
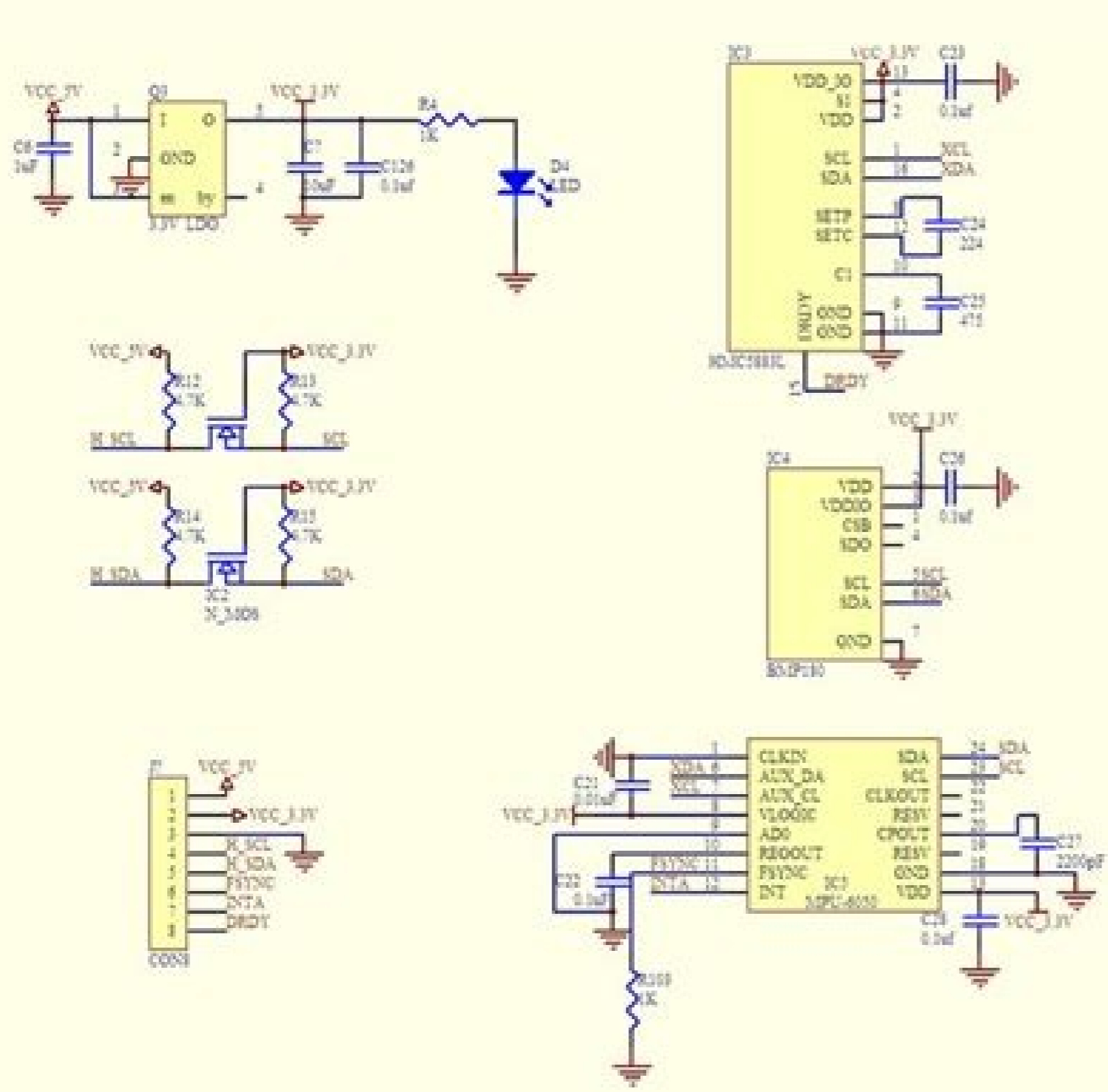
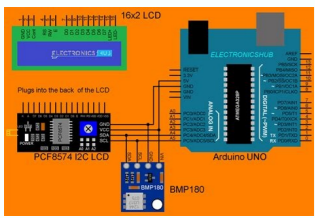
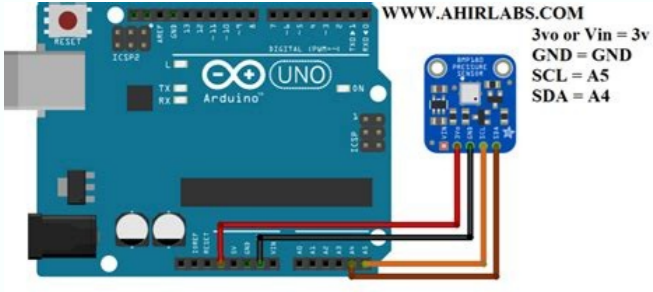


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# Bmp180 library arduino



Sfe\_bmp180 library arduino. Bmp180 pressure sensor arduino library. Bmp180 arduino without library. Sparkfun bmp180 arduino library. Adafruit bmp180 arduino library. Bmp180 library arduino download. Sfe\_bmp180.h arduino library download. Bmp180 gy-68 arduino library.

As the air mass gets higher in altitude, it cools down and compresses. In this tutorial, I'm going to show you how to setup the BMP180 on an Arduino, so you can measure barometric pressure, and altitude from the ground or from sea level. The Arduino's I2C pins (SDA and SCL) are different depending on which Arduino you have. These, along with the UP and UT, are used to calculate the true barometric pressure and temperature. But before getting into the details, let's get some background on barometric pressure and how the BMP180 works. For example, if you measured a local atmospheric pressure of 1011.5 hPa, you would change line 5 of the altitude sketch to: float Po = 1011.5; Finding Sea Level Pressure for Your Area The most accurate way to find the sea level pressure at your current location is to use the BMP180 to measure it. The resulting value can then be inserted into the altitude sketch for a more accurate elevation measurement. The code for this sensor is fairly simple, although you are going to need a library to get your values. One Pascal is defined as one Newton of force per square meter. The BMP180 outputs pressure readings in Pascals, but they are converted to hectoPascals (hPa) by the software library we're going to use. Hopefully this article helps you get the BMP180 hooked up to the Arduino. The BMP180 outputs an uncompensated temperature (UT) value and an uncompensated pressure (UP) value. To do this, you need to use the atmospheric pressure of your current location instead of the sea level pressure. The code I used is found below (I have compiled and uploaded this code to my arduino and it work very well.) Thank you for reading!  

```
#include <Wire.h>
#include <SFE_BMP180.h>
#define ALTITUDE 35.6 //Altitude where I live (change this to your altitude)
//Creating an object of the BMP180 sensor
BMP180 bmp180;
//Starting serial communication
Serial.begin(9600);
//If initialization was successful, continue
Serial.println("BMP180 init success");
//If else, stop code
forever {
  Serial.println("BMP180 init fail");
  while (1);
}
//Creating variables for temp, pressure and relative pressure
double T, P, p0;
//Starting the sensor
bmp180.begin();
//If the sensor is not initialized, stop the code
if (!bmp180.isInit()) {
  Serial.println("BMP180 is not initialized");
  while (1);
}
//Starting the temperature measurement
bmp180.startTemperature();
//If the temperature measurement is successful, continue
if (bmp180.isTemperatureReady()) {
  Serial.println("Temperature ready");
  Serial.println(bmp180.getTemperature());
}
//Starting the pressure measurement
bmp180.startPressure(3);
//If the pressure measurement is successful, continue
if (bmp180.isPressureReady()) {
  Serial.println("Pressure ready");
  Serial.println(bmp180.getPressure());
}
//Calculating the sea level pressure
p0 = bmp180.seaLevel(bmp180.getPressure(), bmp180.getTemperature());
//Calculating the relative pressure
Serial.println("Relative (sea-level) pressure: ");
Serial.println(p0);
//Calculating the altitude
Serial.println("Altitude (meters): ");
Serial.println(bmp180.altitude(p0));
}
//Delay for 1000ms
delay(1000);
}
```

  
The BMP180 barometric pressure sensor is a great sensor that can be used to predict the weather, detect altitude, and measure vertical velocity. It's perfect for weather stations, remote controlled vehicles, weather balloons, and lots of other projects. Barometric pressure (also known as atmospheric pressure), is the pressure caused by the weight of air pressing down on the Earth. I'm going to use a really useful BMP180 library from SparkFun. Use the pressure and temperature sketch to get your local atmospheric pressure. To install it, open up the Arduino IDE, go to Sketch > Include Library > Add Library, then select the ZIP file you just downloaded. This sketch will print the barometric pressure and temperature to the serial monitor: #include <SFE\_BMP180.h>
BMP180 bmp180;
void setup() {
 Serial.begin(9600);
 bool success = bmp180.begin();
 if (success) {
 Serial.println("BMP180 init success");
 }
}
void loop() {
 char status;
 double T, P;
 bool success = false;
 status = bmp180.startTemperature();
 if (status != 0) {
 delay(1000);
 status = bmp180.getTemperature();
 }
 if (status != 0) {
 status = bmp180.startPressure(3);
 }
 if (status != 0) {
 delay(status);
 status = bmp180.getPressure();
 }
 if (status != 0) {
 Serial.print("Pressure: ");
 Serial.println(P);
 Serial.print("hPa (Pressure measured using temperature): ");
 Serial.println(bmp180.getPressure(P, T));
 }
 Serial.print("Sea Level Pressure: ");
 Serial.println(p0);
 Serial.print("Relative (sea-level) pressure: ");
 Serial.println(bmp180.seaLevel(P, T));
 Serial.print("Altitude (meters): ");
 Serial.println(bmp180.altitude(p0));
 delay(1000);
}  
Installing the BMP180 Library Before we start programming the BMP180, download and install the library. This diagram shows the pinout of the BMP180: The BMP180 communicates with the Arduino over I2C. On success it returns a non-zero value: bool success = bmp180.begin(); Following the flow diagram shown earlier, we first use the startTemperature() method to start a temperature measurement. Imagine a column of air rising from the Earth's surface to the top of the atmosphere. The pressure created by a 1x1 inch column of air reaching to the top of the atmosphere is defined as one atmosphere (atm) of pressure. Go ahead and navigate here to download the library from adafruit. As you'll see in a minute, it can detect changes in altitude of just a few inches. It's an extremely sensitive sensor too. Let us know in the comments if you have any questions, and also let us know what projects you're building! You just need to provide the altitude (from sea level) of your current location. BONUS: I made a quick start guide for this tutorial that you can download and go back to later if you can't set this up right now. We provide an oversampling value as parameter, which can be between 0 to 3. This condenses water vapor in the air, forming rain clouds. The function returns the number of milliseconds the Arduino needs to wait before reading the pressure value from the sensor: status = bmp180.startPressure(3); Then we use the getPressure() method to read the pressure value and store it in the variable P; status = bmp180.getPressure(P, T); Notice that we also pass the variable T, since the pressure calculation is dependent on the temperature. A value of 0 provides a lower resolution, but is faster. Input your current altitude on line 5 where it says: float alt = 5.0; //Altitude of current location in meters void setup() { Serial.begin(9600); bool success = bmp180.begin(); if (success) { Serial.println("BMP180 init success"); } } void loop() { char status; double T, P; seaLevelPressure; bool success = false; status = bmp180.startTemperature(); if (status != 0) { delay(1000); status = bmp180.getTemperature(); } if (status != 0) { status = bmp180.startPressure(3); if (status != 0) { delay(status); status = bmp180.getPressure(P, T); if (status != 0) { seaLevelPressure = bmp180.seaLevel(P, alt); Serial.println("Pressure at sea level: "); Serial.println(seaLevelPressure); Serial.println("hPa"); } } } } That's about it. The most accurate way is to use the BMP180, which I'll explain how to do below. It takes care of all the math for calculating the true temperature and pressure readings, as well as the math for calculating altitude. The SI unit for pressure is the Pascal (Pa). At higher temperatures, air is not as dense and heavy, so it applies less pressure on the sensor. At lower temperatures, air is more dense and weighs more, so it exerts more pressure on the sensor. The sensor uses real-time temperature measurements to compensate the pressure readings for changes in air density. Using Barometric Pressure to Measure Altitude Barometric pressure changes depending on the altitude of the sensor. Rising barometric pressures usually indicate that warm, sunny weather is coming. It usually brings wind too, because the surrounding air on the surface flows into the low pressure area. A change of 1 hPa of atmospheric pressure corresponds to a change in altitude of about 8 meters. All barometric pressure values reported by news and weather stations add a certain amount of pressure to the readings to make it appear that the measurement was taken from sea level. If you're building a weather station, you're going to want to adjust your readings too. In this next example, we will use the BMP180's pressure data to get an accurate measurement of altitude. The BMP180 measures both pressure and temperature, because temperature changes the density of gasses like air. The SparkFun library has a function called seaLevel(P, A) that does this for you. Using Barometric Pressure to Predict the Weather Changes in barometric pressure can be used to predict the weather. A value of 3 provides a high resolution, but also a longer delay between measurements. The sensor I'm using in this tutorial is a breakout board from Adafruit that uses the Bosch BMP180 Barometric Pressure Sensor chip. The Bosch BMP180 runs on 3.3V, but many breakout boards have a voltage regulator and an I2C level shifter so you can power it with either 3.3V or 5V. The sensor is really sensitive! This is the barometric pressure at your current location and altitude. Barometric pressure will change according to local weather conditions, but it will also change depending on your altitude. A falling barometric pressure is caused by a mass of air rising from the Earth's surface. Piezoresistive sensors are made up of a semiconducting material (usually silicon) that changes resistance when a mechanical force like atmospheric pressure is applied. Altitude can be calculated using the international barometric formula: Luckily the library performs this calculation, so we don't need to worry about doing this math in the sketch. The warm expanding air is usually low in humidity, which prevents cloud formations. It can be found with one of two ways. What is Barometric Pressure? On success it also returns a non-zero value: status = bmp180.startTemperature(); Then we wait for at least 4.5 milliseconds, and use getTemperature(T) to receive the value and store it in the variable T; status = bmp180.getTemperature(T); The startPressure() method sends the command to start the measurement of pressure. Then insert that value into line 5 of the altitude sketch. Sea level pressure can be calculated from the international barometric formula, rearranged to solve for sea level pressure (P0): The atmospheric pressure at your current location will be measured by the BMP180. To get the altitude of your current location, you can use a smartphone app, or search an online elevation map. The atmospheric pressure at your current location will be measured by the BMP180. The atmospheric pressure at sea level is the atmospheric pressure at your current location, adjusted to remove the effects of altitude. At lower altitudes, there is more air above the sensor, so the pressure is higher. This column of air weighs 14.7 pounds, which is why one atm equals 14.7 pounds per square inch (psi). At higher altitudes, there is less air above the sensor, so the pressure is lower. The vacuum created by the rising air mass forms a low pressure area on the surface. The air in the atmosphere has mass, so gravity causes the weight of that column to exert pressure on the surface. It covers all of the steps, diagrams, and code you need to get started. Check the table below to find the I2C pins for some common Arduino boards: For an Arduino Uno, the connections will look like this: I've connected the BMP180 to the 5V pin in this example, but you can power it from the 3.3V pin as well. You can use the table below to convert from hPa to some other common units of pressure: Unit 1 hPa = Pascal 100 Pa Newtons per square meter 100 N/m<sup>2</sup> Atmosphere 0.000986923 atm Bar 0.001 bar Millibar 1 mbar Millimeters Mercury 0.750063755 mmHg Torr 0.750061683 torr Pounds per square inch 0.014503774 psi How the BMP180 Works The BMP180 is a piezoresistive sensor that detects pressure. In the sketch below, enter your altitude (in meters) on line 6: #include <SFE\_BMP180.h>
BMP180 bmp180;
int Altitude = 5; //current altitude in meters void setup() {
 Serial.begin(9600);
 bool success = bmp180.begin();
 if (success) {
 Serial.println("BMP180 init success");
 }
}
void loop() {
 char status;
 double T, P;
 bool success = false;
 status = bmp180.startTemperature();
 if (status != 0) {
 delay(1000);
 status = bmp180.getTemperature();
 }
 if (status != 0) {
 status = bmp180.startPressure(3);
 }
 if (status != 0) {
 delay(status);
 status = bmp180.getPressure(P, T);
 }
 if (status != 0) {
 float comp = bmp180.seaLevel(P, Altitude);
 Serial.println("Pressure: ");
 Serial.println(comp);
 Serial.println("hPa");
 Serial.println("Temperature: ");
 Serial.println(T);
 Serial.println("Altitude (meters): ");
 Serial.println(bmp180.altitude(comp));
 }
 delay(1000);
}
//The altitude of my current location is only 5 meters so the difference is small, but it does have an effect on the pressure. First we create an object called bmp180: SFE\_BMP180 bmp180; To initialize the BMP180 sensor and download the calibration coefficients, we need to call the begin() method. True pressure and temperature are calculated using fairly complex algorithms: This math is performed by the library we're going to use, so we don't need to code it into the sketch. Altitude Relative to Sea Level This sketch tells you the altitude at your current location relative to sea level. The air mass gets warmer and expands as it gets closer to the surface. You need to insert the atmospheric pressure at sea level for your current location on line 5 where it says: float Po = 1013.0; #include <SFE\_BMP180.h>
BMP180 bmp180;
float Po = 1013.0;
void setup() {
 Serial.begin(9600);
 bool success = bmp180.begin();
 if (success) {
 Serial.println("BMP180 init success");
 }
}
void loop() {
 char status;
 double T, P;
 alt;
 bool success = false;
 status = bmp180.startTemperature();
 if (status != 0) {
 delay(1000);
 status = bmp180.getTemperature(T);
 }
 if (status != 0) {
 status = bmp180.startPressure(3);
 }
 if (status != 0) {
 delay(status);
 status = bmp180.getPressure(P, T);
 }
 if (status != 0) {
 alt = bmp180.altitude(P, Po);
 Serial.println("Altitude: ");
 Serial.println(alt);
 Serial.println("Meters");
 }
}
}

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