



INSTITUTE OF
SPACE TECHNOLOGY & **SPACE APPLICATIONS**

der Bundeswehr
Universität  **München**

Ghosthunter – Telematics System against Wrong Lane Drivers with the help of GNSS

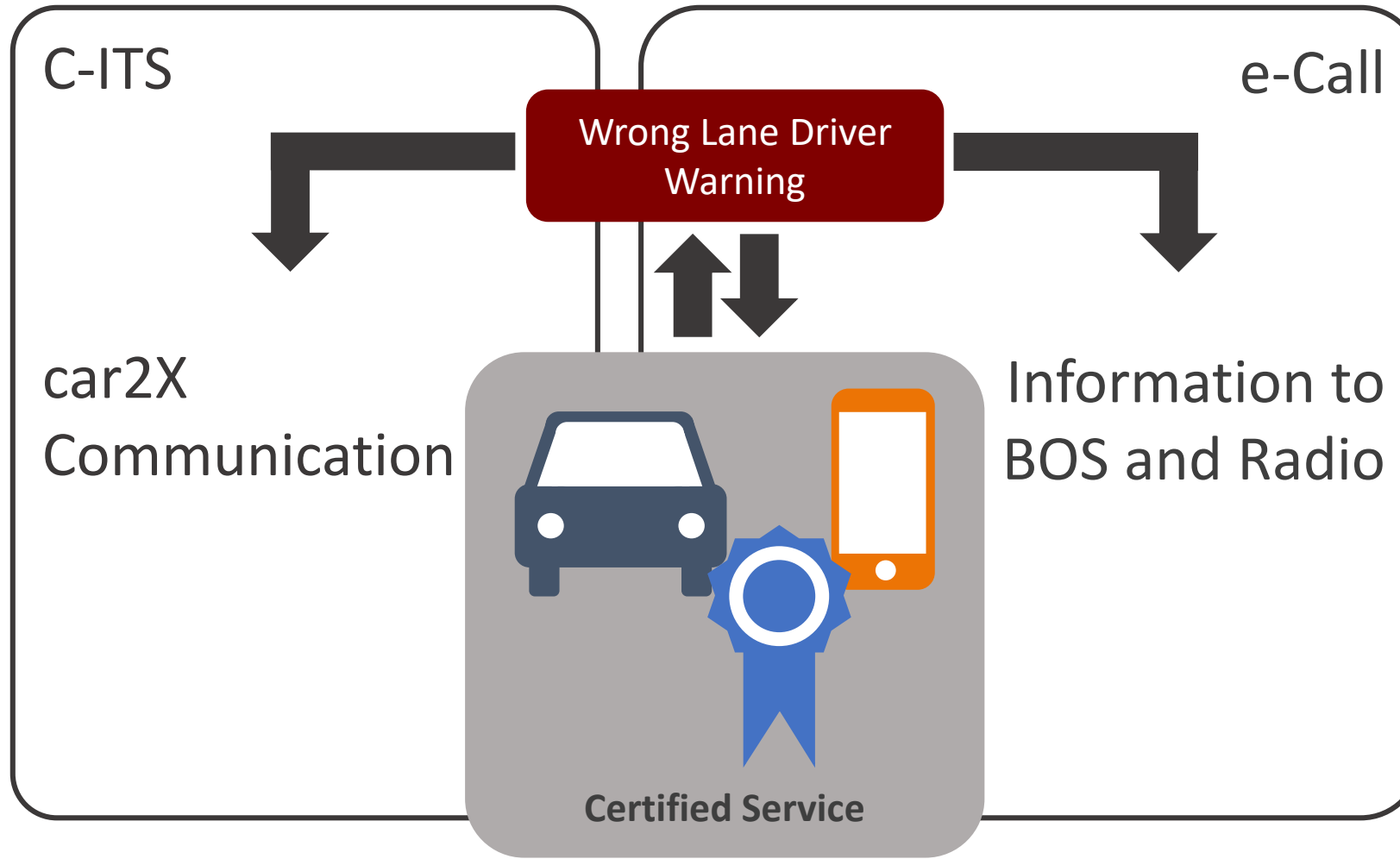
Institut for Space Applications and Space Technology

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Agenda

- Project Goals
- Overall Project Architecture
- Android App Architecture
- Android App Functionalities
- Server/Post Processing

Project Goals – Overview



Difference between existing solutions

- e.g. Bosch Mobility Solutions (Cloud-based wrong-way driver warning SDK)
 - Only SPP position is used
 - Only highway entries/exit are monitored
- Video-based Solutions
 - Low reliability due to weather
- Physical barriers or signs
 - Very expensive
 - No cooperative warning

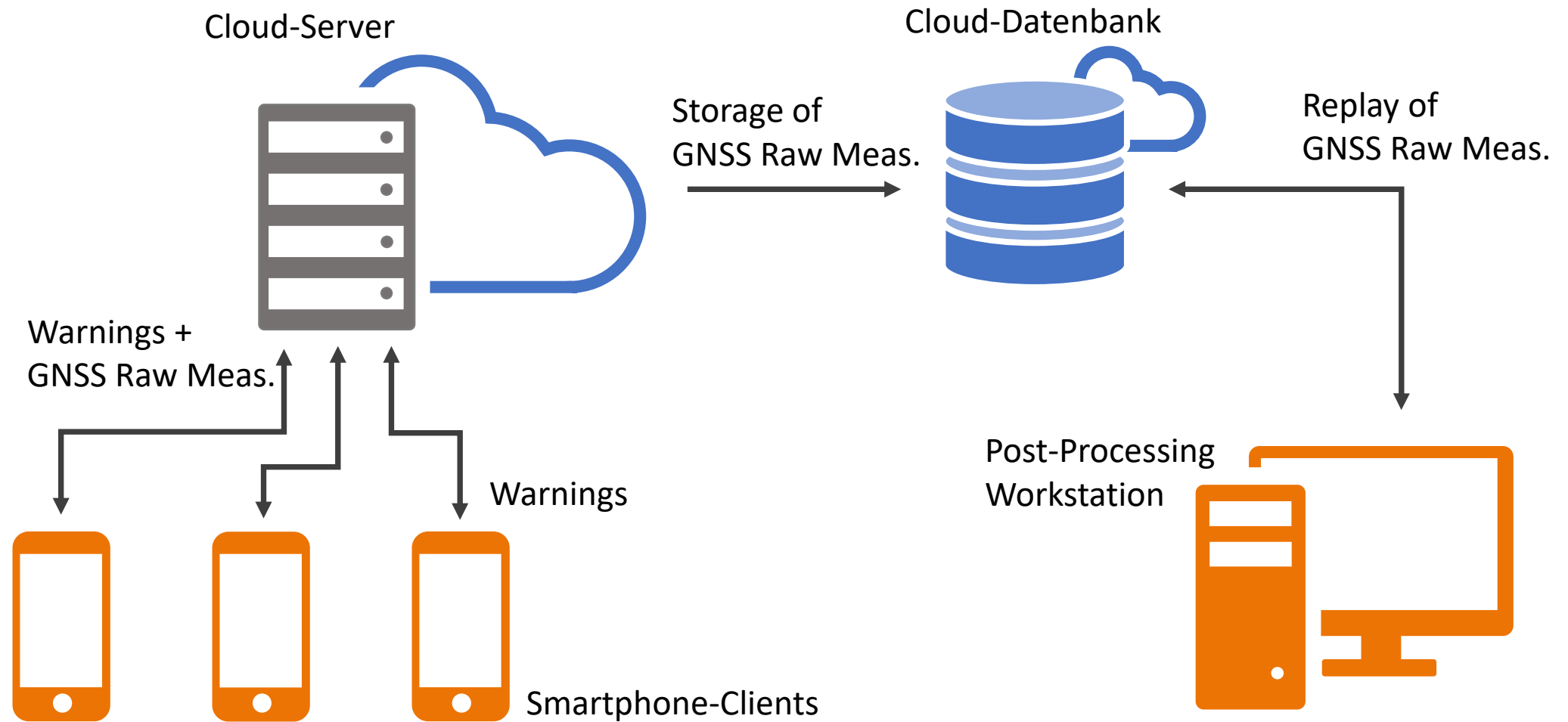
Project Goals – Increase of Detection Integrity

- Proven minimization of false alarms and missed detections
 - Increased position accuracy and integrity through, for example, RTK and (A) RAIM
 - Improvement of map matching by, for example, precise maps
 - Increase in detection integrity through
 - adapted probability distributions
 - Consideration of several epochs and prediction with e.g. particle filter
- Integrity of warning messages essential for certification of the service

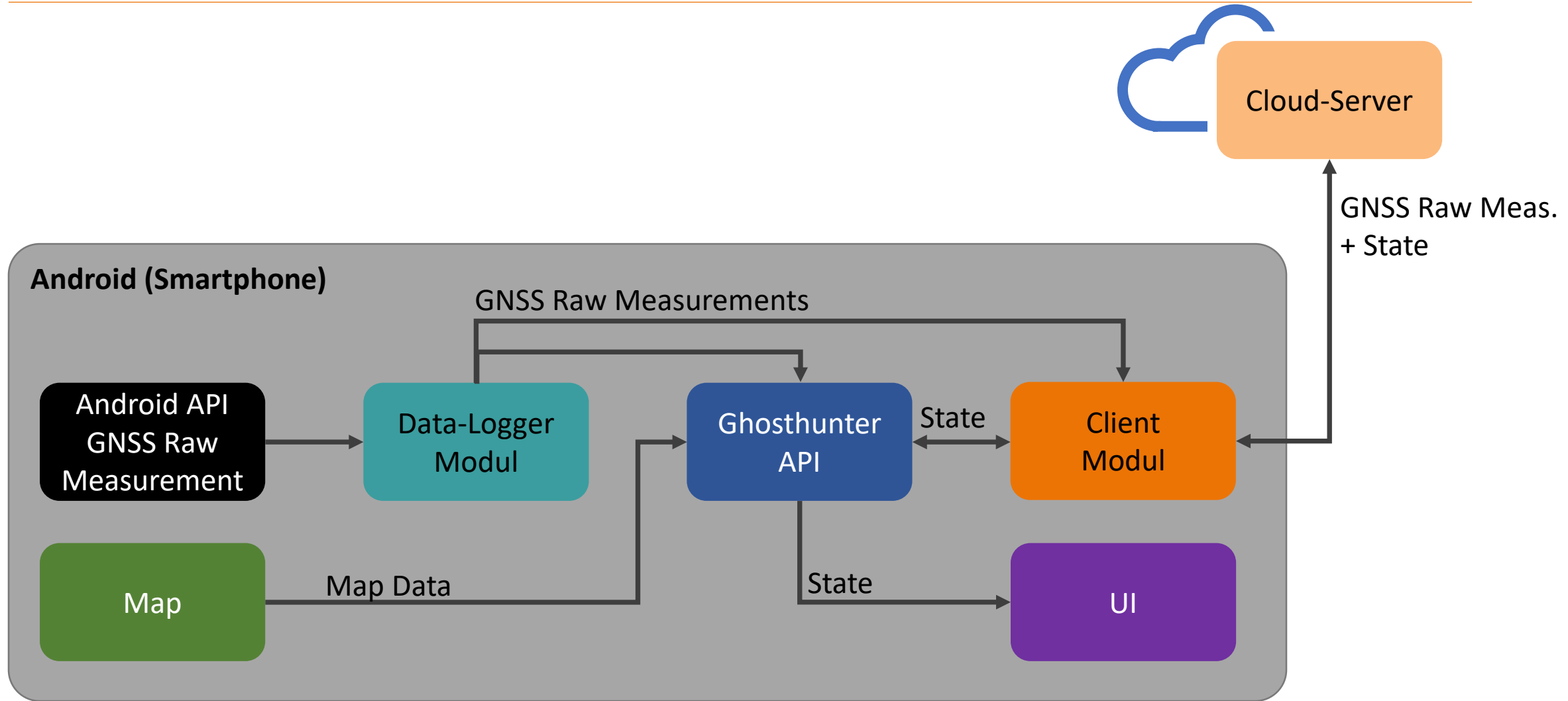
Project Goals – Distribution of Warning Messages

- Building a fleet of smartphones
 - for the simulation of cooperative warnings via a simulated control center
 - for demonstration purposes under real conditions
- Server-based communication between the smartphones
 - Simulation of different warning options (eCall, C-ITS, C2I)
 - Storage of raw data to optimize algorithms in post-processing

Overall Project Architecture



Android App Architecture Overview



Android App Functionalities (1)

Logging + Buffering

- logging and buffering (up to 500 epochs) of GNSS Raw Data + robust data stream to server DB



Ghosthunter Module

integration of ISTA/IIGS Ghosthunter Module (fully encapsulated module, can be easy adapted or replaced)



Android App Functionalities (2)

ArcGis Loader Module

- load ShapeFile data as map reference for Map Matching (automatic selection of corresponding ShapeFile based on initial position)



Display



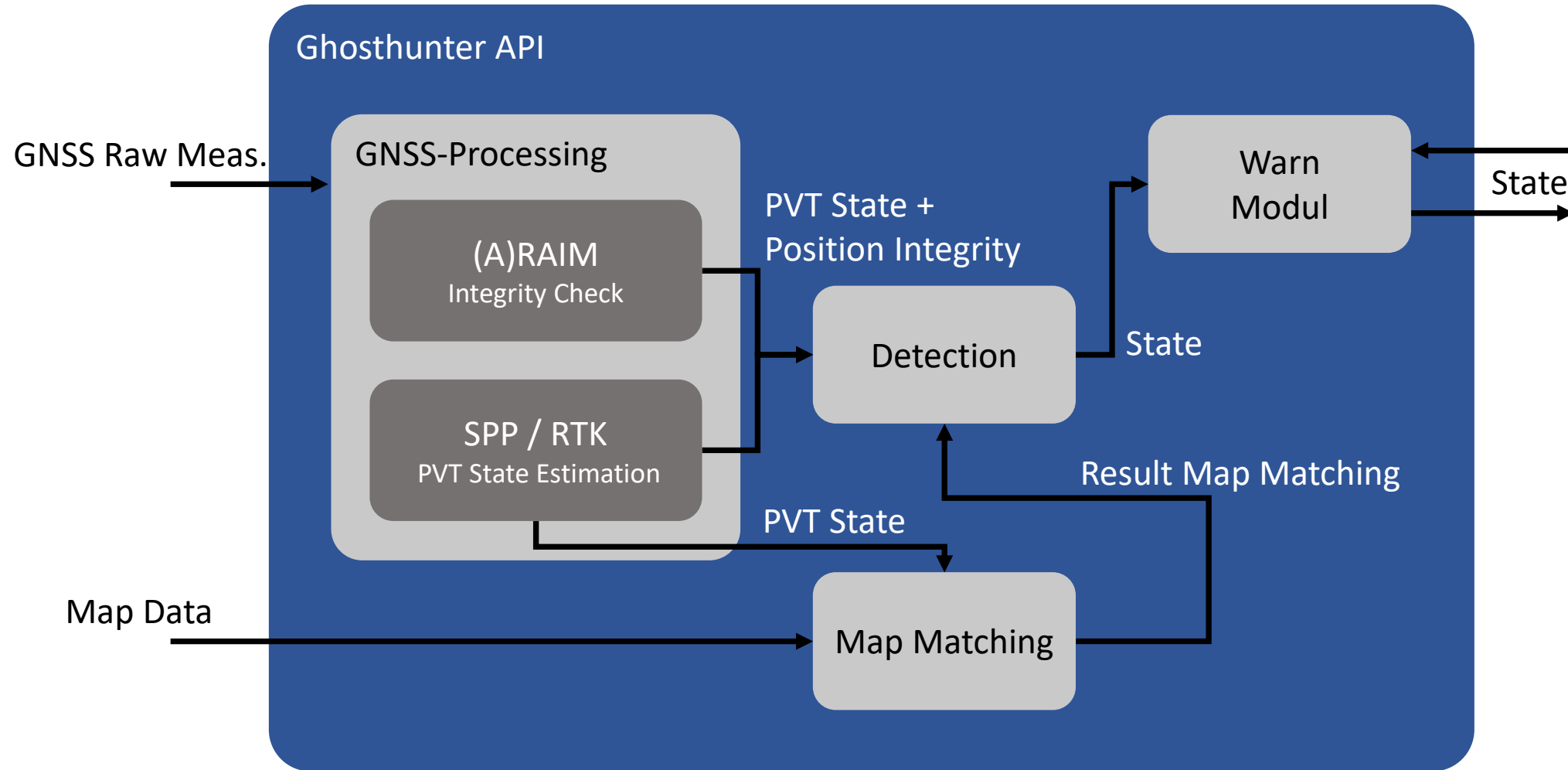
- display of map + overlays and cooperative warning messages

Cooperative Warning

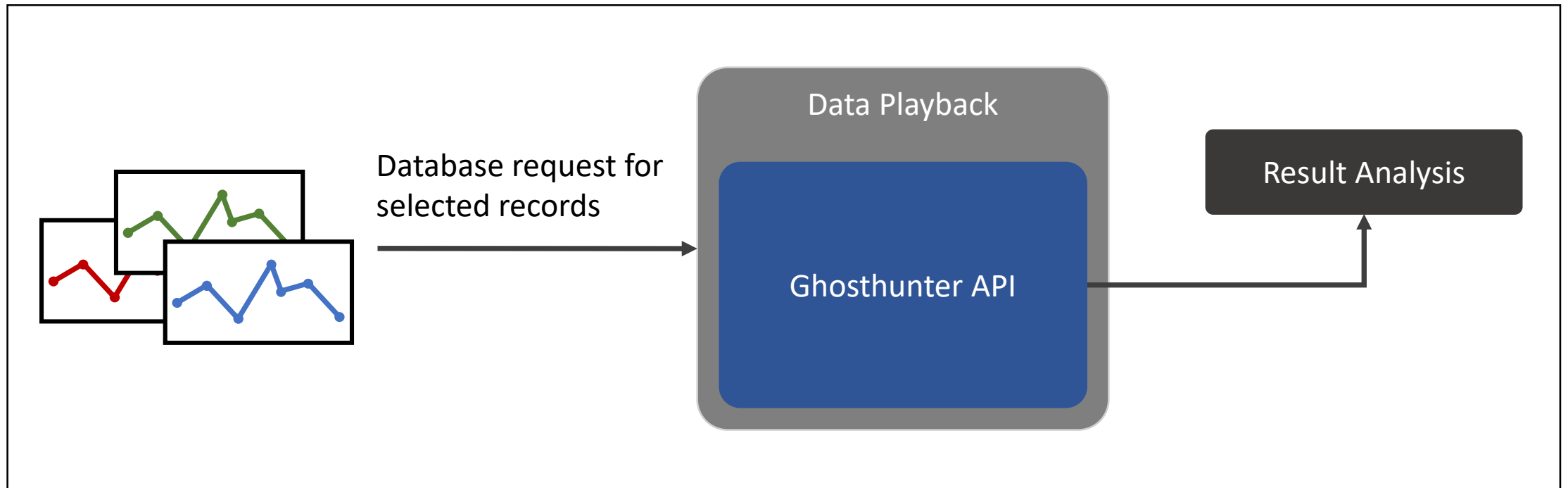
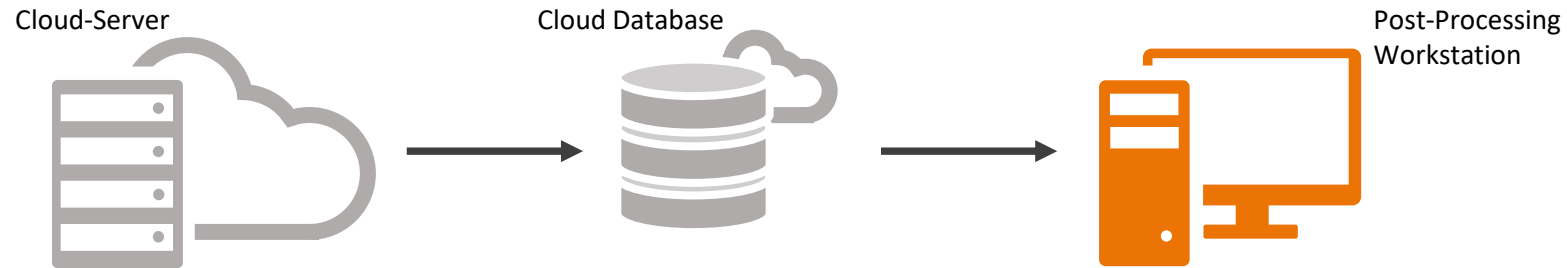


- send + receive warning messages from/to server

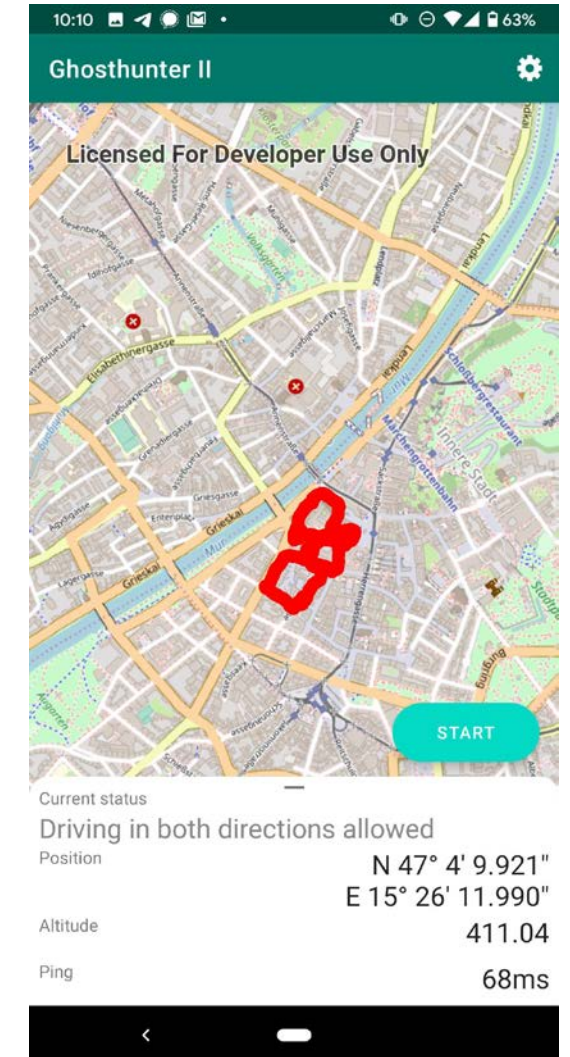
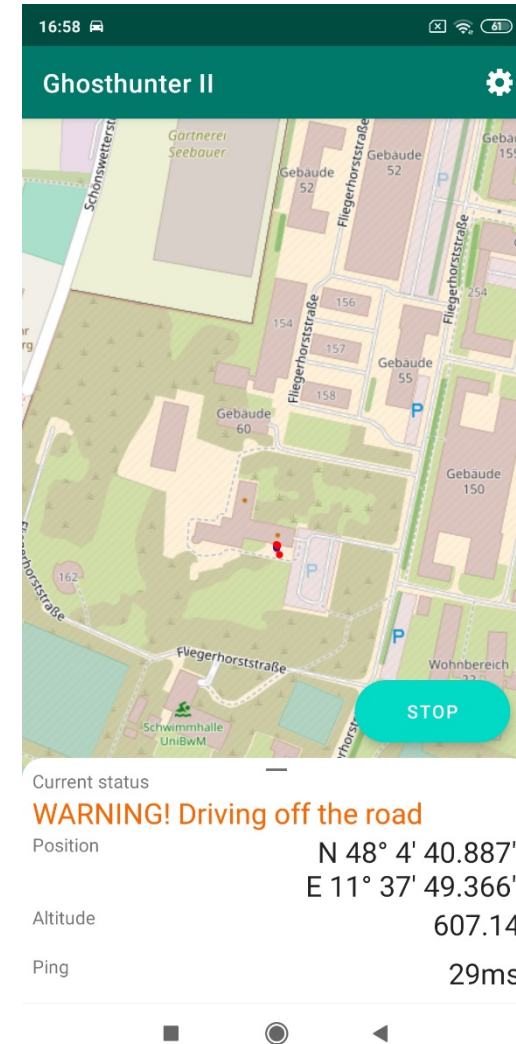
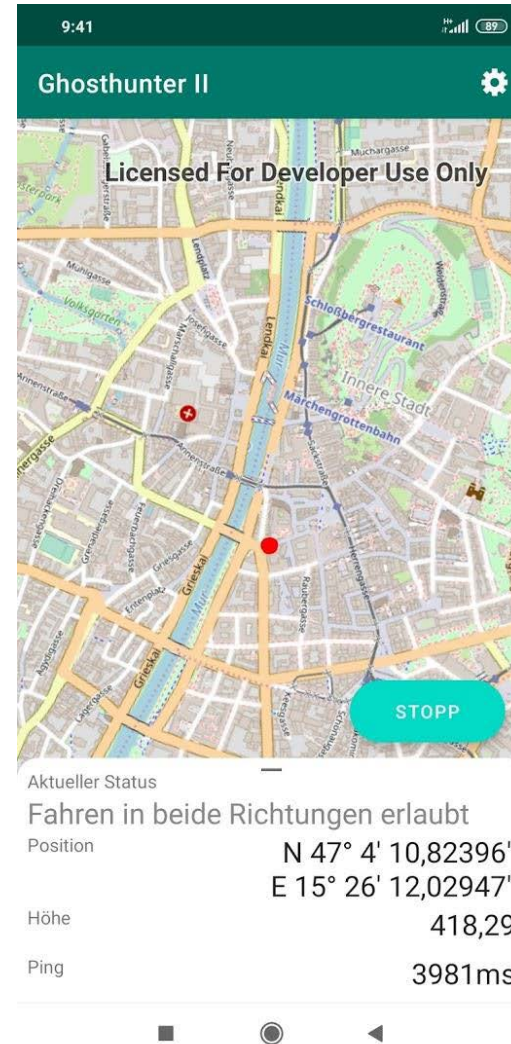
Android App Ghosthunter API



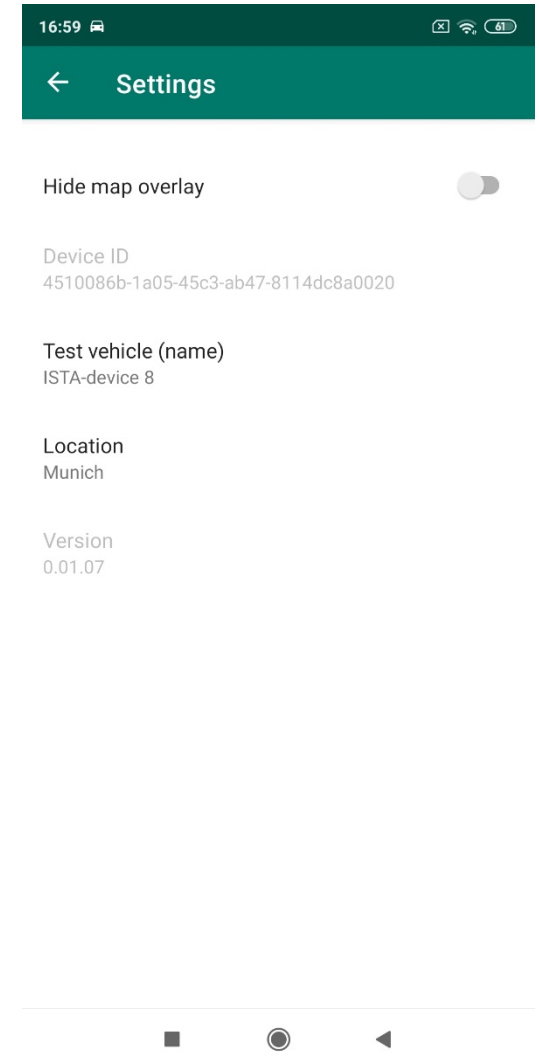
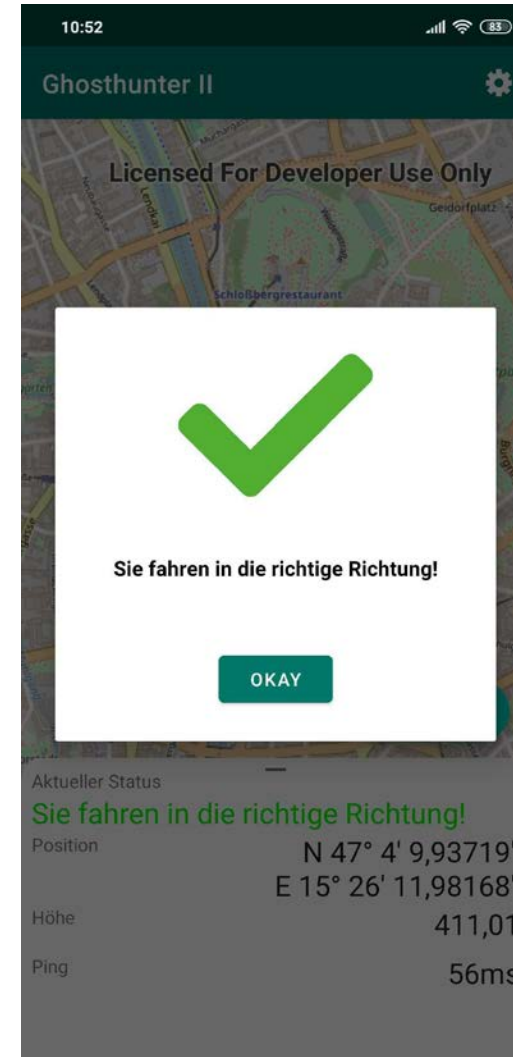
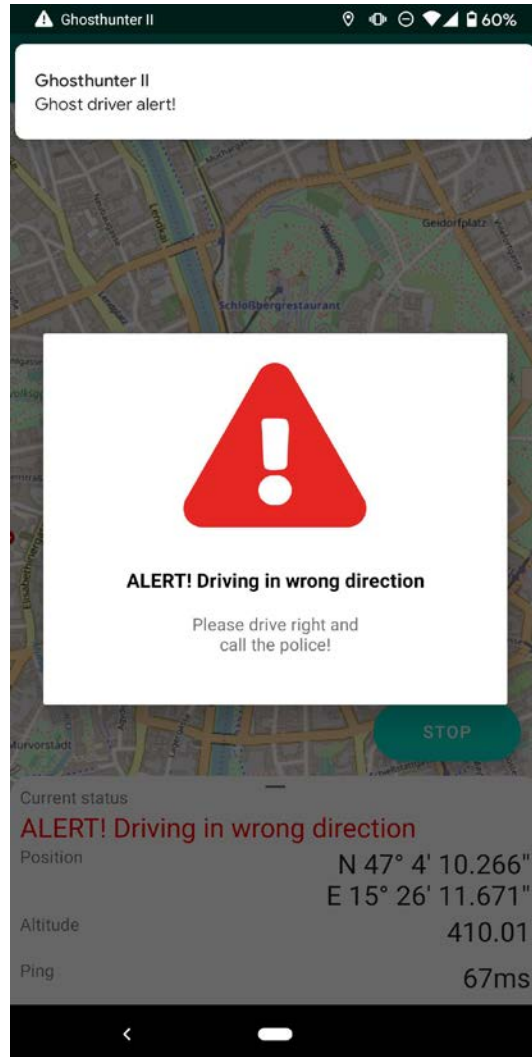
Server/ Post Processing



Wireframes (1)

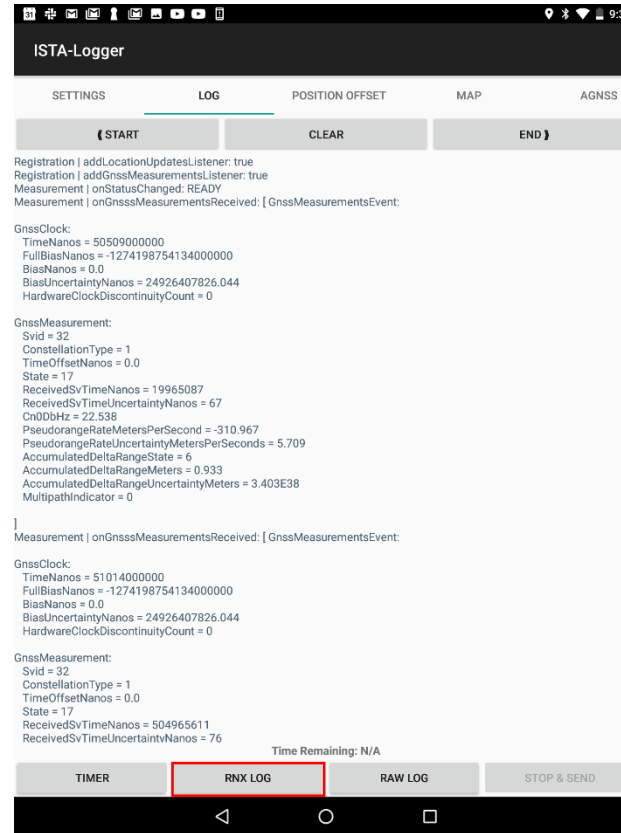


Wireframes (2)

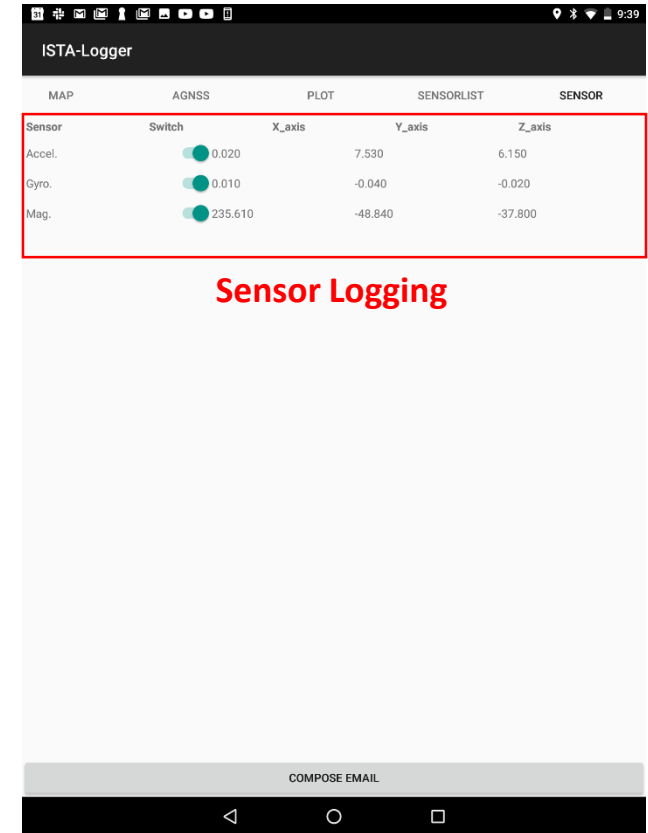


NEWS

- **ISTA Logger**
- Android based GNSS/IMU Logger
- First Logger Capable of Logging RINEX and IMU data from the Smartphone
- Based on GNSSLogger by Google
- Capable of Logging
 - RINEX 3.03 with dual frequency and Multi-Constellation
 - GNSS Raw Measurements
 - IMU data (Accelerometer, Gyroscope and Magnetometer)
 - Time Synchronized GNSS/IMU data to be directly used in GNSS/IMU Fusion



RINEX Logging



Sensor Logging

Will be available on Play Store  soon...



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Thank you for your attention!

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of the DLR



Deutsches Zentrum
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