

# PORTABLE MOBILE MAPPING

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**Key words:** Mobile Mapping, Close-Range Photogrammetry, Digital Compass, Low Cost.

## ABSTRACT

### Introduction

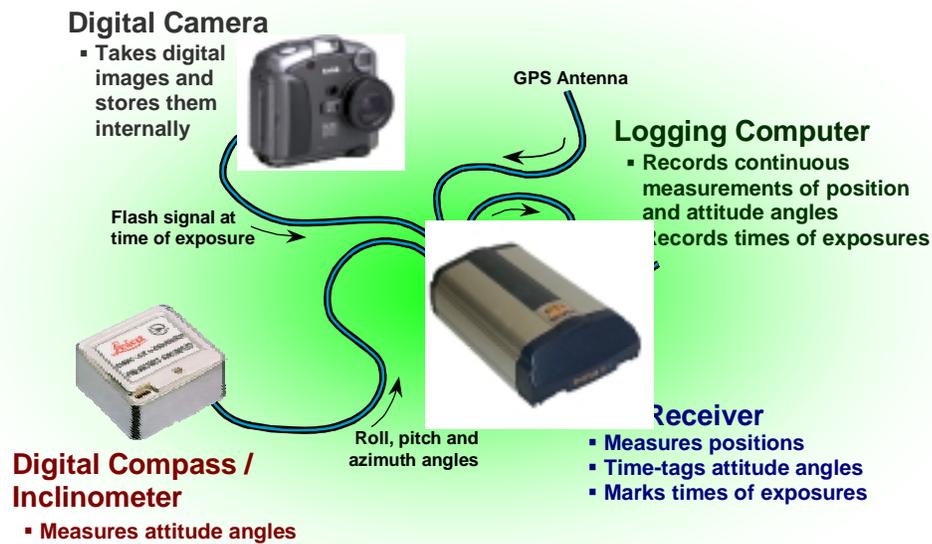
A low-cost backpack mobile mapping system (MMS) is being developed in the department of Geomatics Engineering at the University of Calgary (see the figure below). The goal of the system is to overcome the drawbacks of current mobile mapping systems – namely their high cost, large size, and complexity – that have restricted their widespread adoption in the survey industry. The development of such a system satisfies the demand for a mobile mapping system that can compete in both cost and user friendliness with current GPS and conventional terrestrial survey systems, while realizing the significant gains in efficiency available through the use an MMS.

### Methodology

The system integrates a digital magnetic compass, dual-frequency GPSreceiver and consumer digital camera into a multi-sensor mapping system. The GPS pro-vides estimates of the camera's position at the exposure stations and the magnetic compass provides estimates of the camera's attitude. These exterior orientation estimates are then used as weighted parameter observations in a bundle adjustment.

### Results

The absolute and relative object space accuracies of the system are examined at different camera-to-object point distances using different numbers of images and different numbers of image point measurements. With three images at a 20m object-to-camera distance, absolute accuracies of under 25 cm are achieved. This is comparable to current single-frequency GPS data acquisition systems. The internal agreement of points surveyed using the system is under 10 cm. The effect of including additional observations is also examined.



## CONTACT

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## BIOGRAPHICAL NOTE

Dr. **Naser El-Sheimy** - is an Assistant Professor at the Department of Geomatics Engineering of the University of Calgary. He holds a B.Sc. and M.Sc. from Egypt, two post-graduate Diplomas in Photogrammetry and Remote Sensing from ITC, the Netherlands, and a Ph.D. from the University of Calgary. His area of expertise is the integration of GPS/INS/imaging sensors for mapping and GIS applications with special emphasis on the use of multi-sensor in Mobile Mapping Systems. He is now the chairman of the special study group for Mobile Multi-Sensor Systems of the International Association of Geodesy and the chairman of The International Federation of Surveyors (FIG) working group C5.3 on "kinematic and Integrated Positioning Systems"

**Cameron Ellum** is currently completing his M.Sc. at the department of Geomatics Engineering at the University of Calgary. His research is in the area of mobile mapping systems and multi-sensor integration. Previous work experience has included oil-field surveying in Alberta and an internship in the survey and mapping department of a large multi-national pipeline corporation.