Ground Vehicle Navigation

INTO 2019

JUSSI COLLIN – NORDIC INERTIAL

29 NOVEMBER 2019

NORDIC INERTIAL

Definitions

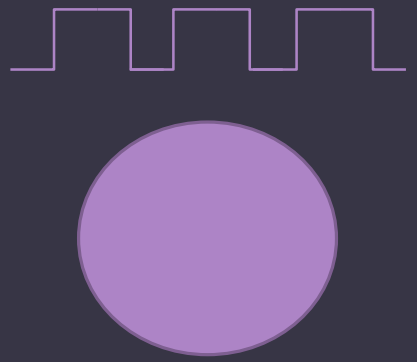
Navigation

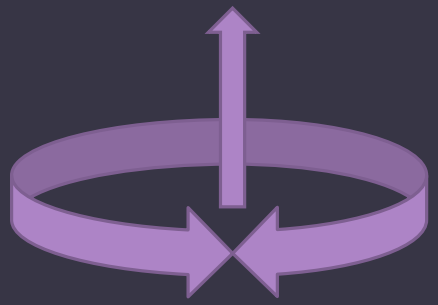
- Determining position and velocity
- Planning and maintenance of a course from A to B
  - Avoid traffic

Ground Vehicle

- Vehicles that are supported by the ground
  - Not water or air
  - Typically at least two contact points
  - Tracked / wheeled

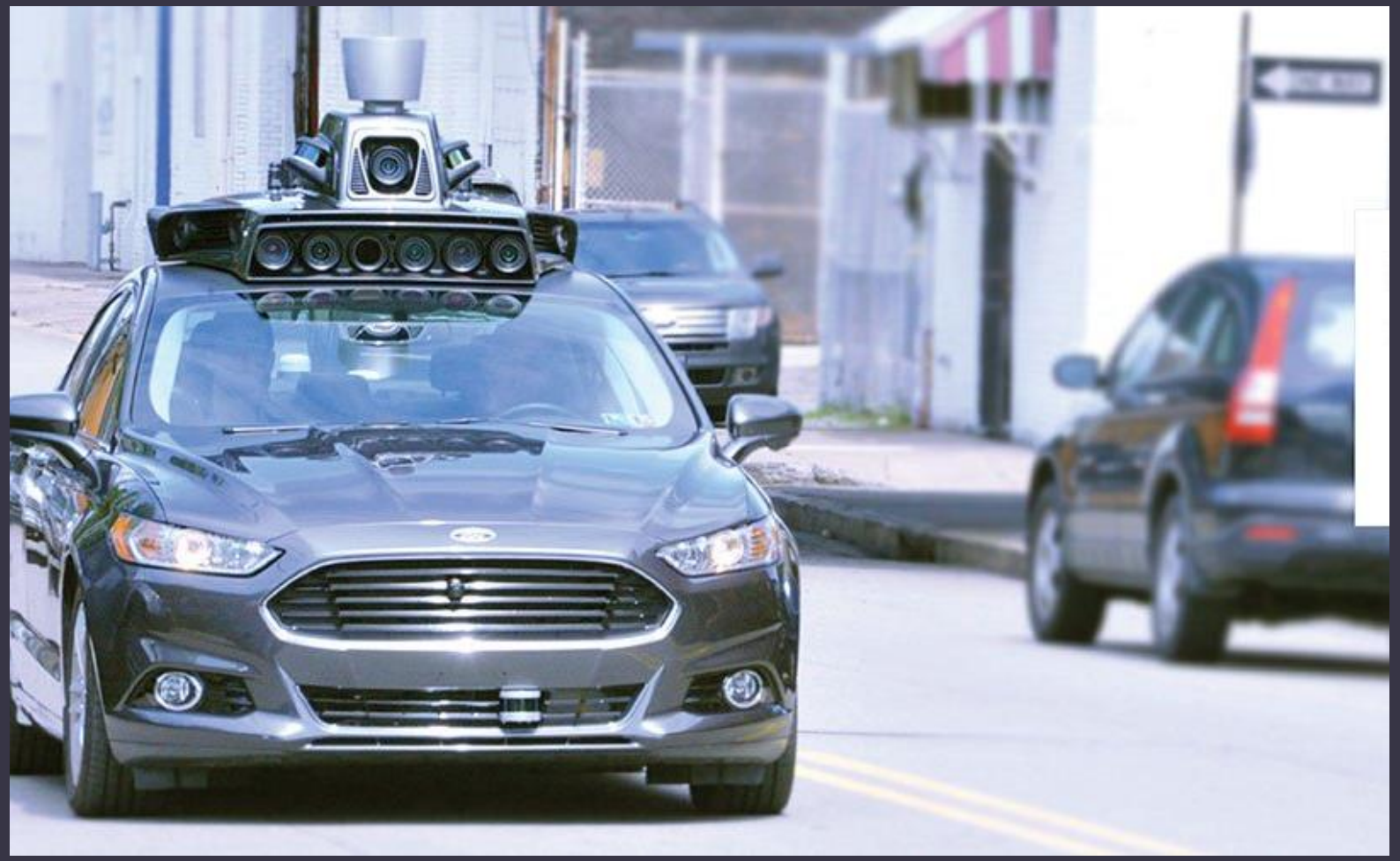
Position and Velocity I – Built In





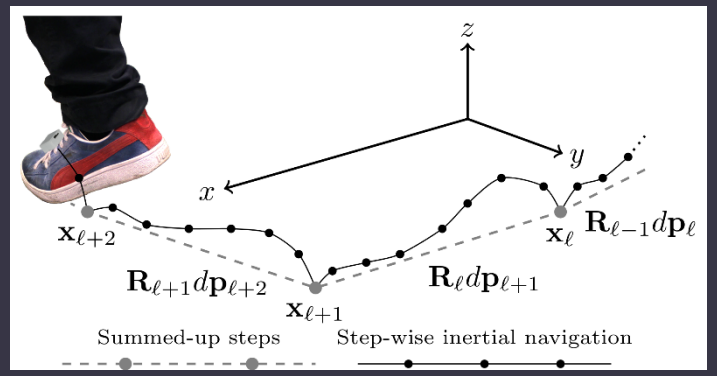
GNSS

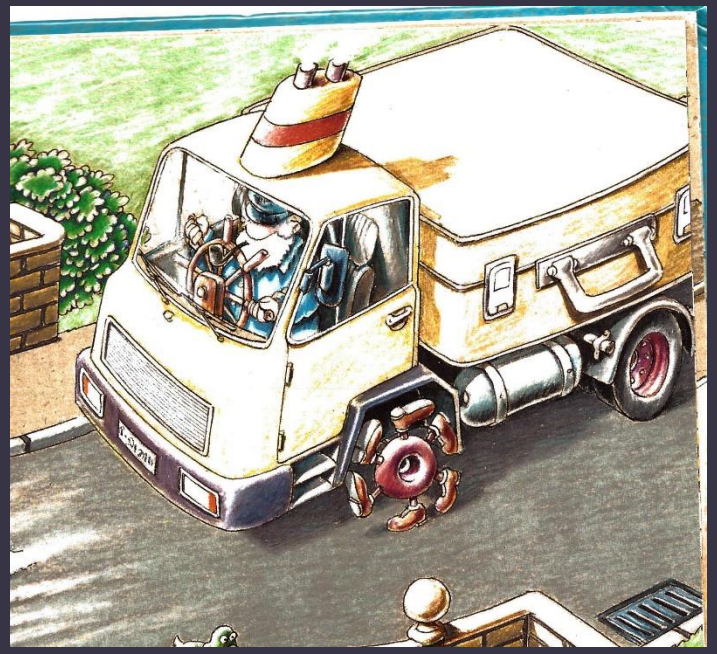
Position and Velocity II – On Top



Position and Velocity III – Wheel Mounted

Wheel-Mounted INS





- Gyroscopes are self-calibrated by wheel rotation
- Wheel contact point gives the speed to the filter
- Completely independent of vehicle – INS of its kind

History

2013

First “soldered on-the-knee” unit

2015

First wireless unit with charging capability

2017

The “horse-shoe” design for 2-wheel vehicles

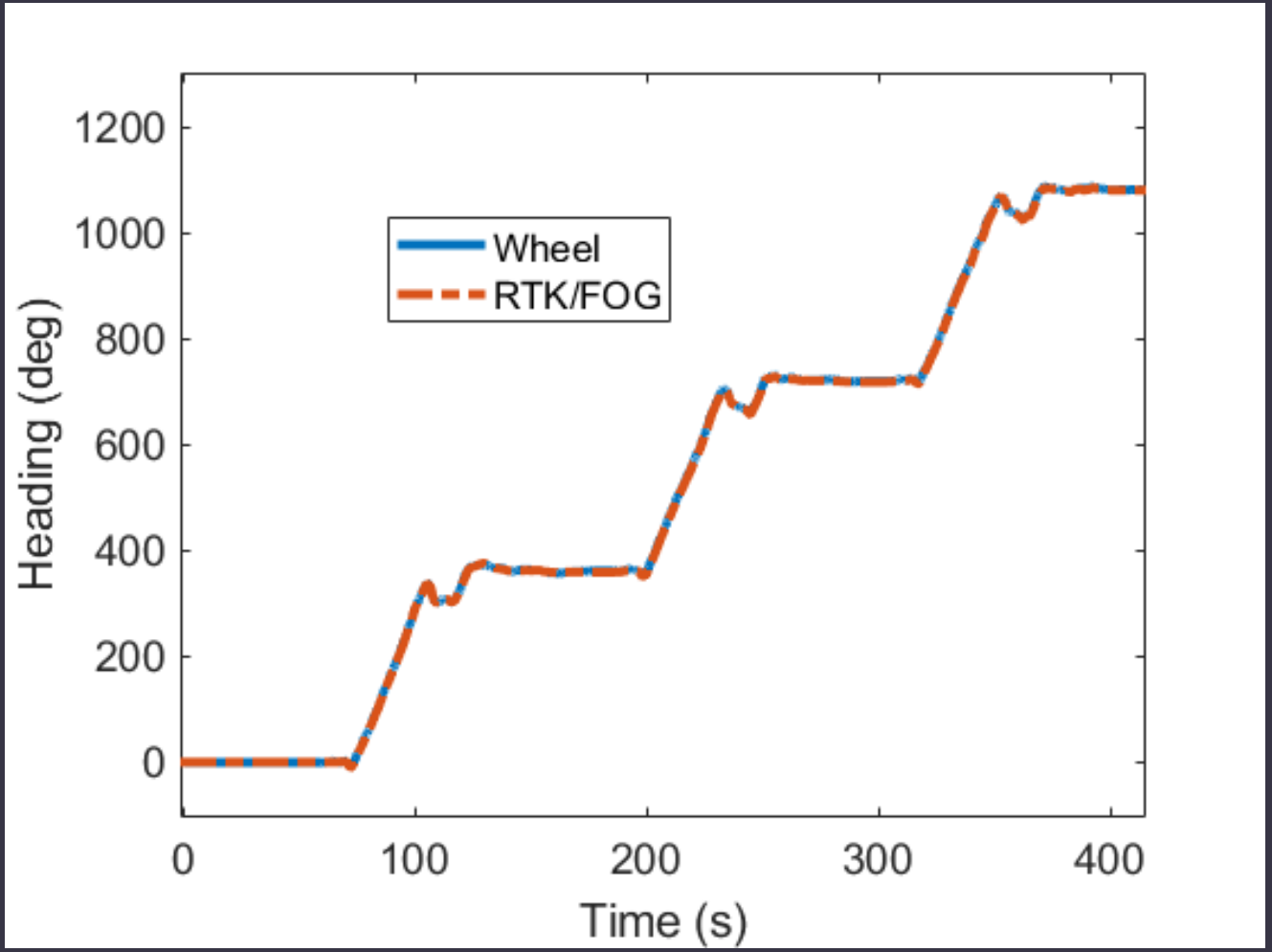
2019

Real-time operating unit, BT connectivity, hi-rate data logging to embedded SD card

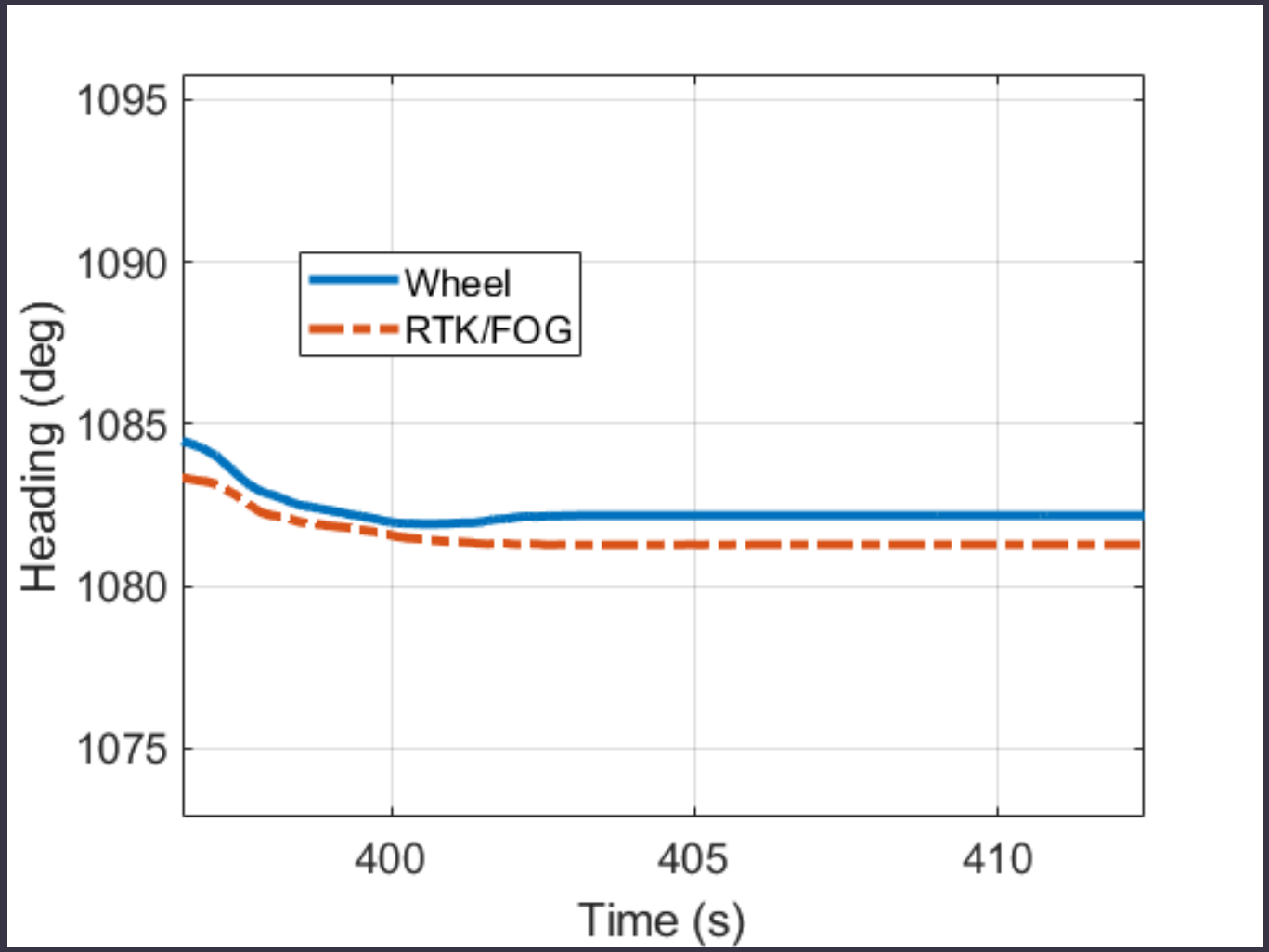
2020

Rugged, 1 month battery

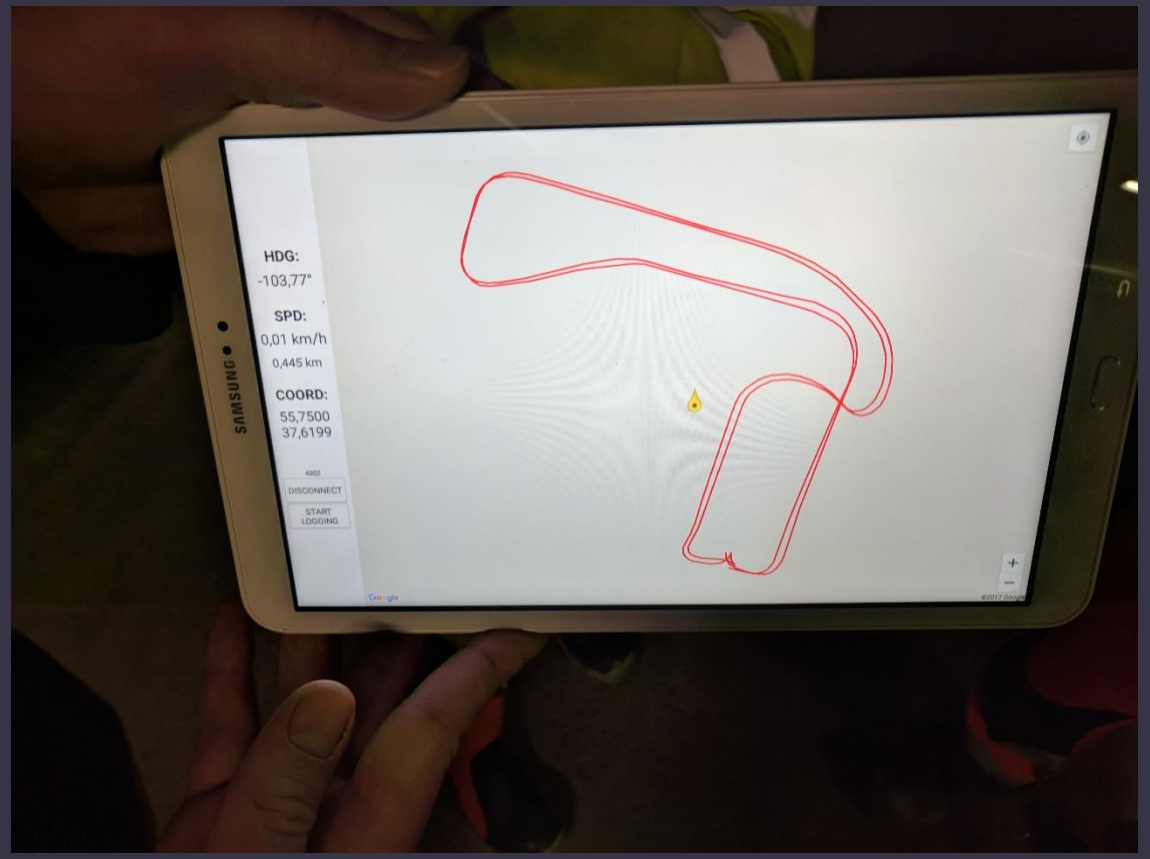
Performance

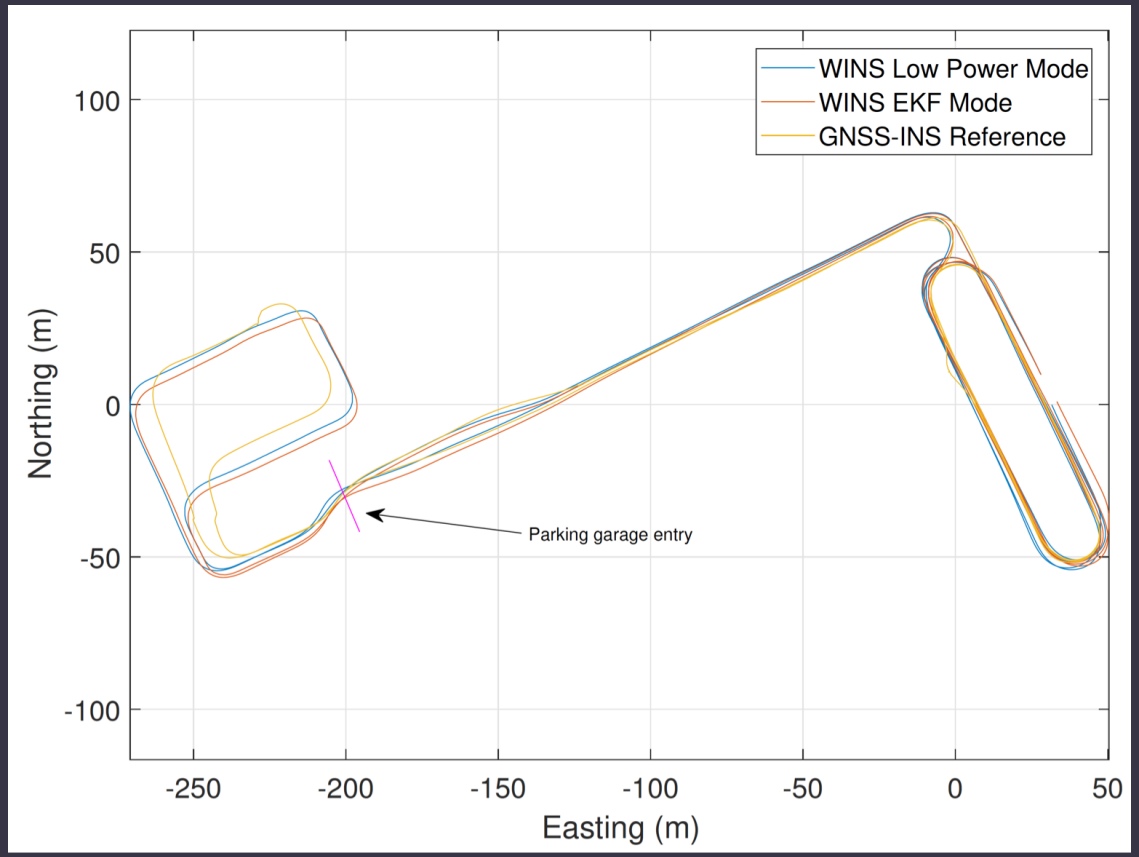


Performance



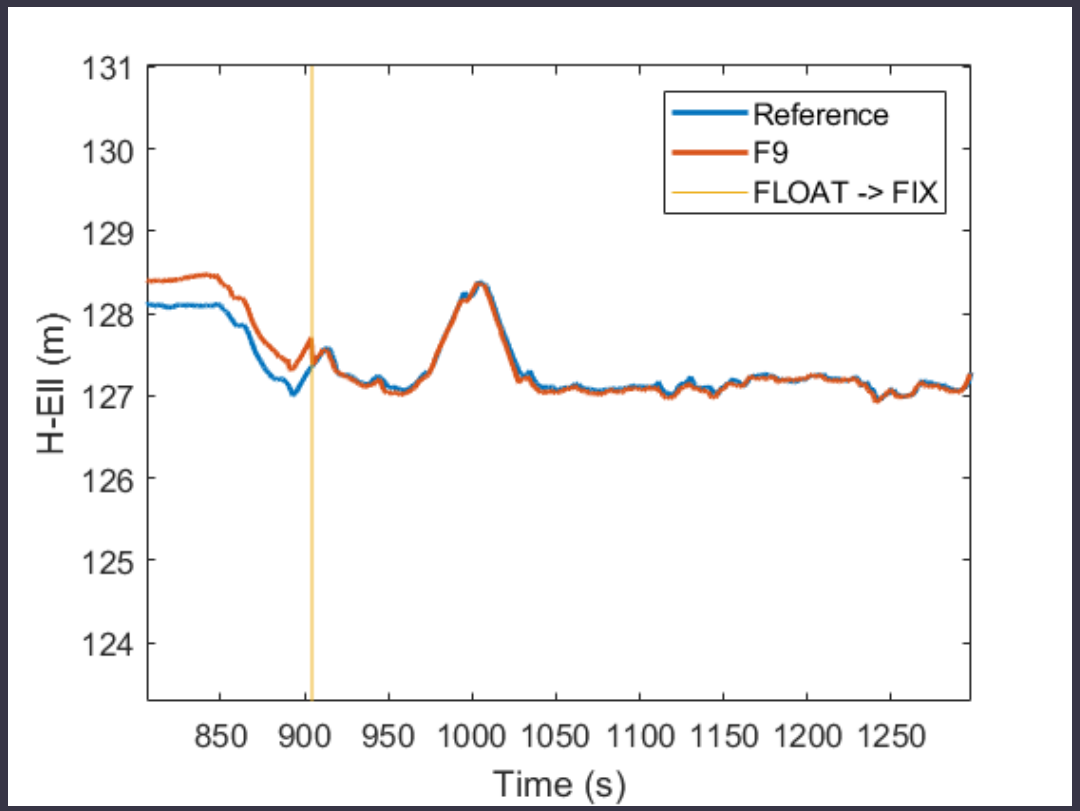
Performance





Compares to standalone GPS for 15-30 minutes

GNSS Integration – u-blox F9P

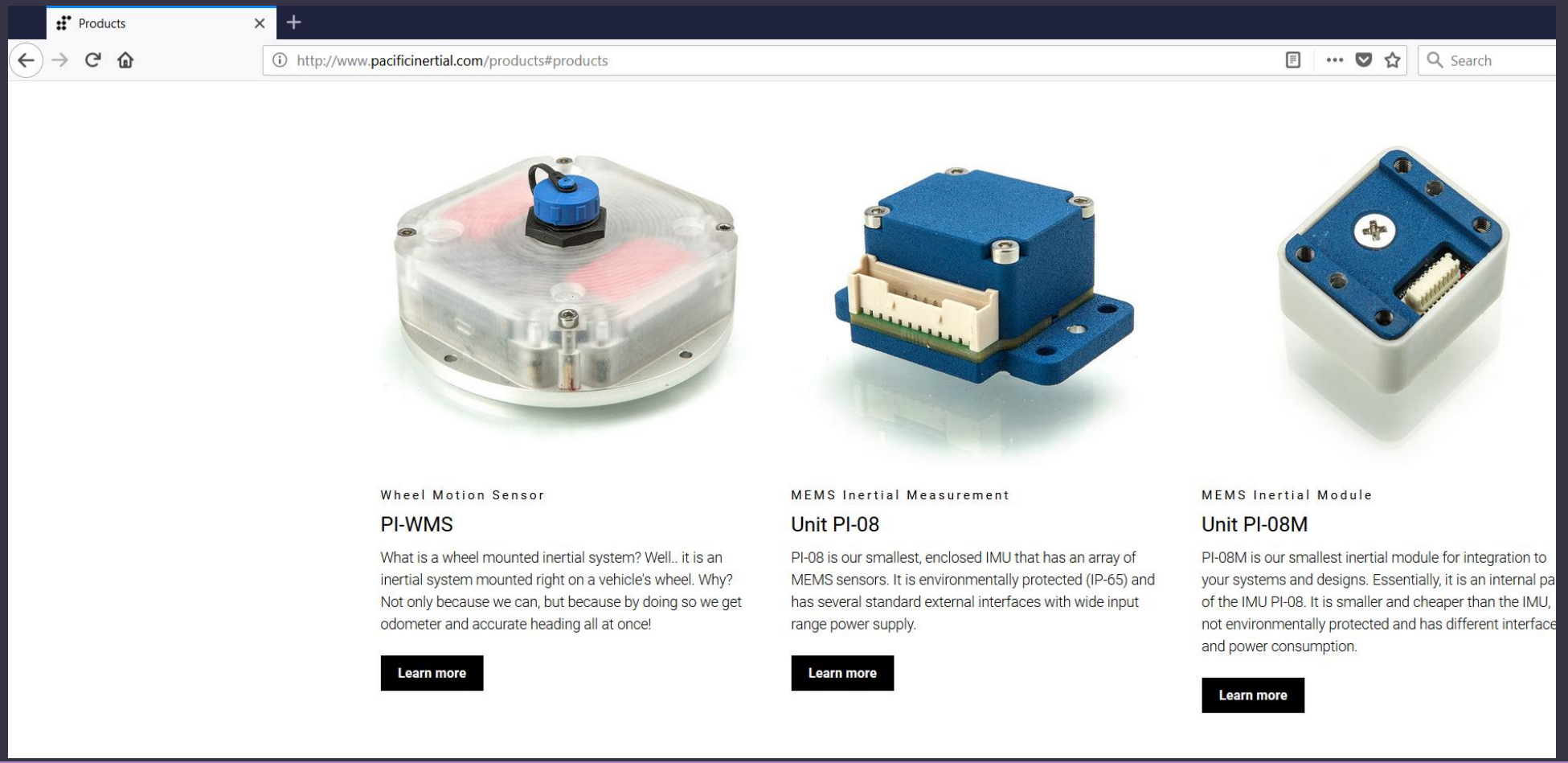


- Fast convergence
- 2-5 cm in Fixed mode
- Low-cost

GNSS Integration – Inertial Explorer

Devices available – Easy to try!

1 day battery, 1 month battery coming soon



Videos & Questions

YouTube Links

https://www.youtube.com/watch?v=TPZxIgu3wyw Wheel Inertial

https://www.youtube.com/watch?v=npOar7MrRDM 3D map-matching

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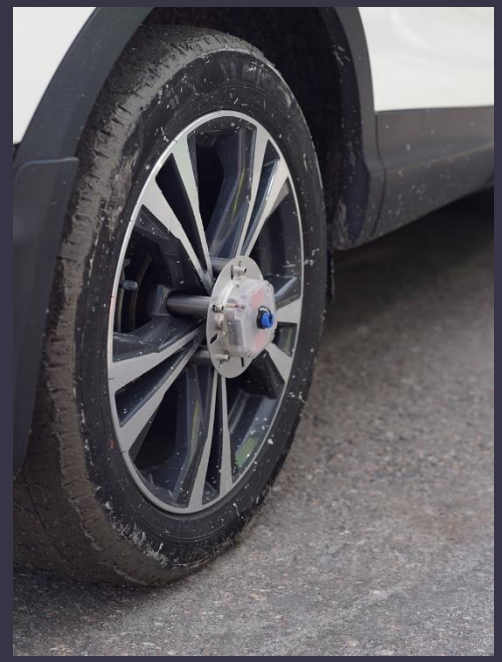

Image sources:
2 https://en.wikipedia.org/wiki/Traffic_congestion#/media/File:Moscow_traffic_congestion.JPG
3 https://www.amazon.com/ Car Antenna Shark
https://en.wikipedia.org/wiki/Anti-lock_braking_system#/media/File:ABS_Sensor_GM_IMG_0557.JPG
www.pacificinertial.com
https://www.u-blox.com/en
4 uber test car
6 openshoe.org
Butschkow, Ralf, Da stimmt doch was nicht, Baumhaus Verlag GmbH, 2011
12 Google Earth
Others JC Inertial Oy (Nordic Inertial)