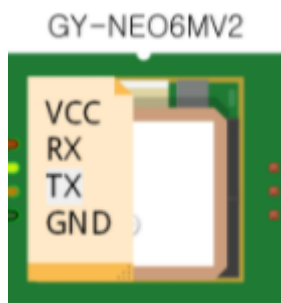


1. GPS 사용 가이드

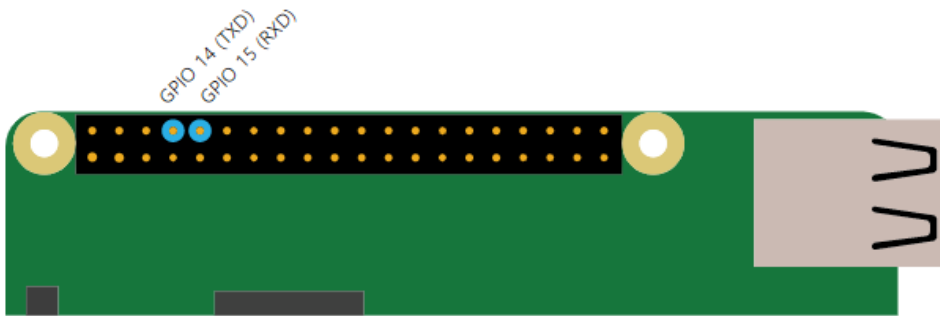
- 사용하는 GPS : NEO-6M



- 라즈베리파이와 UART(시리얼) 통신을 한다.
- UART 통신에서 데이터를 보내는 쪽 : TX, 받는 쪽 : RX
- UART 통신 : <https://shek.tistory.com/41>
- 데이터 통신에 TX만 사용한다.

1. 라즈베리파이에서 UART 통신을 사용하기 위한 핀

- GPIO 14 : TX
- GPIO 15 : RX

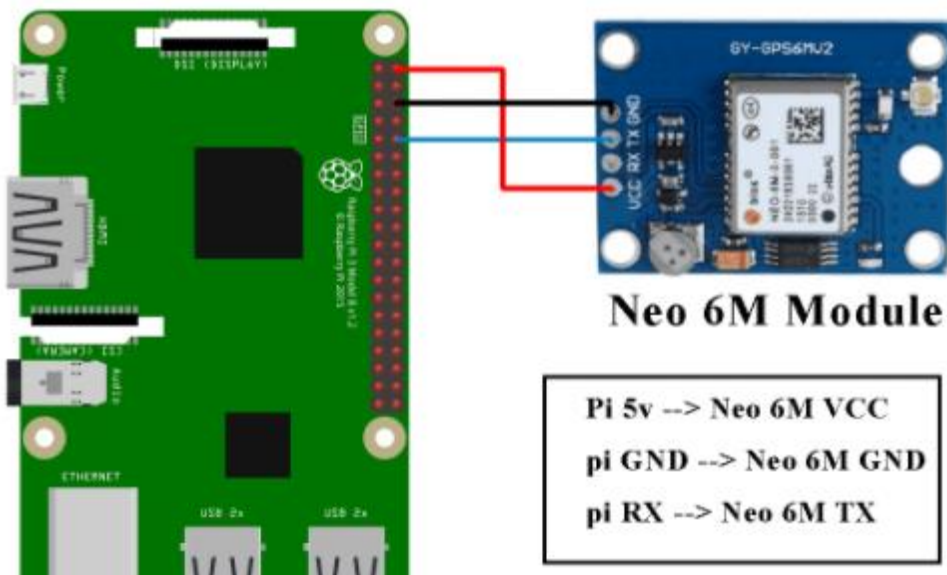


1. UART 통신을 위한 연결

- Neo 6M TX (송신) -----> 라즈베리파이 GPIO 15 (RX 수신)

```
Neo 6M VCC -----> Raspberry pi 5v
Neo 6M GND -----> Raspberry pi GND
Neo 6M RX -----> Raspberry pi TX (gpio 14) //Not required in our case
Neo 6M TX -----> Raspberry pi RX (gpio 15)
```

2. 회로도



- UART 통신을 사용하기 위한 작업
- 라즈베리파이에서 UART 통신을 하기 위해서는 활성화를 시켜야한다.

1. Sudo raspi-config 입력

```
pi@raspberrypi:~ $ sudo raspi-config
```

2. 3번 인터페이스 옵션 선택

| Raspberry Pi Software Configuration Tool (raspi-config) | |
|---|---|
| 1 System Options | Configure system settings |
| 2 Display Options | Configure display settings |
| 3 Interface Options | Configure connections to peripherals |
| 4 Performance Options | Configure performance settings |
| 5 Localisation Options | Configure language and regional settings |
| 6 Advanced Options | Configure advanced settings |
| 8 Update | Update this tool to the latest version |
| 9 About raspi-config | Information about this configuration tool |

3. P6 시리얼 통신 선택

| Raspberry Pi Software Configuration Tool (raspi-config) | |
|---|---|
| P1 Camera | Enable/disable connection to the Raspberry Pi Camera |
| P2 SSH | Enable/disable remote command line access using SSH |
| P3 VNC | Enable/disable graphical remote access using RealVNC |
| P4 SPI | Enable/disable automatic loading of SPI kernel module |
| P5 I2C | Enable/disable automatic loading of I2C kernel module |
| P6 Serial Port | Enable/disable shell messages on the serial connection |
| P7 1-Wire | Enable/disable one-wire interface |
| P8 Remote GPIO | Enable/disable remote access to GPIO pins |

4. 시리얼을 통해 액세스 할 수 있는 로그인 쉘을 요청 : **아니요** 선택

Would you like a login shell to be accessible over serial?

<예> **<아니오>**

5. 하드웨어 직렬 포트 활성화를 요청 : **예** 선택

Would you like the serial port hardware to be enabled?

<예> <아니오>

6. UART 통신 활성화 완료! -> 리부트 해야함

The serial login shell is disabled
The serial interface is enabled

<확인>

- 라즈베리파이 설정하기

```
sudo nano /boot/config.txt
```

```
pi@raspberrypi: ~
GNU nano 3.2 /boot/config.txt M
57 dtparam=audio=on
58
59 [pi4]
60 # Enable DRM VC4 V3D driver on top of the dispmanx display stack
61 dtoverlay=vc4-fkms-v3d
62 max_framebuffers=2
63
64 [all]
65 #dtoverlay=vc4-fkms-v3d
66 enable_uart = 1
67 dtparam=spi = on
68 dtoverlay = pi3-disable-bt
69 core_freq = 250
70 force_turbo = 1
71
```

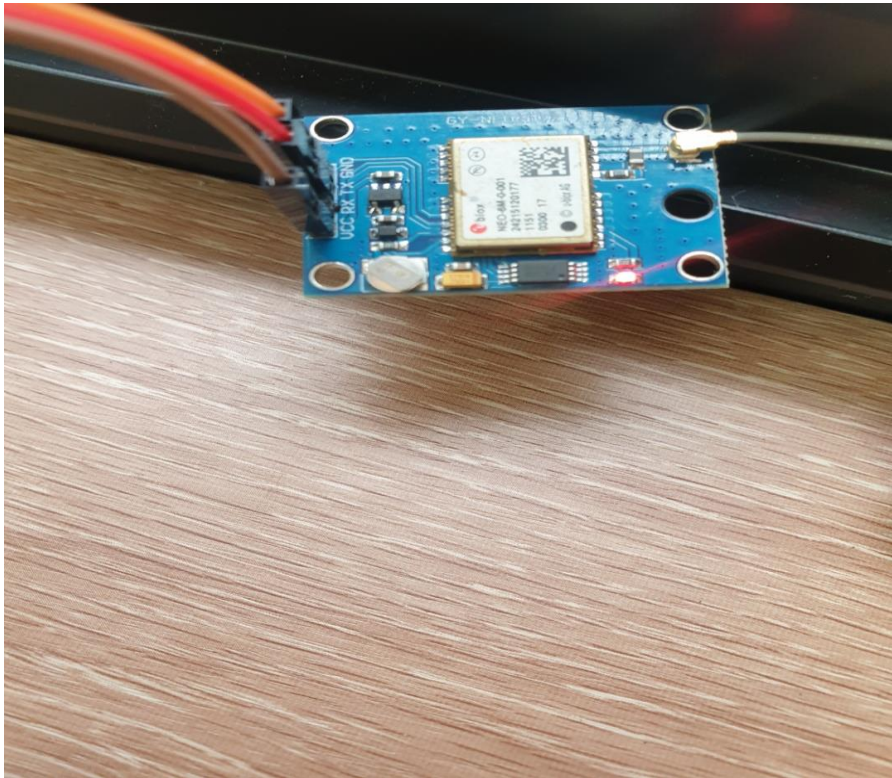
sudo nano /boot/cmdline.txt 입력

```
dwc_otg.lpm_enable=0 console=tty1 root=/dev/mmcblk0p2 rootfstype=ext4
elevator=deadline fsck.repair=yes rootwait quiet splash plymouth.ignore-serial-consoles
```

설정을 바꿔준다.

***** 저장 후 sudo reboot 꼭 하기!

- gps 연결확인



Gps에 불이 들어오기까지 5분 가까이 걸림!

실내에서는 사용하지 못하고 5분이 넘어서도 불이 안켜진다면 밖으로 나가면 켜짐!

- 라즈베리파이 포트 확인 및 콘솔 로그인 비활성화

```
ls -l /dev
```

| | | | | | | | | | | |
|------------|---|------|------|---|----|----|-------|---------|----|---------|
| lrwxrwxrwx | 1 | root | root | 5 | 6월 | 23 | 17:32 | serial0 | -> | ttyS0 |
| lrwxrwxrwx | 1 | root | root | 7 | 6월 | 23 | 17:32 | serial1 | -> | ttyAMA0 |

명령어를 입력하고 serial0 과 serial1의 연결 상태를 확인한다.

ttyS0 와 ttyAMA0의 위치가 다를 수 있음!

- serial0 -> ttyS0 일 때

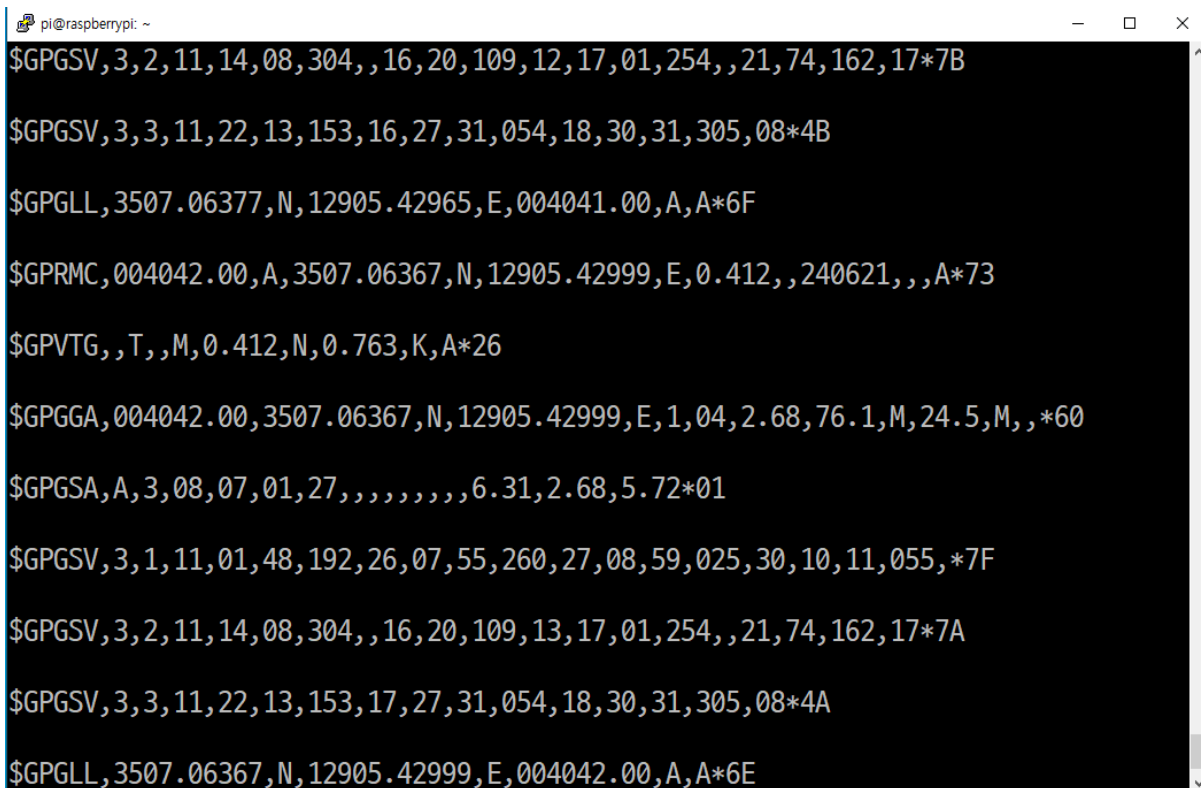
```
sudo systemctl stop serial-getty@ttyS0.service
sudo systemctl disable serial-getty@ttyS0.service
```

- serial0 -> ttyAMA0 일 때

```
sudo systemctl stop serial-getty@ttyAMA0.service
sudo systemctl disable serial-getty@ttyAMA0.service
```

- GPS 실행 / serial0 이 ttyAMA0 이면 /dev/ttyAMA0

```
sudo cat /dev/ttyS0
```



A screenshot of a terminal window on a Raspberry Pi. The window title is 'pi@raspberrypi: ~'. The terminal displays the output of the command 'sudo cat /dev/ttyS0', which shows a series of NMEA sentences from a GPS device. The sentences include status, location, speed, and other data. The window has standard Linux window controls (minimize, maximize, close) in the top right corner.

```
$GPGSV,3,2,11,14,08,304,,16,20,109,12,17,01,254,,21,74,162,17*7B
$GPGSV,3,3,11,22,13,153,16,27,31,054,18,30,31,305,08*4B
$GPGLL,3507.06377,N,12905.42965,E,004041.00,A,A*6F
$GPRMC,004042.00,A,3507.06367,N,12905.42999,E,0.412,,240621,,A*73
$GPVTG,,T,,M,0.412,N,0.763,K,A*26
$GPGGA,004042.00,3507.06367,N,12905.42999,E,1,04,2.68,76.1,M,24.5,M,,*60
$GPGSA,A,3,08,07,01,27,,,,,,,,,6.31,2.68,5.72*01
$GPGSV,3,1,11,01,48,192,26,07,55,260,27,08,59,025,30,10,11,055,*7F
$GPGSV,3,2,11,14,08,304,,16,20,109,13,17,01,254,,21,74,162,17*7A
$GPGSV,3,3,11,22,13,153,17,27,31,054,18,30,31,305,08*4A
$GPGLL,3507.06367,N,12905.42999,E,004042.00,A,A*6E
```

GPS 출력은 NMEA 형식으로 넘어오는데

<https://m.blog.naver.com/PostView.naver?isHttpsRedirect=true&blogId=sanainfo&logNo=70190140877>

이 중에 우리는 \$GPRMC 를 쓴다!

- 파이썬 코드 : 데이터 처리

```
1 import serial
2 import time
3 import string
4 import pynmea2
5
6 while True:
7     port = "/dev/ttyS0"
8     ser = serial.Serial(port, baudrate=9600, timeout=0.5)
9     dataout = pynmea2.NMEAStreamReader()
10    newdata = ser.readline()
11    print(newdata)
12
13    newdata_u = newdata.decode('utf-8')
14    print(newdata_u)
15
16    if newdata_u[0:6] == "$GPRMC":
17        new_gps = pynmea2.parse(newdata_u)
18        lat = new_gps.latitude
19        lon = new_gps.longitude
20        gps = "Latitude = " + str(lat) + " Longitude = " + str(lon)
21        print(gps)
22
```

- 출력 확인

```
b'$GPRMC,004228.00,A,3507.07221,N,12905.43329,E,1.118,,240621,,,A*71\r\n'
$GPRMC,004228.00,A,3507.07221,N,12905.43329,E,1.118,,240621,,,A*71

Latitude = 35.11787016666667 Longitude = 129.09055483333333
```

```
Latitude = 35.1177465 Longitude = 129.09069933333333
Latitude = 35.1177245 Longitude = 129.09069233333332
Latitude = 35.117732333333336 Longitude = 129.09069383333335
Latitude = 35.117728 Longitude = 129.09071366666666
Latitude = 35.11774316666666 Longitude = 129.0906725
Latitude = 35.11777883333333 Longitude = 129.09065583333333
Latitude = 35.11779583333333 Longitude = 129.09064316666667
Latitude = 35.117819 Longitude = 129.09063566666666
Latitude = 35.117827 Longitude = 129.09062633333335
Latitude = 35.117848 Longitude = 129.09062133333333
Latitude = 35.117869 Longitude = 129.09061366666666
```


- 위도 / 경도로 검색 결과

