The NMEA sentences that come from your GPS sensor have other data in addition to location. Investigate the additional data, and use it in your IoT device.

For example - can you get the current date and time? If you are using a microcontroller, can you set the clock using GPS data in the same way you set it using NTP signals in the previous project? Can you get elevation (your height above sea level), or your current speed?

If you are using a virtual IoT device, then you can get some of this data by sending NMEA sentences generated using tools nmeagen.org.

Answer

- For this assignment, I use website nmeagen.org to do

1. Tools and data used

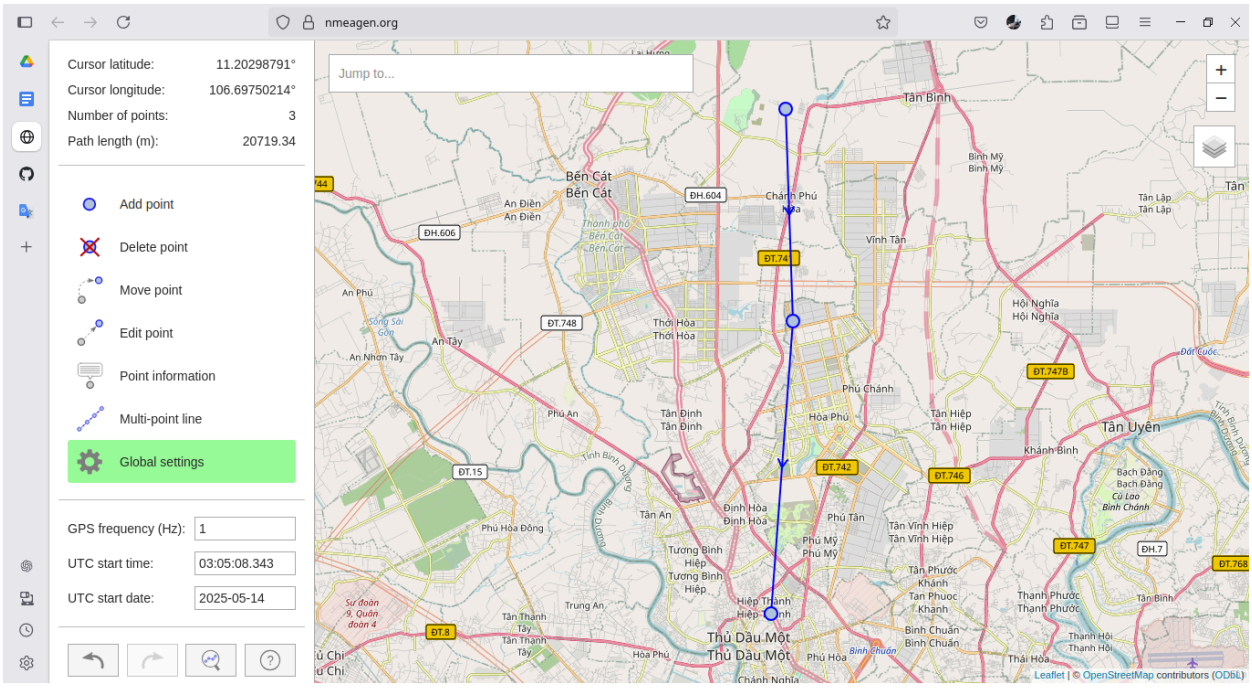
- GPS simulator website: https://nmeagen.org

- Data format: NMEA 0183

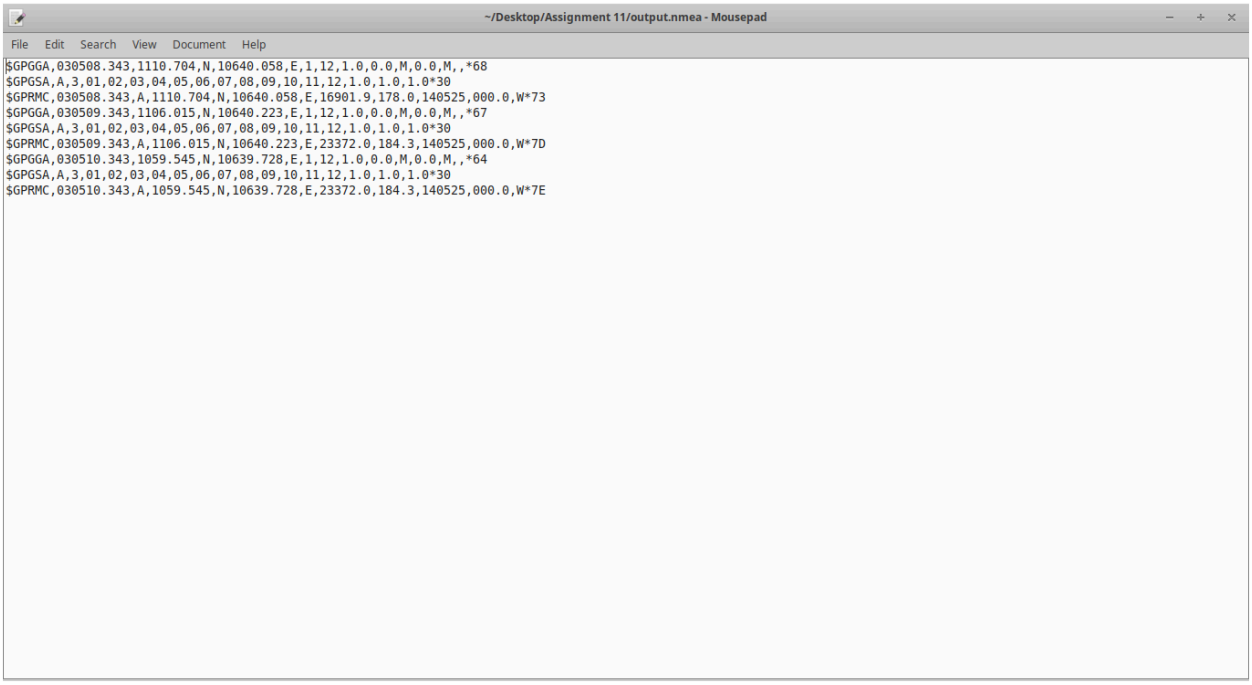
- NMEA commands used: $GPGGA, $GPGSA, $GPRMC

2. Information and data collection process

- First, we will generate the location and direction files from the nmeagen.org website.



- Then download and we get the output.nmea file containing information about location and coordinates.



3. NMEA Data Analysis

- We have the following data:

```
$GPGGA,030508.343,1110.704,N,10640.058,E,1,12,1.0,0.0,M,0.0,M,,*68
$GPGSA,A,3,01,02,03,04,05,06,07,08,09,10,11,12,1.0,1.0,1.0*30
$GPRMC,030508.343,A,1110.704,N,10640.058,E,16901.9,178.0,140525,000.0,W*73
$GPGGA,030509.343,1106.015,N,10640.223,E,1,12,1.0,0.0,M,0.0,M,,*67
$GPGSA,A,3,01,02,03,04,05,06,07,08,09,10,11,12,1.0,1.0,1.0*30
$GPRMC,030509.343,A,1106.015,N,10640.223,E,23372.0,184.3,140525,000.0,W*7D
$GPGGA,030510.343,1059.545,N,10639.728,E,1,12,1.0,0.0,M,0.0,M,,*64
$GPGSA,A,3,01,02,03,04,05,06,07,08,09,10,11,12,1.0,1.0,1.0*30
$GPRMC,030510.343,A,1059.545,N,10639.728,E,23372.0,184.3,140525,000.0,W*7E
```

Analyzing each key data point from the $GPRMC sentence:

- Time: 03:05:08, Latitude: 11°10.704'N, Longitude: 106°40.058'E, Speed: 16901.9 knots ≈ 31.304 km/h, Bearing: 178.0°
- Time: 03:05:09, Latitude: 11°06.015'N, Longitude: 106°40.223'E, Speed: 23372.0 knots ≈ 43.285 km/h, Bearing: 184.3°

- Time: 03:05:10, Latitude: 10°59.545'N, Longitude: 106°39.728'E, Speed: 23372.0 knots ≈ 43,285 km/h, Direction: 184.3°

4. Conclusion

- The simulation data shows continuous changes in position, velocity, and direction.
- The $GPRMC data is useful for extracting real-world position and movement information.
- The simulated velocity is abnormally high due to the simulation accelerating.
- This information can be used to display position, calculate distance, or monitor the trip.