

The Third International Symposium on Mobile Mapping Technology
3rd – 5th of January, 2001, Cairo, Egypt

This symposium was held in Cairo from 3 – 5 January 2001. It was sponsored by the University of Calgary, the Survey Group of Ain Shams University in Egypt, the Egyptian Survey Authority, and the Chinese National Laboratory for Information Engineering in Surveying, Mapping and Remote Sensing; and supported by three well-known companies, Ashtech-Magellan Corp, Applanix Corp. of Canada, and Premier GPS Inc., also of Canada.

Nearly six years ago Ohio State University hosted the first symposium on this subject. Then it was very clear that mobile mapping had the potential for providing a diversity of services and products to the mapping community. The second symposium, which took place in Bangkok in 1999, provided further evidence – the quality and diversity of papers and the number of participants confirmed that mobile mapping was a separate area of research. Since then, substantial progress has been made in technological development, progress that could not have been anticipated six years ago.

There were 350 participants from 29 countries at the Cairo meeting. They were specialists, engineers, users and those interested in mobile mapping technology, kinematic real-time positioning, sensor integration and calibration, feature extraction and 3-D data acquisition. Some 90 oral presentations in 18 sessions reported on recent research and development, and the achievements of applications in mobile mapping.

The opening ceremony included speeches of welcome by Prof. Jean-Marie Becker, Prof. Heribert Kahmen, and Prof. Chen Jun representatives of the sponsoring organizations, senior members of Ain Shams University and the Egyptian Minister of Transportation. Gerard Lachapelle of the University of Calgary gave a very informative keynote address on “Location: A 21st Century Utility” in which he described how location and navigation technology, user requirements and new applications drive each other in a never-ending circle, with the users as the major beneficiaries.

“The exciting technical program was complemented by a most interesting and educational social program that included a night cruise on the river Nile, a Sound and Light show at the Pyramids and individual visits to the countless historical sites of Cairo. Cairo is the oldest lived-in city in the world and is an historical treasure trove. The Egyptians are keenly aware of their own and other cultures and were most gracious hosts” Said Gerard Lachapelle

The symposium also witnessed the signing of a Memorandum of Agreement (MoA) between Ain Shams University and the University of Calgary. The MoA was signed by Prof. Gerard Lachapelle as representative of the UofC and by both the Prof. Prof. Mohamed Sheriah, the Dean of Faculty of Engineering of Ain Shams University, Prof. Hassan Ghallab, President of Ain Shams University. The MoA will strengthen further the relationship between the two universities and encourage academic exchange between them.

The symposium was structured in such a way that features common to all Mobile Mapping Systems (MMS) were treated before specific applications, new applications, and trends in MMS

were considered. Common features included the mathematical framework of direct georeferencing for land and airborne imaging sensors, kinematic positioning, object extraction and recognition, and estimation techniques common to all MMS. Only then were specific sessions dedicated to covering the full spectrum of mobile mapping technology.

It was clear from the number of papers presented at the symposium that building a mobile mapping system by integrating off-the-shelf hardware and software components is becoming easier, but it requires significant courage, investment and effort. The symposium witnessed development activities by many universities and companies on almost all continents. Land-based systems continue to demonstrate the power promised in the earlier phase of development, for example in road and railway and utility surveys. The takeover of the part of such traditional surveying markets is believed to be only a start. Meanwhile, the very same concept has been transferred to airborne and backpack systems in which position and orientation sensors are integrated with imaging sensors to approach real-time mapping that is not restricted to areas which only land vehicles can reach. The “dream” is to achieve the same level of ground position accuracy as traditional aerial triangulation.

Illustrations of new developments include

- Helicopter-based portable handheld MMS for avalanche mapping, developed by the Photogrammetric Laboratory in the Institute of Geomatics of the Swiss Federal Institute of Technology. It integrates light aerial camera and GPS/INS components with a platform that is free of the helicopter in 6 degrees of freedom
- A portable MMS for the survey community developed by the Department of Geomatics Engineering, University of Calgary. This integrates a digital magnetic compass, dual-frequency GPS receiver and consumer digital camera into a multi-sensor mapping system.
- Airborne Laser-ranging and Multi-spectral Imaging Mapping System (ALMIMS) developed by the Institute of Remote Sensing Applications of the Chinese Academy of Sciences. It is integrated with multi-spectral imaging scanner, laser ranging scanner, Global Positioning System (GPS), and Inertia Navigating System (INS), all of which are tightly coupled and synchronized to ensure pixel-level correspondence of image and laser ranging points.
- DORIS (Differential Ortho-Rectification Imagery System), an airborne multi-sensor mapping system developed at the Alberta Research Council. DORIS combines laser-scanning and digital imaging technologies to produce high-resolution and highly accurate ortho-rectified planimetric image maps.

New applications include

1. Automatic bald digital terrain model reconstruction from digital surface data acquired from an airborne SAR system.
2. Automatic generation of an hierarchical DEM for Mars Rover navigation.
3. Integrating data from terrestrial MMS and aerial imagery for change detection purposes.
4. Integrating photogrammetric data from mobile ship-borne and airborne systems to support the processes of conservation and environmental analysis along sections of the Italian coast of importance to tourism.

5. Automatic building extraction from airborne laser systems, techniques which perform well in semi-real-time and thus provide a fast data source for GIS systems.
6. Integration of mobile phone location services with intelligent GPS vehicle navigation systems for which preliminary results of investigation are provided

The continual development of MMS is stimulating the development of intelligent processing techniques and new areas of application. Advanced techniques such as neural networks and snake models are currently under development to automate the measuring procedures and automatic object recognition from mobile mapping data. The unique advantages of MMS-generated data are that images have unknown exterior orientation parameters, and the image sequences are along a known path. These two advantages make the automation of object recognition and measuring procedures more efficient and robust.

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