A Distributed and Collaborative vSLAM Framework for Real-Time Localisation in Huge Environments for Mobile Devices

Nagore Barrena, Jairo R. Sánchez, Alejandro García-Alonso

vicomtech
IK4 Research Alliance

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Current mobile localisation approaches

GPS & Compass

- ✓ High outdoors Availability
- ✗ Low precision but valid for 2D augmented reality

Markers

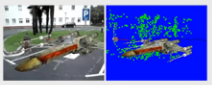
- ✓ Very high precision, suitable for 3D augmented reality
- ✗ Reduced localisation range

Wifi + 3G

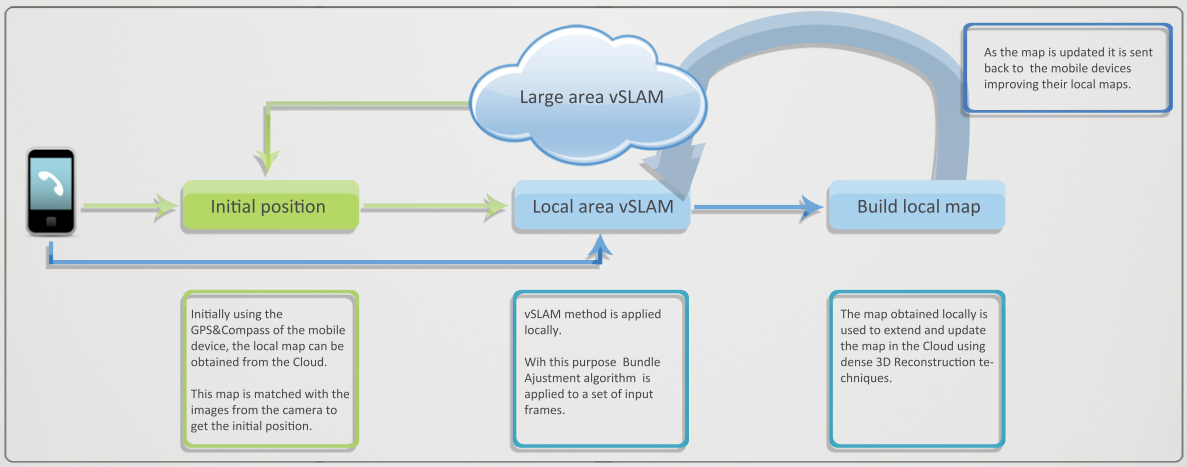
- ✓ High indoors & outdoors availability
- ✗ Low precision insufficient for augmented reality

Slam

- ✓ Very high precision in unknown environments
- ✗ Only suitable for small environments in mobile devices because of drift



Collaborative vSLAM



Challenges

- Real-time vision based localisation in very large known environments stored in the Cloud
- Local area mapping and localisation in unknown environments
- Strong image processing algorithms invariants to lighting conditions
- High performance computing methods for handling huge area maps
- Synchronization and coherence problems derived from extending and updating the huge map from different sources
- Map consistency in highly changing and cluttered environments
- Scalability, loop closure and drift removal

Contact person: nbarrena@vicomtech.org