

Part 1: Introduction

Building a GPS receiver from scratch

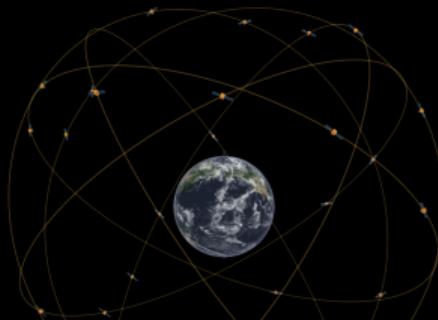
Chris Doble

January 18, 2022

GPS

Global Positioning System is, without a doubt, one of the most useful inventions of the late 20th century. It made it significantly easier for ships, airplanes, cars, and hikers to figure out where they are with high degree of accuracy.

One of the most exciting aspects of this system are the satellites surrounding Earth. Here's a current constellation of active satellites, you can drag the view around to see it from different angles:

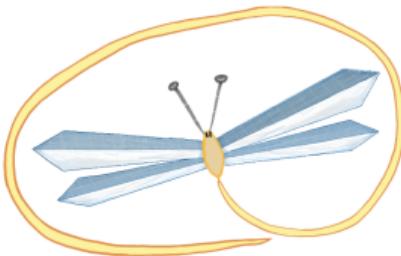


<https://ciechanowski.gps/>

Building a GPS Receiver, Part 1: Hearing Whispers

15 Apr, 2024

Reading time: 11 minutes



Gypsum

A software-defined GPS receiver

In this 4-part series I build [gypsum](#), a from-scratch GPS receiver.

[↳ Part 1: Hearing Whispers](#)

[↳ Part 2: Tracking Pinpricks](#)

[↳ Part 3: Juggling Signals](#)

[↳ Part 4: Measuring Twice](#)

[gypsum's web dashboard](#)

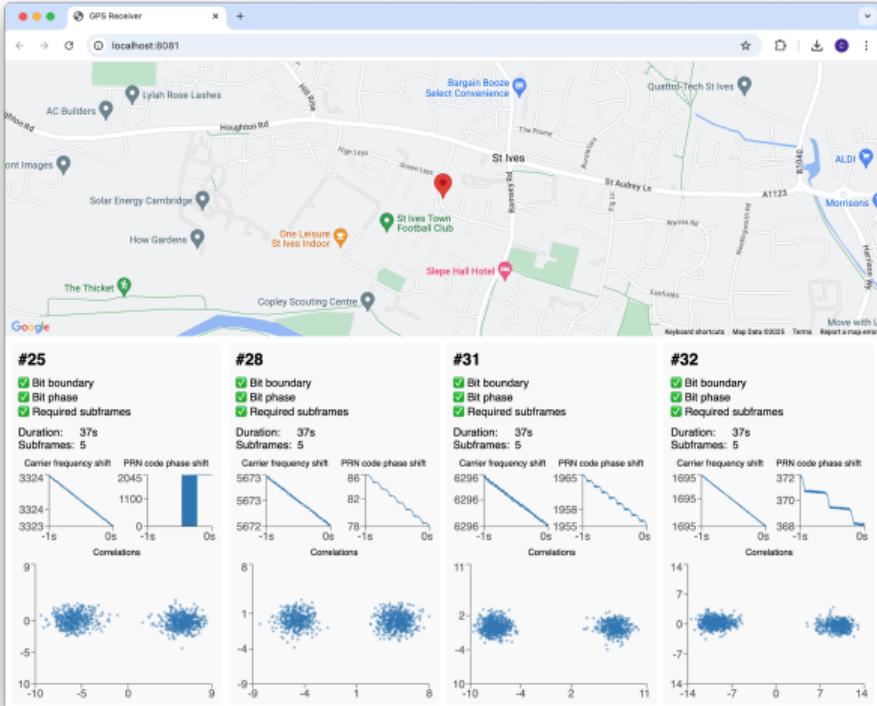
<https://axleos.com/building-a-gps-receiver-part-1-hearing-whispers/>



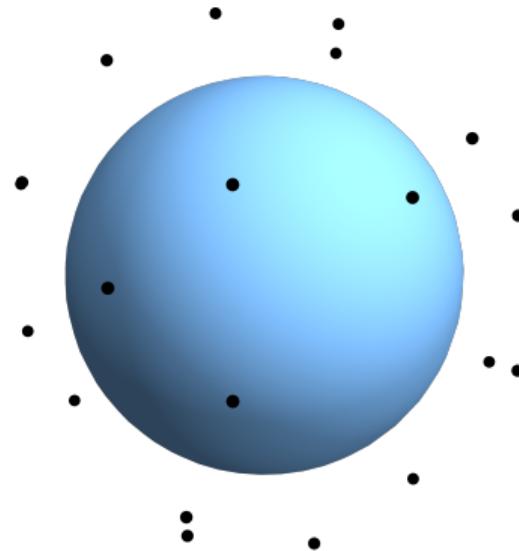
GPS receiver



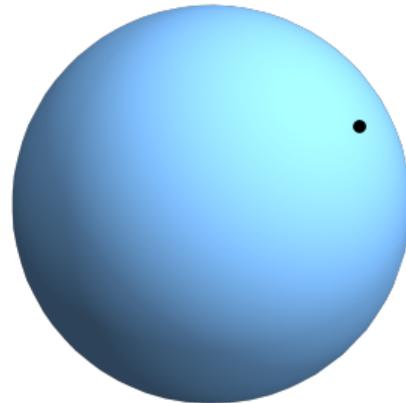
Dashboard



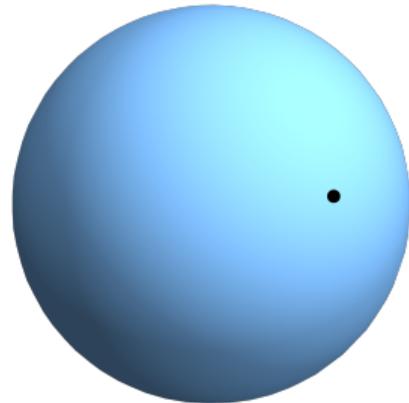
Overview of GPS



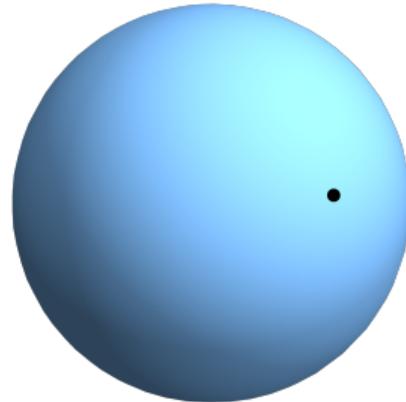
Overview of GPS



Overview of GPS

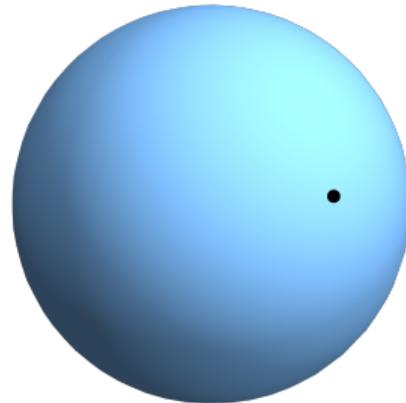


Overview of GPS



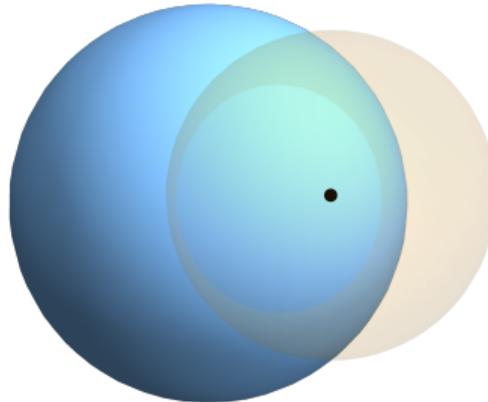
$$T = t_{\text{received}} - t_{\text{transmitted}}$$

Overview of GPS



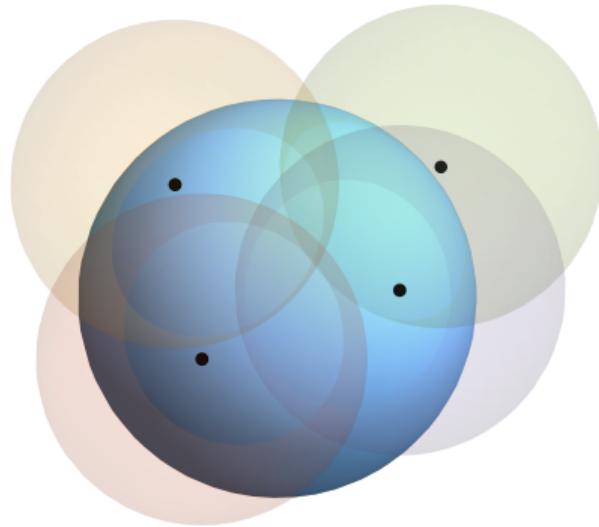
$$T = t_{\text{received}} - t_{\text{transmitted}}$$
$$d = cT$$

Overview of GPS



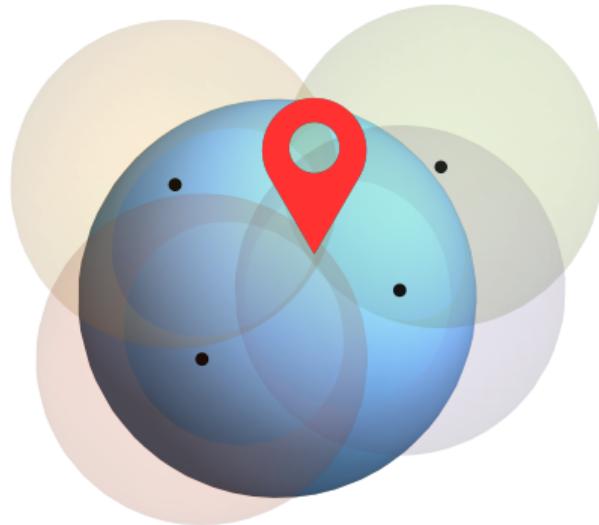
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Overview of GPS



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Overview of series

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- Theory

Overview of series

- Theory
- Correlation

Overview of series

- Theory
 - ② Correlation
 - ③ GPS signals

Overview of series

- Theory
 - ② Correlation
 - ③ GPS signals
- Stages

Overview of series

- Theory
 - ② Correlation
 - ③ GPS signals
- Stages
 - ④ Sampling

Overview of series

- Theory
 - ② Correlation
 - ③ GPS signals
- Stages
 - ④ Sampling
 - ⑤ Acquisition

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- Stages
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 - ⑥ Tracking

Overview of series

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- Stages
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 - ⑤ Acquisition
 - ⑥ Tracking
 - ⑦ Decoding

Overview of series

- Theory
 - ② Correlation
 - ③ GPS signals
- Stages
 - ④ Sampling
 - ⑤ Acquisition
 - ⑥ Tracking
 - ⑦ Decoding
 - ⑧ Solving