#include<EEPROM.h>

#include <LiquidCrystal.h>

#include "ZMPT101B.h"

#include "ACS712.h"

// ZMPT101B sensor connected to A0 pin of arduino

ZMPT101B voltageSensor(A0);

float unit=0;

// 5 amps version sensor (ACS712\_05B) connected to A1 pin of arduino

ACS712 currentSensor(ACS712\_30A, A1);

LiquidCrystal lcd(7,6,5,4,3,2);

int led=13;

#define pulsein 8

#define relay 9

unsigned int pusle\_count=0;

long int t2=0;

float units=0;

unsigned int rupees=0;

boolean v=false;

float watt\_factor=0.3125;

unsigned int temp=0,i=0,x=0,k=0;

char str[70],flag1=0,flag2=0;

String bal="";

void setup()

{

lcd.begin(16,2);

Serial.begin(9600);

pinMode(led, OUTPUT);

pinMode(pulsein, INPUT);

pinMode(relay, OUTPUT);

digitalWrite(pulsein, HIGH);

digitalWrite(relay, HIGH);

Serial.println("Calibrating..");

delay(100);

voltageSensor.calibrate();

currentSensor.calibrate();

Serial.println("Done!");

lcd.setCursor(0,0);

lcd.print("Automatic Energy");

lcd.setCursor(0,1);

lcd.print(" Meter ");

delay(2000);

lcd.clear();

lcd.print("GSM Initilizing...");

gsm\_init();

lcd.clear();

lcd.print("System Ready");

Serial.println("AT+CNMI=2,2,0,0,0");

init\_sms();

send\_data("System Ready");

send\_sms();

delay(1000);

digitalWrite(led, LOW);

//digitalWrite(relay, HIGH);

lcd.clear();

//EEPROM.put(1,100);

// rupees=EEPROM.get(1);

}

void loop()

{

serialEvent();

EEPROM.get(1,rupees);

units=rupees/2.0;

lcd.setCursor(0,0);

lcd.print("Units:");

lcd.print(units);

lcd.print(" ");

lcd.setCursor(0,1);

Serial.print("reading 111");

if(rupees<15)

lcd.print("LOW Balance:");

else

lcd.print("Balance:");

lcd.print(rupees);

lcd.print(" ");

v=true;

delay(1000);

read\_pulse();

Serial.print("status check");

check\_status();

if(temp==1)

{

decode\_message();

send\_confirmation\_sms();

}

}

void serialEvent()

{

while(Serial.available())

{

char ch=(char)Serial.read();

str[i++]=ch;

if(ch == '\*')

{

temp=1;

lcd.clear();

lcd.print("Message Received");

delay(500);

break;

}

}

}

void init\_sms()

{

Serial.println("AT+CMGF=1");

delay(200);

Serial.println("AT+CMGS=\"+919492794334\"");

delay(200);

}

void send\_data(String message)

{

Serial.println(message);

delay(200);

}

void send\_sms()

{

Serial.write(26);

}

void read\_pulse()

{

while(v==true){

Serial.print("reading");

long int t1 = millis();

float U = voltageSensor.getVoltageAC() \* 10;

float I = currentSensor.getCurrentAC();

// To calculate the power we need voltage multiplied by current

Serial.println(String("U = ") + U + " V");

Serial.println(String("I = ") + I + " A");

Serial.print("Time taken by the task: ");

float time=(t1-t2)/1000;

Serial.print(time,5);

Serial.println(" milliseconds");

float P = (U \* I \* time)/100 ;

delay(2000);

Serial.println(String("P = ") + P + " Watts");

//k=false;

if(units<1 || P<0.25){}

else{

Serial.println(units);

units=units-P;

rupees=units\*2;

EEPROM.put(1,rupees);

}

t2 = millis();

v=false;

}

//delay(2500);

}

void check\_status()

{

if(rupees>15)

{

digitalWrite(relay, LOW);

flag1=0;

flag2=0;

}

if(rupees<15 && flag1==0)

{

lcd.setCursor(0,1);

lcd.print("LOW Balance ");

init\_sms();

send\_data("Energy Meter Balance Alert:");

send\_data("Low Balance\n");

Serial.println(rupees);

delay(200);

send\_data("Please recharge your energy meter soon.\n Thank you");

send\_sms();

message\_sent();

flag1=1;

}

if(rupees<5 && flag2==0)

{

digitalWrite(relay, HIGH);

lcd.clear();

lcd.print("Light Cut Due to");

lcd.setCursor(0,1);

lcd.print("Low Balance");

delay(2000);

lcd.clear();

lcd.print("Please Recharge ");

lcd.setCursor(0,1);

lcd.print("UR Energy Meter ");

init\_sms();

send\_data("Energy Meter Balance Alert:\nLight cut due to low Balance\nPlease recharge your energy meter soon.\n Thank you");

send\_sms();

message\_sent();

flag2=1;

}

}

void decode\_message()

{

x=0,k=0,temp=0;

while(x<i)

{

while(str[x]=='#')

{

x++;

bal="";

while(str[x]!='\*')

{

bal+=str[x++];

}

}

x++;

}

bal+='\0';

}

void send\_confirmation\_sms()

{

int recharge\_amount=bal.toInt();

rupees+=recharge\_amount;

EEPROM.put(1, rupees);

lcd.clear();

lcd.print("Energy Meter ");

lcd.setCursor(0,1);

lcd.print("Recharged:");

lcd.print(recharge\_amount);

init\_sms();

send\_data("Energy Meter Balance Alert:\nYour energy meter has been recharged Rs:");

send\_data(bal);

send\_data("Total Balance:");

Serial.println(rupees);

delay(200);

send\_data("Eelctricity Has Been Connected\nThank you");

send\_sms();

temp=0;

i=0;

x=0;

k=0;

delay(1000);

message\_sent();

}

void message\_sent()

{

lcd.clear();

lcd.print("Message Sent.");

delay(1000);

}

void gsm\_init()

{

lcd.clear();

lcd.print("Finding Module..");

boolean at\_flag=1;

while(at\_flag)

{

Serial.println("AT");

while(Serial.available()>0)

{

if(Serial.find("OK"))

at\_flag=0;

}

delay(1000);

}

lcd.clear();

lcd.print("Module Connected..");

delay(1000);

lcd.clear();

lcd.print("Disabling ECHO");

boolean echo\_flag=1;

while(echo\_flag)

{

Serial.println("ATE0");

while(Serial.available()>0)

{

if(Serial.find("OK"))

echo\_flag=0;

}

delay(1000);

}

lcd.clear();

lcd.print("Echo OFF");

delay(1000);

lcd.clear();

lcd.print("Finding Network..");

boolean net\_flag=1;

while(net\_flag)

{

Serial.println("AT+CPIN?");

while(Serial.available()>0)

{

if(Serial.find("+CPIN: READY"))

net\_flag=0;

}

delay(1000);

}

lcd.clear();

lcd.print("Network Found..");

delay(1000);

 lcd.clear();

}