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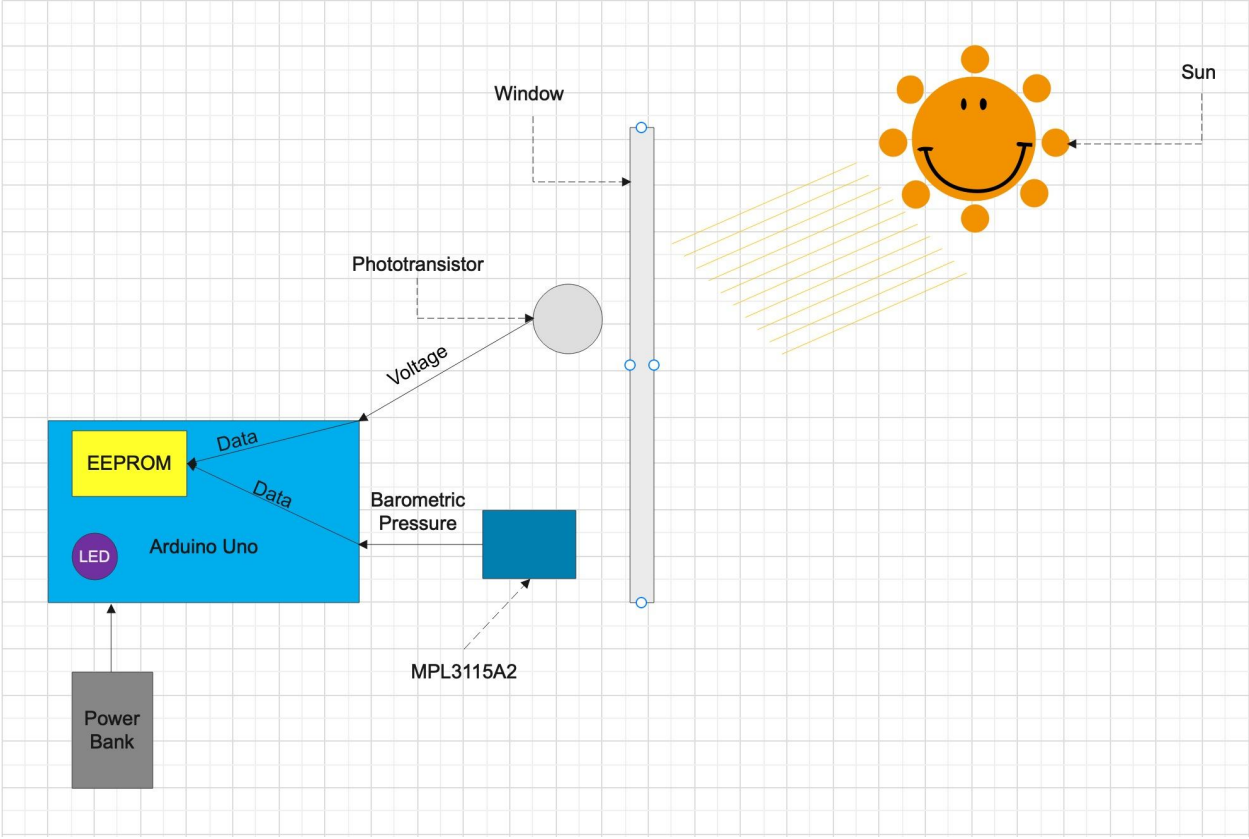
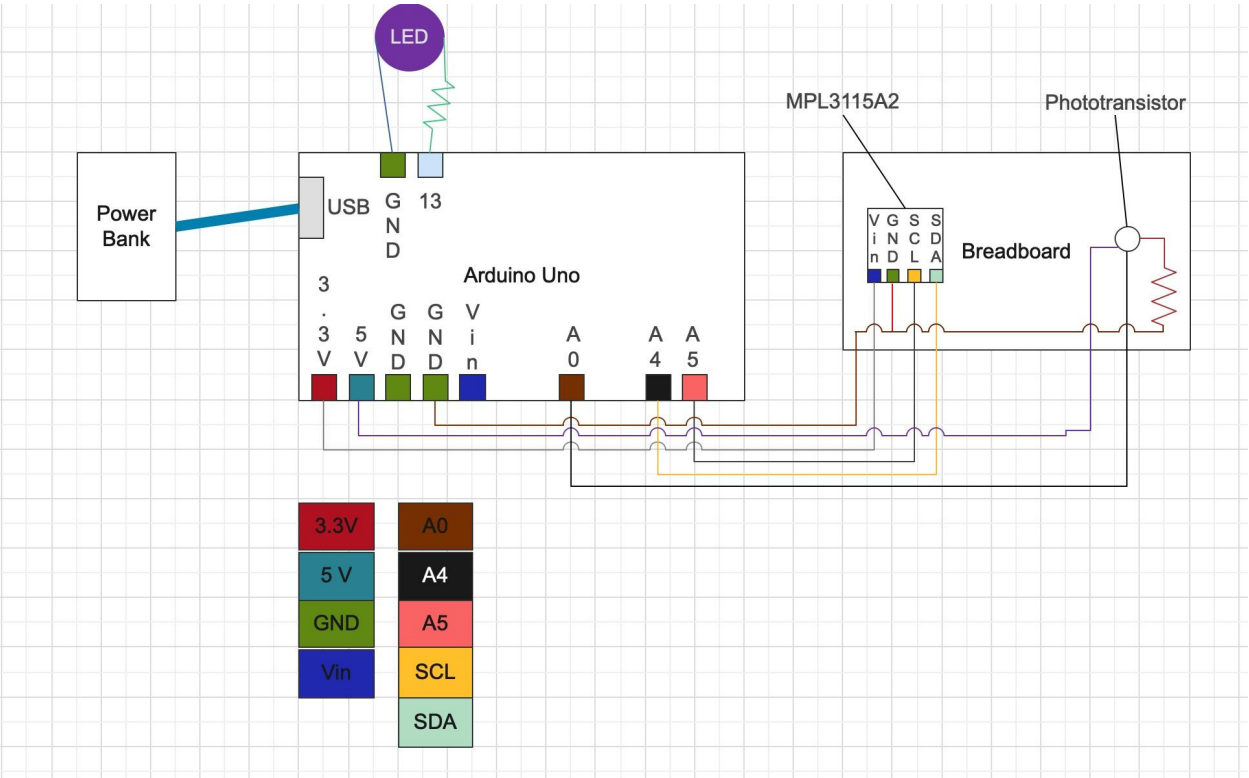
Question:

Does the Barometric Pressure Correlate With the Amount of Sunlight in My Room?

Schematic Diagram:



Wiring Diagram:



Code:

Code is also available at https://github.com/Sfolan2/Barometric-Pressure-vs.-Sunlight.git

EEPROM_CLEAR.ino

```
#include <EEPROM.h>
/*
 * I used https://www.arduino.cc/en/Reference/EEPROM as a
reference
 * for using EEPROM on Arduino
 *
 * This code just clears the EEPROM so fresh values can be put
in
 */

void setup() {
  // put your setup code here, to run once:
```

```
  Serial.begin(9600);
  for(int i=0;i<EEPROM.length();i++)
  {
    EEPROM.write(i,0);
  }
}

void loop() {
  // put your main code here, to run repeatedly:

}
```

EEPROM_getBaro.ino

```
#include <EEPROM.h>
/*
 * I used https://www.arduino.cc/en/Reference/EEPROM as a
reference
 * for using EEPROM on Arduino
 */
void setup() {
  // put your setup code here, to run once:
  Serial.begin(9600);
}
int addr=0;
//Create struct for each Value
struct Value
{
  unsigned char hour_;
  unsigned char minute_;
  float voltage;
  float inHg;
};
int i=0;
void loop() {
  // put your main code here, to run repeatedly:
  Value var;
```

```
    //Print out sunlight Values
    for(int i =0; i<EEPROM.length();i+=sizeof(Value))
    {
      EEPROM.get(i, var);
      //Serial.print(var.hour_);
      //Serial.print(", ");
      //Serial.print(var.minute_);
      //Serial.print(", ");
      Serial.print(var.voltage);
      Serial.println();
    }
    for(int i =0; i<EEPROM.length();i+=sizeof(Value))
    {
      EEPROM.get(i, var);
      //Serial.print(var.hour_);
      //Serial.print(", ");
      //Serial.print(var.minute_);
      //Serial.print(", ");
      Serial.print(var.inHg);
      Serial.println();
    }
    Serial.println("////////////////////////////");
  delay(100000);
}
```

Final_BaroLight.ino

```
#include <TimeLib.h>
#include <Adafruit_MPL3115A2.h>
#include <Wire.h>
#include <EEPROM.h>
/*
 * I used
https://github.com/adafruit/Adafruit_MPL3115A2_Library/blob/mas
ter/Adafruit_MPL3115A2.h
 * as a refence for the code regarding the MPL3115A2 sensor
```

```
 * as well as https://www.arduino.cc/en/Reference/EEPROM for
EEPROM
 * reference
 */
void setup() {
  // put your setup code here, to run once:
  Serial.begin(9600);
  //Set time at start
  setTime(22, 17, 0, 1, 1, 1970);
  //Set up for LED
  pinMode(LED_BUILTIN, OUTPUT);
}
//Define hour 10, 11, 12, 13, 14, 15, 16, 17, 18
int nexthour=10;
//Define minute 0, 15, 30, 45
int nextminute=0;
//Define baro object
Adafruit_MPL3115A2 baro = Adafruit_MPL3115A2();
//define address
int addr=0;

//define struct Value which holds all info
struct Value
{
  unsigned char hour_;
  unsigned char minute_;
  float voltage;
  float inHg;
};

//We want to take a sunlight and baro value every 15 minutes
from
//10:00 to 18:00
void loop() {
  //make sure sensor is working properly
  if(!baro.begin())
  {
    //Serial.println("Couldn't find sensor");
    return;
  }
```

```
  //Define current time
  time_t t = now();

  //Check if it is the correct time interval
  if(hour(t)==nexthour&&minute(t)==nextminute)
  {
    //Calculate pressure
    float pressure = baro.getPressure();
    pressure/=3377.;

    //Calculate sunlight
    int sensorValue=analogRead(A0);
    float voltage= sensorValue*(5.0/1023.0);

    //convert to unsigned char to save space
    unsigned char h=(unsigned char)hour(t);
    unsigned char m=(unsigned char)minute(t);

    Value info;//={hour(t), minute(t), voltage, pressure};
    info.hour_=h;
    info.minute_=m;
    info.voltage=voltage;
    info.inHg=pressure;

    //Put the struct Value info into EEPROM at addr
    EEPROM.put(addr, info);

    //Increment to the next 15 minutes unless it is at 18:00
when it is reset to 10:00
    nextminute+=15;
    if(nextminute>=60)
    {
      nextminute=0;
      nexthour++;
    }
    if(nexthour>=18&& nextminute!=0)
    {
      nexthour=10;
      nextminute=0;
```

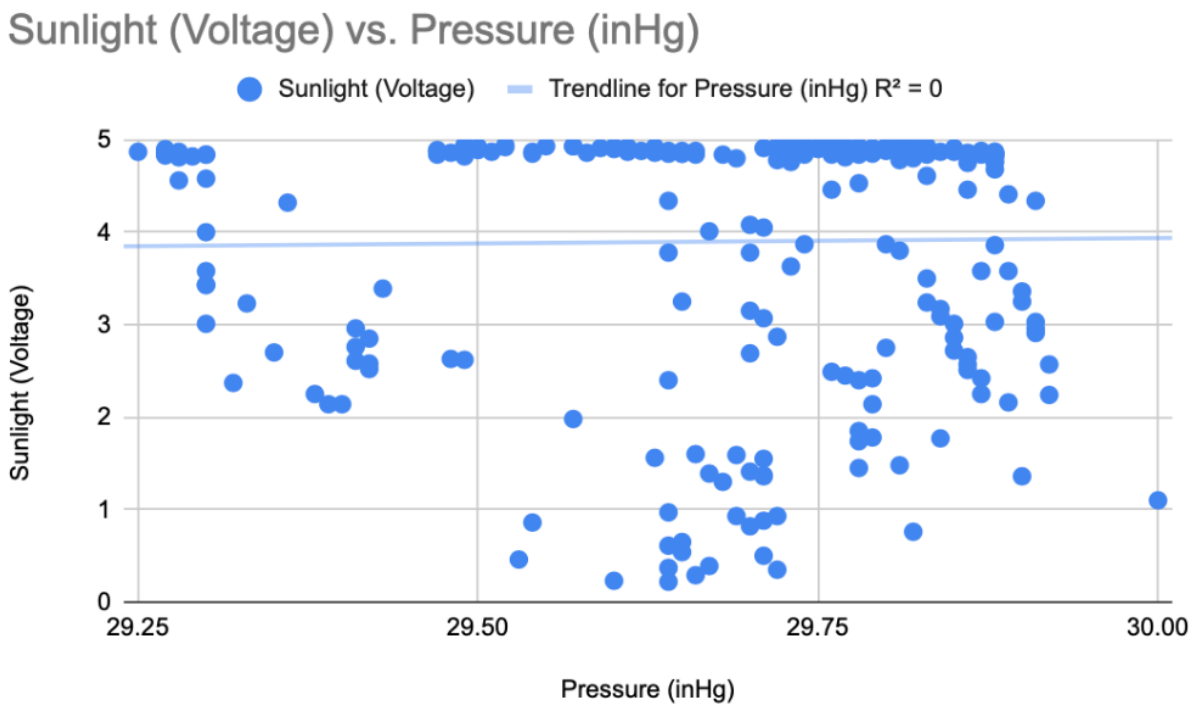
```
    }
  //Increment addr if not out of room
  addr+=sizeof(Value);
  if(addr>=EEPROM.length())
  {
    addr=0;
  }

  }
  //Serial.print("Delay Ended");
  digitalWrite(LED_BUILTIN, HIGH);   // turn the LED on (HIGH
is the voltage level)
  delay(1000);                       // wait for a second
  digitalWrite(LED_BUILTIN, LOW);    //This LED was put in so
that the arduino would
  delay(13000);                      //consume more power so I
could use a power bank
}
```

How the data was collected:

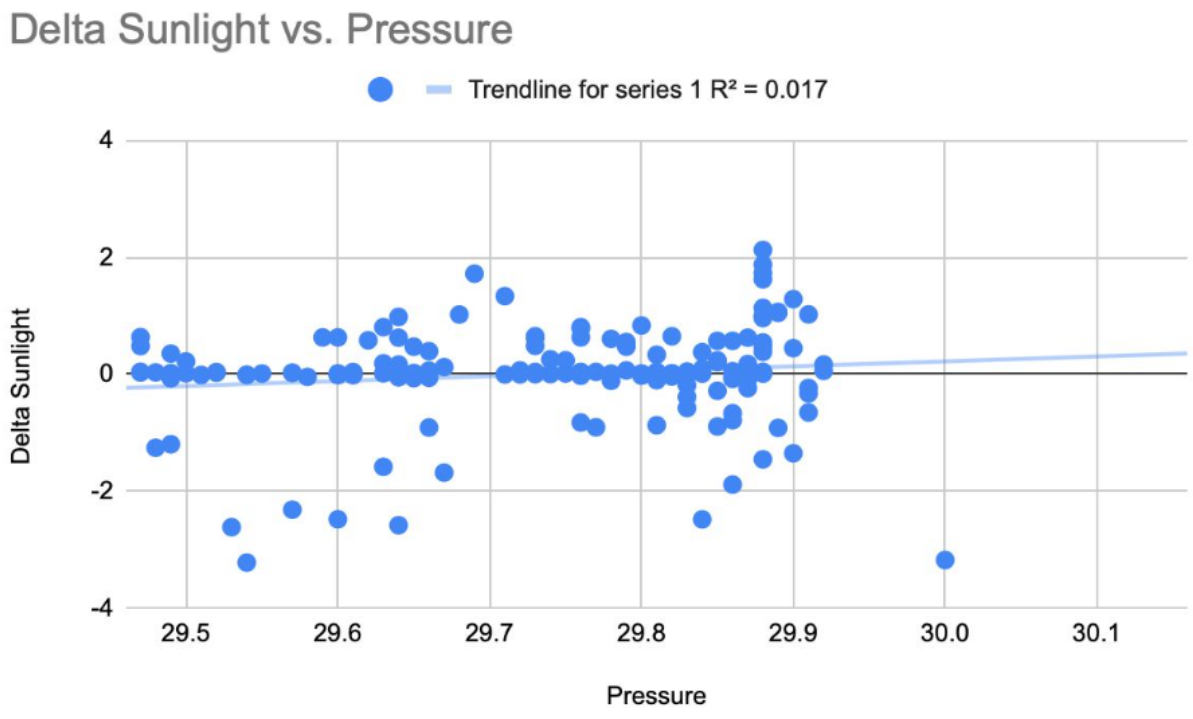
To collect the data, I set up my Arduino to collect a reading for Barometric Pressure and Sunlight every 15 minutes from 10:00 to 18:00 and then store that data as well as the hour and minute into a struct which was then stored in EEPROM. The Barometric Pressure was collected by an Adafruit MPL3115A2 Barometric Pressure sensor and the sunlight was measured by a phototransistor. This was all powered by a portable charger. The main variables that I used for my plots were Sunlight (Voltage), Delta Sunlight (Sunlight-Average Sunlight at that time), Pressure (inHg) and Time. The two plots which are the most relevant to my answer are Sunlight vs. Pressure and Delta Sunlight vs. Pressure.

Relevant Plots:

Sunlight vs. Pressure- $R^2 = 0$



Delta Sunlight vs. Pressure- $R^2 = 0.017$



Conclusion:

The outcome of this experiment is not what I expected. From watching the weather I knew that there was a relationship between low pressure systems and bad weather. I thought that this would correlate to lower pressure having lower sunlight but this was not reflected in the data that I collected. In the Sunlight vs. Pressure graph there was no correlation with an R2 of 0 and in the ΔSunlight vs. Pressure graph there was a positive trend with an R2 of .017. That data is extremely uncorrelated. Therefore, I would say that Barometric Pressure has no direct relationship with Sunlight.