#define LIGHT\_MOSFET\_PIN 8  
#define SUPERCAP\_VOLTAGE\_PIN  A3  
  
#define HIGH\_THRESHOLD 900  
#define LOW\_THRESHOLD 300  
  
#define CAPACITANCE 1.5  
  
// Energy (joules) stored in a capacitor = 0.5 x C x V^2  
#define HIGH\_THRESHOLD\_ENERGY   (0.5 \* CAPACITANCE \* (5.0\*HIGH\_THRESHOLD/1024.0)\*(5.0\*HIGH\_THRESHOLD/1024.0))  
#define LOW\_THRESHOLD\_ENERGY    (0.5 \* CAPACITANCE \* (5.0\*LOW\_THRESHOLD/1024.0)\*(5.0\*LOW\_THRESHOLD/1024.0))  
  
void setup()   
{  
  Serial.begin(9600);  
  pinMode(LIGHT\_MOSFET\_PIN,OUTPUT);  
}  
  
void loop()   
{  
    static boolean lightIsOn = false;  
    static unsigned long nextReport=0;  
    static float energyGathered = 0.0;  
      
    int a = analogRead(SUPERCAP\_VOLTAGE\_PIN);  
    if (lightIsOn)  
    {  
        if (a < LOW\_THRESHOLD)  
        {  
            Serial.print("a=");  
            Serial.print(a);  
            Serial.print("; switching off light. ");  
            energyGathered += (HIGH\_THRESHOLD\_ENERGY - LOW\_THRESHOLD\_ENERGY);  
            Serial.print(energyGathered);  
            Serial.println(" joules");  
            lightIsOn = false;  
            digitalWrite(LIGHT\_MOSFET\_PIN,LOW);  
        }  
    }  
    else  
    {  
        if (a > HIGH\_THRESHOLD)  
        {  
            Serial.print("a=");  
            Serial.print(a);  
            Serial.println("; switching on light");  
            lightIsOn = true;  
            digitalWrite(LIGHT\_MOSFET\_PIN,HIGH);  
        }  
    }  
    if (millis() > nextReport)  
    {  
        nextReport = millis()+1000;  
        Serial.println(a);  
    }  
}