To,

COMMUNICATION TEAM

GLOBAL POSITIONING SYSTEM

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INTRODUCTION

GPS provides geolocation and time information to a GPS receiver in all wheather condition anywhere near the Earth where there is an unobstructed line of site to four or more GPS satellite.

DISCRIPTION

* -165 dBm sensitivity, 10 Hz updates, 66 channels
* 5V friendly design and only 20mA current draw
* Breadboard friendly + two mounting holes
* RTC battery-compatible
* Built-in datalogging
* PPS output on fix
* Internal patch antenna + u.FL connector for external active antenna
* Fix status LED
* New! Version 3 comes with the latest module which has external antenna support and Pulse-Per-Second output

...all for under $40

TECHNICAL DETAILS

* Satellites: 22 tracking, 66 searching
* Patch Antenna Size: 15mm x 15mm x 4mm
* Update rate: 1 to 10 Hz
* Position Accuracy: < 3 meters (all GPS technology has about 3m accuracy)
* Velocity Accuracy: 0.1 meters/s
* Warm/cold start: 34 seconds
* Acquisition sensitivity: -145 dBm
* Tracking sensitivity: -165 dBm
* Maximum Velocity: 515m/s
* Vin range: 3.0-5.5VDC
* MTK3339 Operating current: 25mA tracking, 20 mA current draw during navigation
* Output: NMEA 0183, 9600 baud default, 3V logic level out, 5V-safe input
* FCC E911 compliance and AGPS support (Offline mode : EPO valid up to 14 days )
* Up to 210 PRN channels
* Jammer detection and reduction
* Multi-path detection and compensation

FUNDAMENTALS

GPS concept based on time and known position of GPS specialized satellites. The satellites carry very stable Atomic Clocks that are synchronized with one another and ground clocks. Any drift from true value is reflected on ground clock and correction is made, similarly GPS receiver has function.

Each GPS satellite continuously transmit data containing current time and position. Since speed of radio waves is constant and independent of speed of satellite, time delay between transmitting and receiving proportional to distance from satellite to receiver. A GPS receiver monitor multiple satellite and evaluate the equation for proper position of receiver and its deviation from true time. At minimum four satellites must be in view to compute four unknown quantites (x,y,z,t).

ABSTRACT

We will be basically working on ADAFRUIT ULMATE BREAKOUT VERSION 3(gps module).

WHY THIS SENSOR?

All other sensor except this and few did not strictly follow the communication rules of United States, which often leads to misconception in data interpretation and parsing .That is most of the gps stop working above 60000ft but ADAFRUIT ULMATE BREAKOUT VERSION 3 work normally at this height.

There is lot we can know with this sensor without coding but not very usefull, it directly start streaming data on serial monitor when power is given to module.

What we can find with this module?

TIME,

LATITUTE,

LONGITUDE,

VELOCITY,

DIRECTION,

TRACK ANGLE,

DATE etc .

This module stream data in NMEA(*nema*) sentence format we need to focus only on two NMEA sentence(www.gpsinformation.org) that is GPGGA and GPRMC.

Following are explaination of NMEA sentences.

$GPRMC,160949.000,A,3051.7880,N,100035.8968,W,0.12,1.23,040119, ,, A\*7

1. 160949.000 – TIME (hrs/min/sec)

2. A / V – quality of fix (we r getting usefull data and V for raw data)

3. 3051.7880, N– latitude (not in standard form)in northern hemisphere.

4. 100035.8968, W – longitude in western hemisphere.

6. 0.12- speed in knots.

7. 1.23- track angle.

8. 040119- date.

Studying the NEMA sentences is goofy so there is need of proper knowledge of

format in which GPS module gives the data while parsing.

One major problem comes while using this module is we need to immediately use the data there must be no delay while taking output from it otherwise there is glitch in data and it might show old data or rough data.

CONNECTING THE SD CARD READER

We need to store our data for further mathematics of communication with rover

Pin connection are as usual refers to (https://www.adafruit.com/product/746)

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