

Progress in Integrated Positioning, Navigation and Mapping Systems



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Research Group

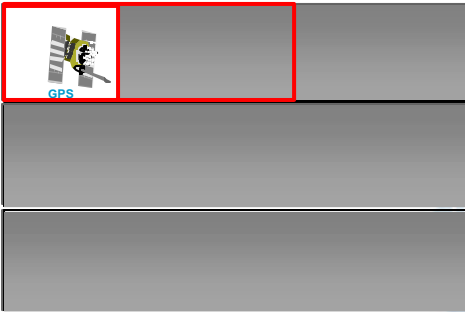


Outline

- Review of mobile mapping technology and some of the issues that should be addressed
- A brief view of where we think mobile mapping systems are leading us



Components of MMS



VISAT Van Alpha



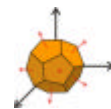
VISAT Station 2006



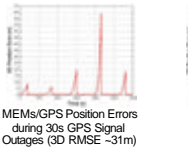
NavAids



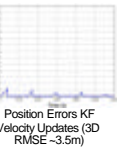
- Alternative Sensors
- Application of Model Constraints
- Post Processing – Backward smoothing
- Photogrammetric Reconstruction Techniques
- Multi-sensor configurations to provide redundancy



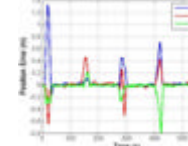
MEMS Solution with NavAids



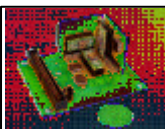
MEMS/GPS Position Errors during 30s GPS Signal Outages (3D RMSE ~31m)



Position Errors KF Velocity Updates (3D RMSE ~3.5m)

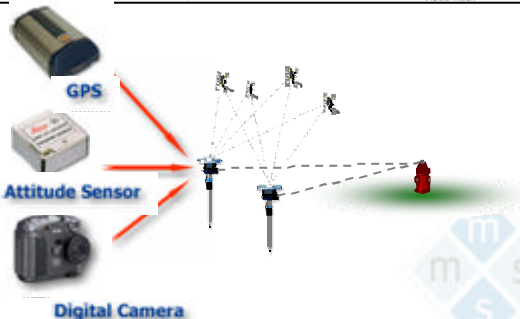


MEMS/GPS Position Errors during 30s GPS Signal Outages Using Additional KF Velocity Updates and Backward Smoothing (3D RMSE ~0.25m)



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Portable MMS System



GPS

Attitude Sensor

Digital Camera

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Portable MMS System




Image 1






Image 2



Anchor 1

3-D coordinates

Latitude	43.81 07 23.87
Longitude	141.89 12 23.87
Altitude	100.00 m
Scale	4300000.0 m
Time	2008.08.24
Height	100.00 m
Position	0.000
Distance	0.000



Anchor 2

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Wildlife Tracking Applications



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Imagery – G096, 2004



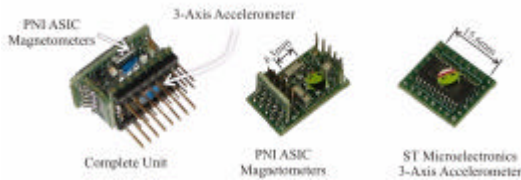
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Animal Dead Reckoning Solution



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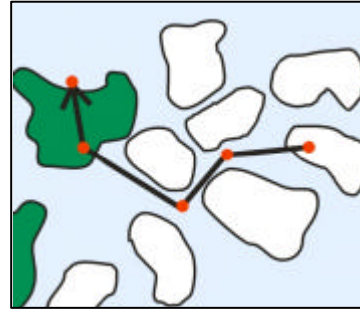
Animal Dead Reckoning Solution



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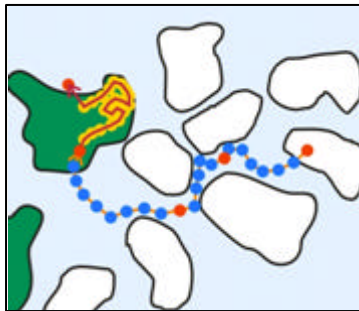
Current Path from GPS



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Path from GPS + Sensors



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Summary



- For continuous navigation/mapping solutions integration of GPS/INS is fundamental, however, to meet specific application accuracy requirements under a broad range of conditions that include GPS denied environments, it is beneficial to incorporate navigation aids that include additional sensors and post-processing techniques.
- With the advent of MEMS sensor technology it is now feasible to produce systems of comparable accuracy to navigation grade IMU systems, that are both affordable and unconstrained by governmental regulations.

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Questions



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