Arduino Ublox GPS

by **msuzuki777** on June 11, 2014

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Lazy Old Geek

Intro: Arduino Ublox GPS

So this Lazy Old Geek (L.O.G.) was looking for a GPS for an Arduino project. Well, I found this UBLOX-NEO-6M GPS on ebay:

http://www.ebay.com/itm/Ublox-NEO-6M-GPS-Module-with-EEPROM-and-Built-in-Active-Atenna-APM2-5-APM2-0-Com-/251548034492?pt=LH_DefaultDomain_0&hash=item3a916e65bc

WARNING: I think I actually ordered this one but the one I got was slightly different. The connectors were not as shown but centered on the PCB.

The antenna is attached to the PCB with a little snap on coax connector. It can be carefully lifted off to disconnect.

The metal shield on the antenna should be pointed down. You can buy cases for the antenna. You can also use double sticky tape to stick the antenna to the bottom of the GPS pcb.

Image Notes
1. Connector is centered on PCB
2. Antenna snaps on
3. EEPROM

Image Notes
1. Connector is offset to one side
2. This is the picture shown in the ebay listing

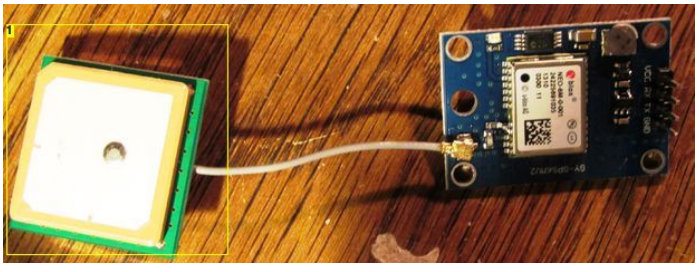
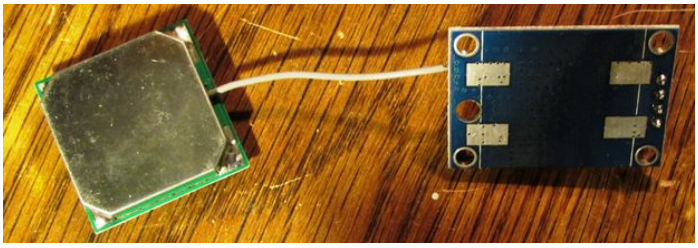


Image Notes
1. Antenna



Step 1: Arduino

The Ublox NEO-6M GPS is fairly easy to use with Arduino.

There are a few options for Arduino GPS libraries. I chose TinyGPSPlus:

http://arduiniana.org/libraries/tinygpsplus/

There is also a TinyGPS, I believe written by the same person.

You also need to include SoftwareSerial.h to use this library.

Hardware: Some of the UBLOX NEO-6M modules come with a loose 4pin header. These can be soldered in with pins going in either direction. Unfortunately, I put some on the wrong side for another project and had to unsolder them and put some new ones on the other side.

TIP: I saw a picture of someone using these types of clips (see picture) so that you don't have to decide ahead of time.

Connect the four pins from UBLOX to an Arduino as follows:

Ublox - Arduino

GND - GND

TX - Digital pin (D4 in the DeviceExample)

RX - Digital pin (D3 in the DeviceExample)

Vcc - 5Vdc or 3.3Vdc

Now you can start up your Arduino environment and run the TinyGPSPlus example called DeviceExample.

In the sketch, change GPSBaud = 9600

Should work fine.

TIP: Here is one thing you need to remember, the TX pin from the UBLOX goes to the RX pin of the Arduino and vice versa.

TECHNOBABBLE: The explanation for this is not so bad. TX stands for Transmit where data is sent out. RX stands for Receive where data comes in.

So the UBLOX-TX sends data to the Arduino-RX

And the UBLOX-RX receives data from the Arduino-TX

HINT: While the standard is to label pins from the perspective of the device, this is not always the case.

Image Notes
1. Could clip to header connector

Step 2: U-center

So this works pretty good.

But I'm a Geek and the UBLOX-NEO-6M supports something called WAAS, Wide Area Augmentation System.

So standard commercial GPS are not really precise. A particular reading may be several meters off. Using WAAS is supposed to improve the precision.

Ublox is a Swiss company. Here's their website:

http://www.u-blox.com

Documentation for this product is a little hard to find:

http://www.u-blox.com/en/download/documents-a-resources/u-blox-6-gps-modules-resources.html

but everything under NEO-6 series should be applicable.

Okay, now I'm a Geek, but most of this stuff is over my head. So I did a lot of Internet searching and guessing.

Most GPSs are basically serial devices. Most are set for a baud rate of 4800 (these Ubloxs are set for 9600). They use a standard called NMEA 0183:

http://en.wikipedia.org/wiki/NMEA_0183

I think most GPSs when powered up will automatically start sending out data typically every two second.

Okay, according to the U-blox6_ReceiverDescriptionProtocolSpec, the Ublox supports both NMEA 0183 (that's why it works with TinyGPS) and their own UBX protocol.

NOTE: I think WAAS is only used in the U.S. I think Europe has or will have something similar.

I haven't found any standard way of activating WAAS or even determining if it is activated. But Ublox has some PC software called: u-center

http://www.u-blox.com/en/evaluation-tools-a-software/u-center/u-center.html

This is really nice free software and even has a manual but for this Lazy Old Geek it's still very confusing.

Well, the first thing I had to figure out was how to hook it up to the Ublox-Neo-6M GPS.

So PCs and laptops no longer have serial ports (besides the Ublox is not RS-232 compatible) but they have USB ports and I have several PL2303 USB modules that convert serial to USB. I hooked mine up as follows:

PL2303 - Ublox

Gnd - Gnd

Rxd - Tx

Txd - Rx

3.3V - Vcc

NOTE: Notice that RXD connects to TX and Txd connects to RX as previously discussed.

HINT: You can alternately connect the Ublox Vcc to 5V.

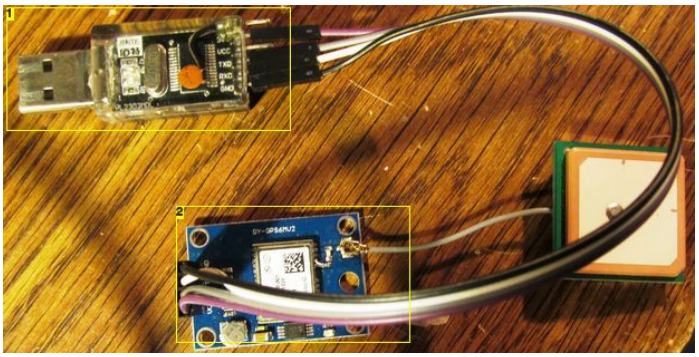


Image Notes
1. PL2303 module
2. Ublox-Neo-6M GPS module

Step 3: Using u center

PROBLEM: So I connected my Ublox-neo-6m to my PL2303, plugged the PL2303 into a USB port on my laptop and powered it up. Well, Windows started up fine, but my mouse movement was erratic and I couldn't control it. Well, (I'm pretty sure), the laptop thinks I have a serial mouse connected.

SOLUTION: Well, first, I tried disconnecting the PL2303 until after the laptop loaded up Windows. Still did the same thing.

So what I have to do is leave the PL2303 connected but disconnect power to the Ublox. Then power up laptop to Windows, then connect power to the Ublox.

Hopefully, you won't have this problem.

Okay, so once the Ublox has power it takes a minute or two for it to get started. (I guess this is called a cold start). The green LED on the Ublox will start flashing.

Click on the Ucenter icon.

Click on **Receiver Port** Select the COM # that your PL2303 comes up as. Mine is COM 5.

Click on **Receiver Baudrate** Select 9600.

You should see some activity on the right side of the screen(see picture)

Note: on the bottom, it shows Com5 9600 ublox 6 and NMEA

The screens in the middle show satellite information.

The screen on the right shows latitude, longitude and altitude.

Note: FixMode is 3D/DGPS.

Differential Global Positioning System (DGPS) means WAAS is working.

HINT: Especially indoors, this may just say 3D. Also the DGPS may take several minutes before it displays.

Configuring the Ublox Neo-6M. The way I did it is:

view - configuration view(see next picture)

NAV5

Nav Mode

Dynamic Model: Pedestrian

Fix Mode: Auto 2D/3D

UTC Standard: USNO(GPS) {Doesn't save??}

Click on **send** lower left corner

NOTE: Pedestrian mode probably won't make much difference but for my application it is more accurate. See ProductSpec

view-configuration view (see next picture)

Subsystem: Enabled

Services: Ranging

Apply SBAS Correction data

Number: 3

PRN Codes: WAAS

Click on **send** lower left corner

NOTE: This forces WAAS. The more general term is SBAS(Space Based Augmentation Systems)

NOTE: There are other configurations you can change like Baud rate and sampling rate.

Okay, the two sends above send it to the Ublox GPS but it doesn't save it. To save, do the following.

(see next picture)

Main menu

Receiver

Action

Save config

This saves it to (I believe) the EEPROM on the Ublox-neo-6m pcb.

WARNING: Close 'u-center' before disconnecting GPS . Otherwise u-center will lock up and you will get a Blue screen.

The next picture shows the Deviation Map. Each GPS sampling shows in yellow, which changes to green when the next sampling occurs. This shows the readings have drifted about two meters.

U-center has a lot of other features, one I like it Google Earth. It will show the GPS location on Google Earth.

So that's what I've learned about the Ublox-neo-6m so far.

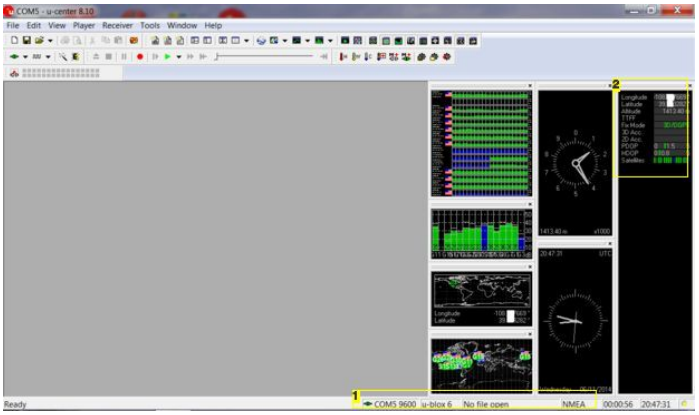


Image Notes
1. Describes USB connection and protocol
2. Latitude, Longitude, Altitude and Fix Mode

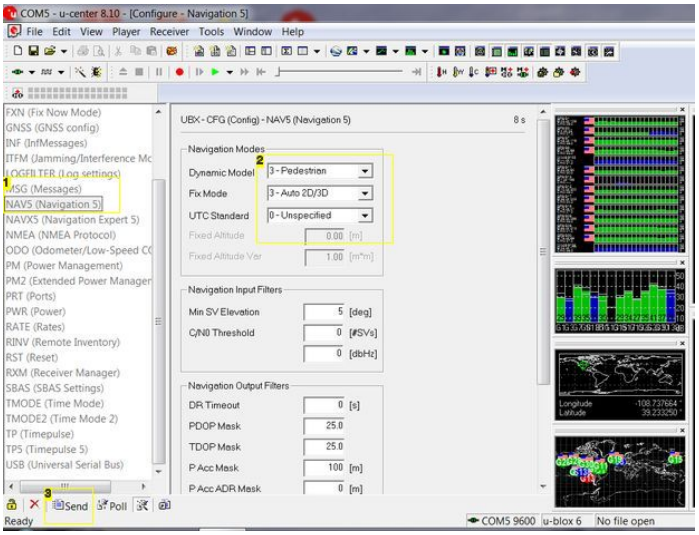


Image Notes
1. Select NAV5
2. I chose Pedestrian model
3. Send to GPS module

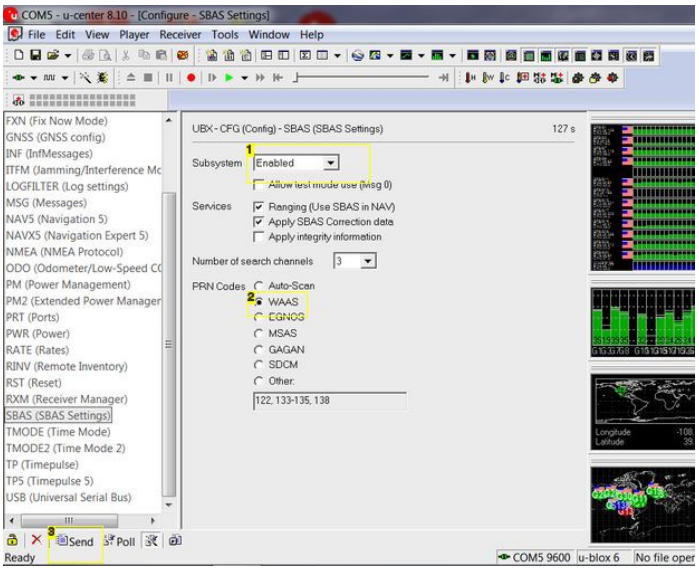


Image Notes
1. Make sure it's Enabled

2. WAAS selected
3. Send to GPS module

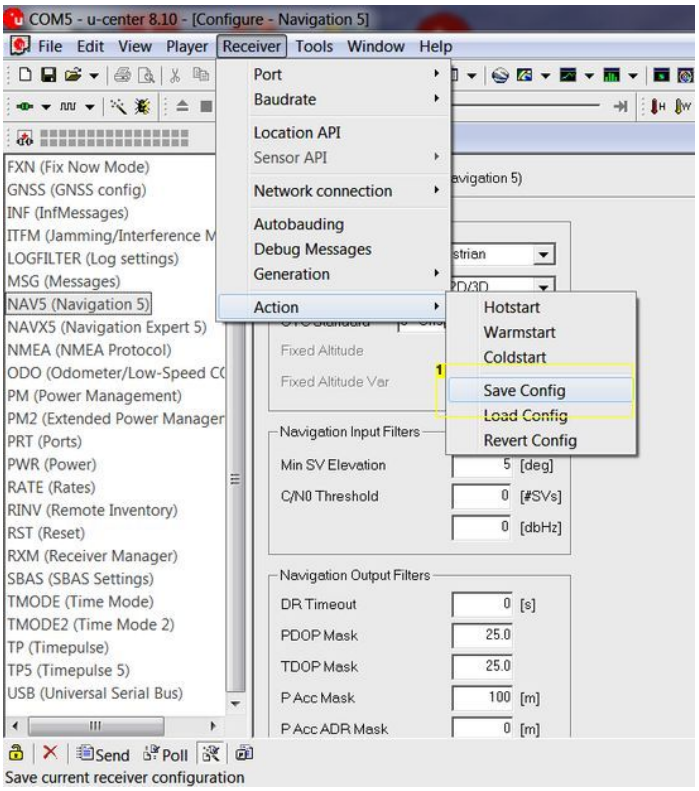


Image Notes
1. Saves configuration to EEPROM

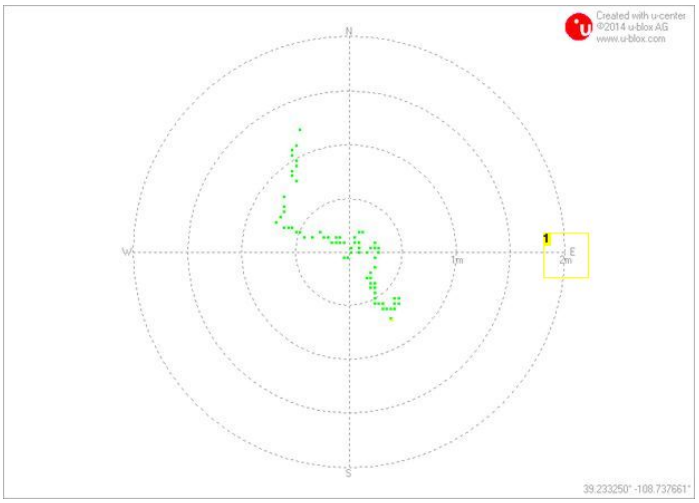


Image Notes
1. Shows 2 meter range

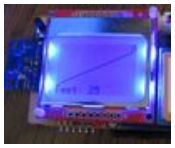
Related Instructables

Raspberry Pi & the Neo 6M GPS by sspence

MonkeyDogTrack by msuzuki777

GOING BEYOND THE HORIZON WITH LoRa RF1276 by Jasonw3

Boat Autopilot - Based on the Arduino by comsa42



CarTracker by msuzuki777

$8 GPS Receiver Hack! by comsa42

Comments

26 comments **Add Comment**

captclearleft says: Jul 28, 2015. 7:36 AM **REPLY**

Great Job,

Some basic help for others that I learned while hooking this up.

This unit does not have a power led.

When first powering up your Ublox NEO-6M you may see nothing for a period of time. After about 10 min the only led(green on mine) will begin to flash about once a second.

If you are connecting through Software Serial on an Arduino,

Read the tutorial and pay attention to how your wire the RX, and TX lines. Its just like hardware serial. Rx to Tx, and Tx to Rx...

Just like the tutorial above states...

I hooked mine up to a regular Arduino Uno(r3) 5v, and have had no issues....

Hope this helps...

msuzuki777 says: Jul 28, 2015. 9:48 AM **REPLY**

Thanks for the Tips. Yes it is hard to tell if it's working with the delayed LED. I do like these NEO-6Ms.

LOG

matejj says: Nov 11, 2014. 3:45 PM **REPLY**

The Neo-6 documentation says absolute maximum supply voltage is 3.6V. Why are you so confident 5V won't destroy it?

msuzuki777 says: Nov 11, 2014. 5:54 PM **REPLY**

The NEO-6 module does have a maximum of 3.6V but the module I'm using is rated for 3-5Vdc. It has a 3.3V regulator on the board.

LOG

tmatz81 says: Apr 26, 2015. 2:02 PM **REPLY**

Don't forget to hook up a level converter to the Rx and Tx to go down to 3,6V. Or at least hookup a 10kOhm resistor to the Rx side of the NEO-6M module. As you can see in this diagram, the Rx pin of the GPS is not level shifted on the board.
http://www.uctronics.com/ebayproductpic/GYGPS6MV1_SCH.jpg

msuzuki777 says: Apr 26, 2015. 4:29 PM **REPLY**

Actually, that is not necessary in this case. The USB to serial converter that I am using has a PL2303 chip. The Tx and Rx pins are actually 3.3V levels already so no level conversion is necessary.

The original USB-BUB also has a jumper that select either 5V or 3.3V serial voltage levels.

LOG

AmandaS11 says: Apr 25, 2015. 12:04 PM **REPLY**

Hello from Brazil!

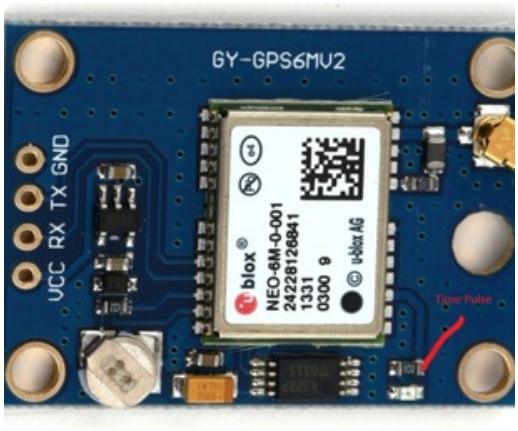
I think I have a problem: I working on a synchronization of a phasor measurement unit and so I bought two of this Ublox Neo board. But now I'm seeing that it don't have one pin for PPS like another models from dx.com ... :'(

But I hope that I can adapte this board for it. Do you think it's possible?? Cause I don't have money neither time to buy another and wait arrive... Please help.

msuzuki777 says: Apr 25, 2015. 12:29 PM **REPLY**

I am not quite sure what you are talking about but I'm assuming you mean what ublox calls the Time Pulse. This is used to blink the module LED. I marked it's location on the picture below. You would have to solder a wire to this spot. Hopefully, this will do what you need.

LOG



AmandaS11 says: Apr 25, 2015. 4:30 PM **REPLY**

Thank you, I think you're right. Exactly, PPS (pulse per second) is the Time Pulse, which permits time synchronization in long distances.

msuzuki777 says: Apr 25, 2015. 5:53 PM **REPLY**

Hope that works. It's pin 3 of the NEO-6M module. I think it's even selectable in software but don't know if U-center supports it.

LOG

ZubairK3 says: Apr 15, 2015. 11:00 AM **REPLY**

hello guys,,

i am facing problem in loading map while connecting UBLOX gps with multi wii...guys i have to submit my project please i would be very thankfull if someone could send me the correct aurdino code to interface UBLOX gps with multiii wii..

my email id is :- kzbr1993@gmail.com

thanks

msuzuki777 says: Apr 15, 2015. 11:50 AM **REPLY**

Sorry I never used multiwii.

LOG

nathan.marchuk.3 says: Mar 23, 2015. 8:24 PM **REPLY**

i follow all these steps exactly to change my baud rate to 115200 but u-center is still reading data on it at 4800 baud? please help im trying to configure this to read out ubx protocol in 115200 baud so that i can connect it to my i2c nav board and then connect to my multiwii for gps RTH functions :S

doug.carnahan1 says: Mar 30, 2015. 10:45 PM **REPLY**

I believe you will have to use the u-center to modify the baud rate as it has to do with the firmware in the chip. The ublox could possibly be on a module that runs on some different firmware as I have seen these mounted to several different boards. There are many tutorials here and on youtube for this task.

msuzuki777 says: Mar 23, 2015. 9:28 PM **REPLY**

So what kind of GPS module are you using? If you're using the NEO-6M like in my example the baud rate is fixed at 9600. I don't think this is configurable unless you change the voltages on a couple of pins (probably by cutting and jumpering) and according to my documentation, the NEO-6M doesn't support 115200.

If you're using a different GPS, you will have to look at the documentation for it.

LOG

doug.carnahan1 says: Mar 28, 2015. 8:17 PM **REPLY**

Im assuming I wont need the I2c chip if im connecting directly to arduino?

msuzuki777 says: Mar 30, 2015. 8:48 PM **REPLY**

I am not using I2C in this project.

LOG

doug.carnahan1 says: Mar 30, 2015. 10:38 PM **REPLY**

The one I purchased from ebay stated it was needed to communicate with arduino ,Im assuming they mistook it for one of the flight controller boards used with open hardware drones. Either way I have a couple happily running gps modules that I tested using this tutorial. I am now in the process of modifying my traffic management application, thanks!

taylor.d.shields says: Mar 20, 2015. 12:28 PM **REPLY**

Hey there! When I run this setup on the Arduino Serial, the device doesnt send any data. It registers the GPS, and starts spitting out "stars" (*) in place of where coordinates would be.... What could this be?

msuzuki777 says: Mar 20, 2015. 1:17 PM **REPLY**

I'm guessing but make sure the Serial port baud rate is set to the same as the sketch. It sounds like they're different.

LOG

AhmadE2 says: Feb 1, 2015. 8:25 AM **REPLY**

hi, i did everything you have done exactly but when i turn it on the LED that build-in on the GPS do not turn on and it say on the serial monitor "No GPS detected: check wiring."

what is the problem? and what i should do>

msuzuki777 says: Feb 1, 2015. 10:25 AM **REPLY**

If the GPS module LED is not on than it sounds like you're not getting power to the GPS module. If you have a meter, measure the DC voltage on the Vcc pin to ground. If it's 3.3Vdc or 5Vdc then the module is probably bad. If it's 0Vdc, then check the wiring to the USB adapter.

If you don't have a voltmeter, check the wiring between the USB module and the GPS module, especially the Vcc and ground connections. It should work with Vcc connected to 5Vdc or 3.3Vdc.

Hopefully, this will help solve your problem. If the GPS module LED isn't on then it's not receiving power.

LOG

AhmadE2 says: Feb 6, 2015. 9:21 AM **REPLY**

thanks :)

anouman says: Jan 4, 2015. 3:41 AM **REPLY**

Very useful thanks

comsa42 says: Jun 11, 2014. 8:59 PM **REPLY**

U-center, Great Idea!

msuzuki777 says: Jun 12, 2014. 4:46 AM **REPLY**

It's a nice program especially for freee.

LOG