum = 0;
    if(Irms>0  &&  Irms<=5){level  =  1;digitalWrite(light_alarm,
LOW);digitalWrite(sound_alarm, LOW);}
    if(Irms>5  &&  Irms<=10){level  =  2;digitalWrite(light_alarm,
LOW);digitalWrite(sound_alarm, LOW);}
    if(Irms>10  &&  Irms<=20){level  =  3;digitalWrite(light_alarm,
LOW);digitalWrite(sound_alarm, LOW);}
    if(Irms>20  &&  Irms<=30){level  =  4;digitalWrite(light_alarm,
LOW);digitalWrite(sound_alarm, LOW);}
    if(Irms>30){level  =  5;digitalWrite(light_alarm,
HIGH);digitalWrite(sound_alarm, HIGH);}
    Serial.print("Irms  =  ");  Serial.print(Irms,3);  Serial.print("\t");
Serial.print("Level = "); Serial.println(level);
    Serial1.print("Irms  =  ");  Serial1.print(Irms,3);  Serial1.print("\t");
Serial1.print("Level = "); Serial1.println(level);
    }
    //-----

```