Training and Outreach with Galileo App Competition for Smartphones

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Background

- With the release of Android 7 (Nougat) in 2016, Google made **GNSS raw measurements** available to smartphone users
- Access to a range of **advanced GNSS processing techniques** that had previously been restricted to more professional GNSS receivers
- Raw measurements produced by the phone's GNSS chip allow users to calculate **pseudoranges** (the distance between the user's receiver and the satellite) and **position, velocity and time** (PVT) using Android devices
- Allow the development of applications to compute position fixes based on **specific satellites** as configured by the application developer
- ESA launched **Galileo App Competition** in 2017 and 2018 to develop such applications on Android smartphones

Objectives

- Design a smartphone app to:
  - allow user to select the constellations used for navigation
    (**mandatory:** Galileo-only, GPS-only, Galileo + GPS; **optional:** GLONASS and BeiDou)
  - allow the user to compute **single** and **dual frequency positioning solutions** and assess the performance using various constellation combinations
  - provide direct and **real-time visualisation** on an open source world-wide map of the computed positions
  - allow user to log their positions and the raw measurements used for computation
  - demonstrate the quality of the position in the most modern and visual way

- Competition open to:
  - Young graduate/national trainees within ESA as pilot project for the 2017 Edition
  - Extended to all students in universities and trainees at R&D organisations located in Europe for the 2018 Edition

- Team Composition:
  - 3 - 5 people
  - Diversity within the team considered an asset
  - Cooperation across different sites/countries are encouraged

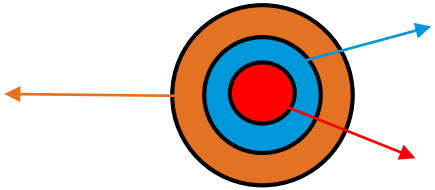
1st Galileo App Competition

- Launch of ESA internal competition: *17 October 2017*

- Objectives of the competition

Form teams
(3 to 5 persons)

ESA YGTs, Trainees,
Internal Research Fellows



Design an Android application that processes GNSS raw measurements

Galileo only, GPS only and Galileo+GPS PVT functionalities

- Prize: ESA/JRC International Summerschool on GNSS 2018 in Austria

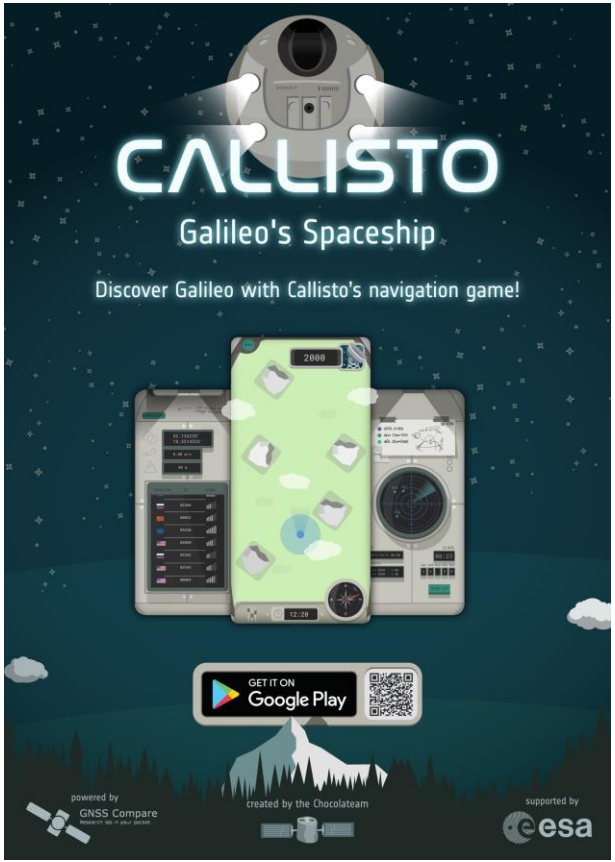
- Three teams in the final:

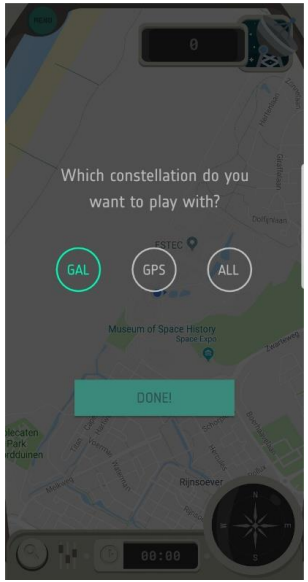
Chocolateam

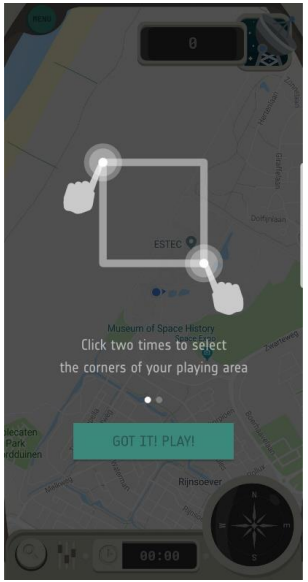
Team 5G

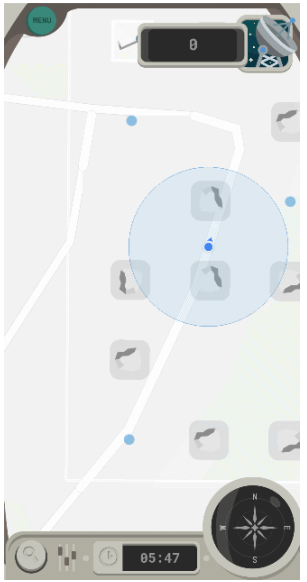
The Galfins

Callisto by Chocolateam

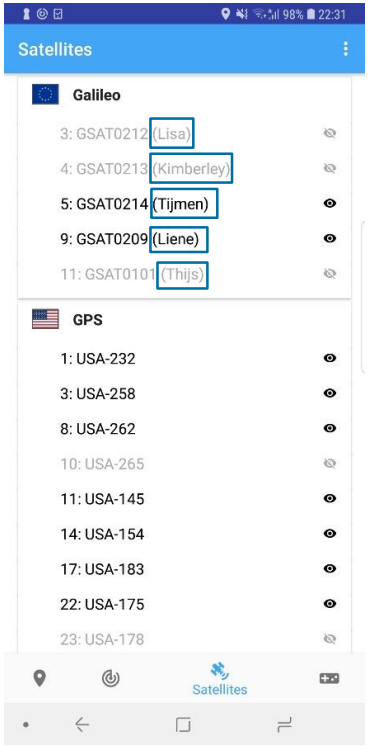






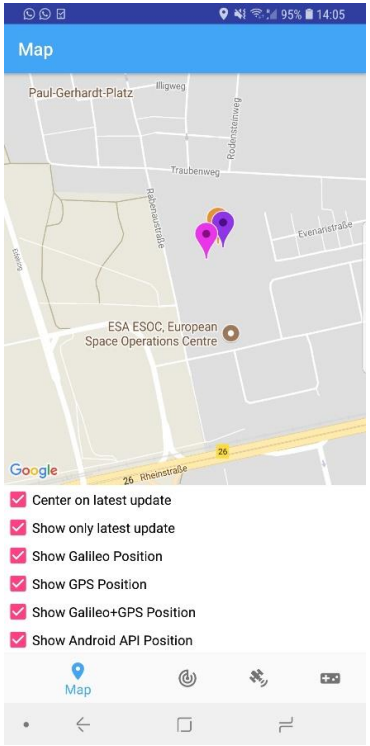


Galocator by Team 5G



Display of the Galileo satellites names

Display of the GPS satellites names

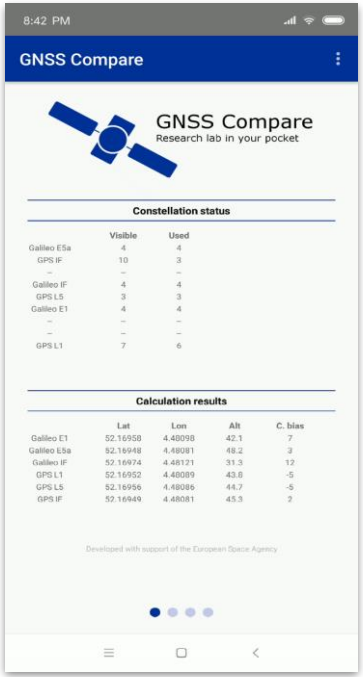


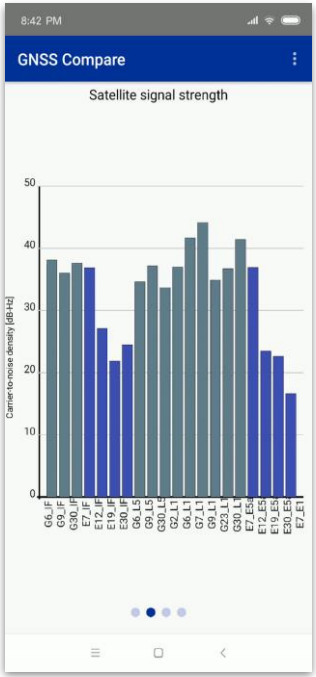
Navigation algorithms coded from scratch

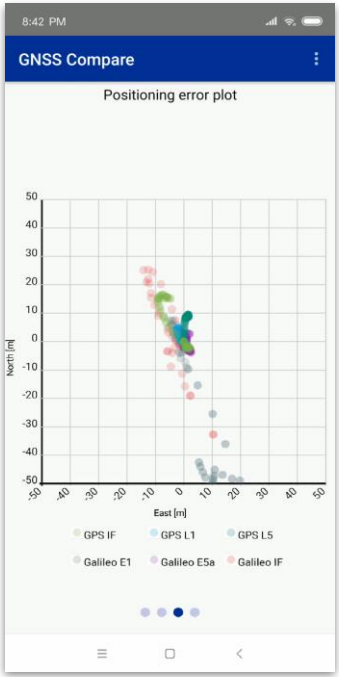
Galocator

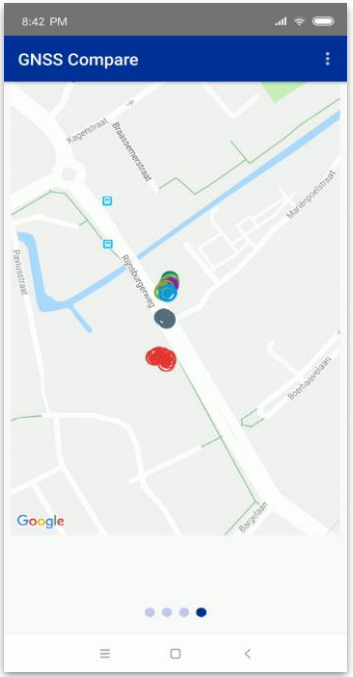
Mind the G_App

GNSS Compare by The Galfins









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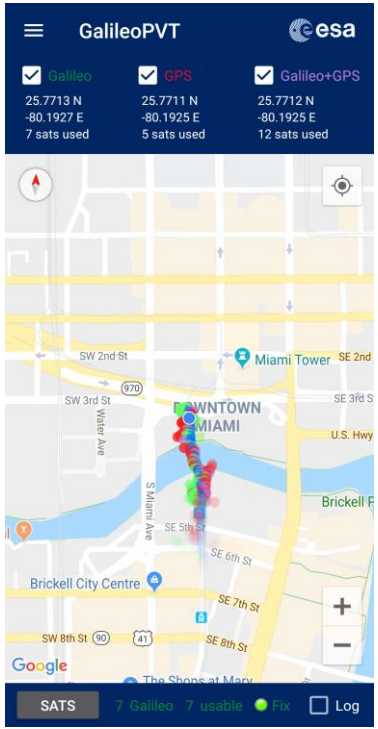
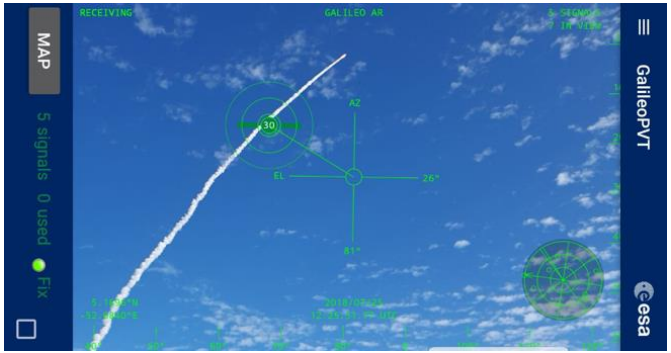
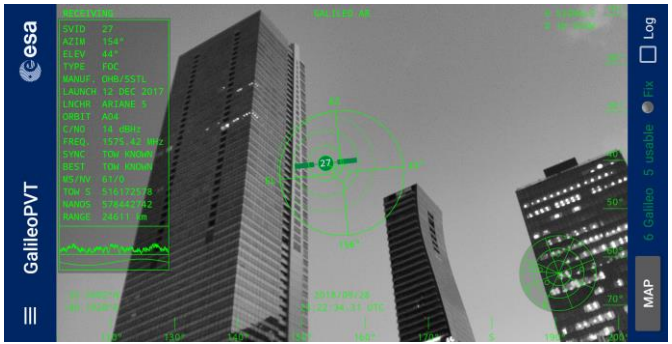
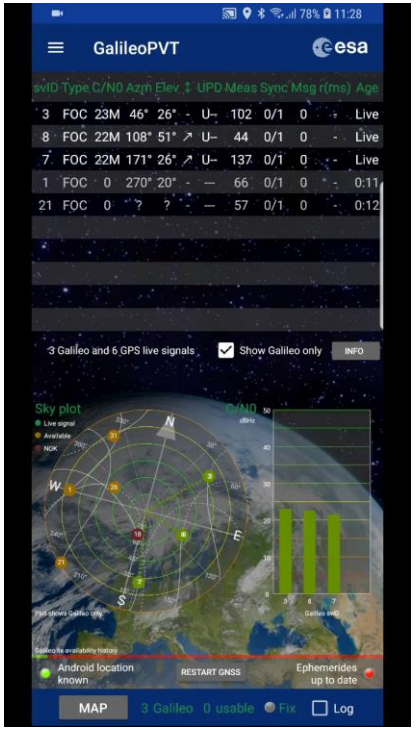
Winner of Galileo App Competition!

GalileoPVT by ESA Technical Advisory Team

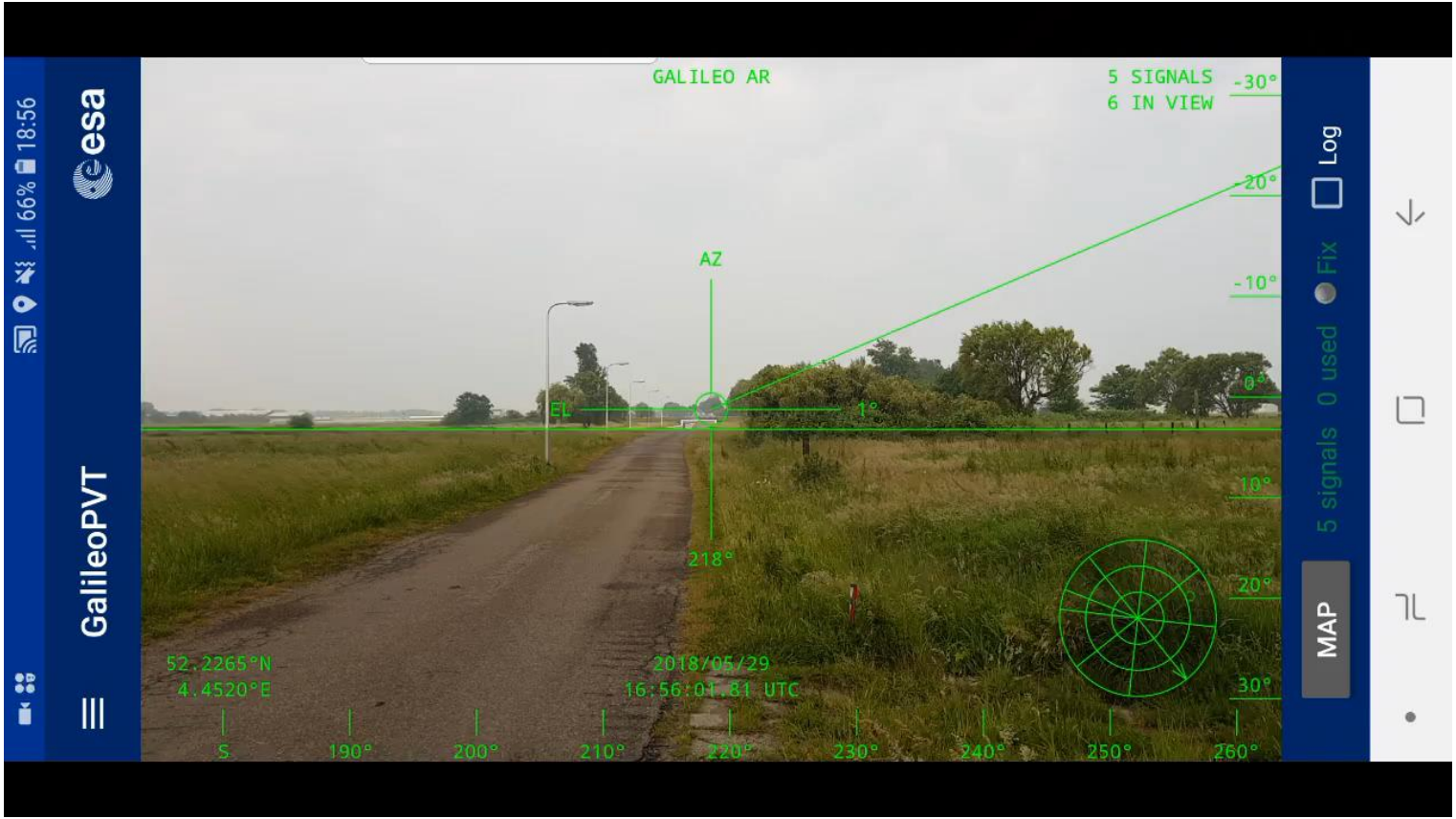


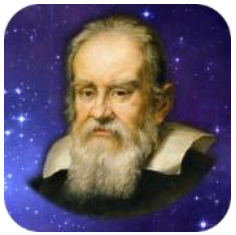






GalileoPVT - Augmented Reality View





GalileoPVT

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Conclusion

- App development competition is a good tool for **dissemination and capacity building**
- 1st edition **internal to ESA** was a success with 3 apps already on Google Play
  - Boosted motivation for young professionals and trainees within ESA
  - Offered valuable learning experience on GNSS and Android development with exposure to full product development lifecycle

GET IT ON Google Play

- 2nd edition **extended to European region** open to all students in universities and trainees at R&D organisations
  - Final award ceremony on 18 April 2019 at ESA site in Netherlands with live web streaming and on-line voting
- Future extension to other regions **worldwide** with other Service Providers could be considered

Tune in for the final award ceremony and cast your vote on 18 April 2019

http://www.esa.int/GalileoAppCompetition

European Space Agency

European Global Navigation Satellite Systems Agency

European Commission

Google