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GNSS INTEGRITY MONITORING IN URBAN ENVIRONMENT

Objective

- The objective of this PhD thesis is to provide accurate positioning along with integrity monitoring in dense urban environments.
- Integrity monitoring consists in providing a measure of trust of the positioning information.

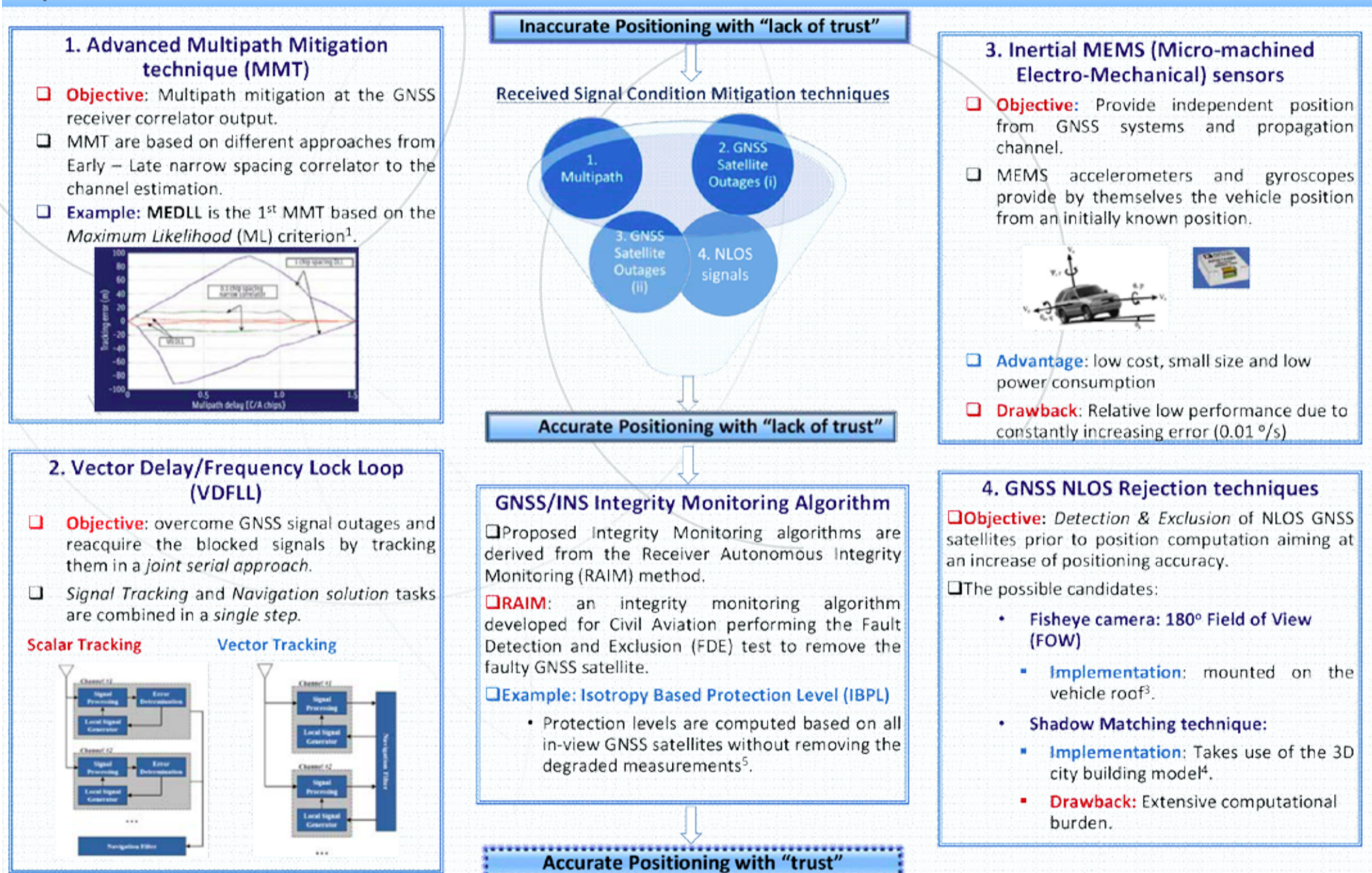
Problem Statement

Problematic: Traditional GNSS signal processing is usually unreliable in urban environments due to typical blocking, shadowing and fading of received GNSS signals.

➤ The following problematic arise from the above described urban conditions:

- *Multipath*: decreasing the received GNSS pseudorange accuracy;
- *GNSS satellite Outages* due to:
 - Erroneous pseudorange measurements provided from one or more satellites;
 - Nonfulfillment of the minimum requirement of four visible GNSS satellites in a time epoch;
- *Non-Line of Sight (NLOS) signals*: significant decrease of positioning accuracy due to the non-reception of line-of-sight GNSS signals.

Proposed Solution



Conclusions

- Advanced Multipath Mitigation techniques along with Vector Tracking and GNSS NLOS rejection techniques were proposed and described to overcome the received signal conditions in dense urban environments.
- GNSS & INS integration employing MEMS sensors yields a low cost solution for an improved positioning performance and availability in urban canyons.
- In this work, several Integrity Monitoring algorithms being capable of providing integrity monitoring for GNSS/INS fusion were targeted.

Future Work

- Focus toward the implementation of advanced GNSS signal processing algorithms and exploitation of GNSS/INS hybridization techniques.
- Definition of the Measurement Quality Indicators for our specific urban scenarios.
- A key objective of this work will be the determination of innovative integrity monitoring algorithm suited to our measurement model.
- Simulations and experimentations of our positioning algorithm and integrity monitoring technique will be carried out in the testing campaigns in Toulouse and Madrid.

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