

MOSAICMILL

Revolutionising Mapping with Small and Medium-format Sensors



Rikola hyperspectral UAV camera, technologies with its EnsoMOSAIC software solutions.

50 bands in 500-950nm.

MosaicMill Ltd. is a Finland-based technology company established in 2009. MosaicMill specialises on remote sensing and photogrammetry, and is the developer of the EnsoMOSAIC aerial mapping and survey system. EnsoMOSAIC technology was originally owned by Stora Enso OYJ, the biggest forest-industry company in the world, but in 2009 the management team decided to divert the technology into a new external company. Development of EnsoMOSAIC tools is today being continued by MosaicMill together with its partner companies.

High-precision tools

MosaicMill supplies two products under the EnsoMOSAIC brand name, for two types of clients: one is a complete turn-key aerial mapping system and the other is photogrammetric image processing software.

Imaging system

The complete aerial imaging system is targeted mainly at companies and institutions who do not necessarily have previous experience in aerial mapping but who want to start their own mapping operations, for whatever reason. EnsoMOSAIC is a set of tools for carrying out aerial imaging projects, from flight planning through photogrammetric processing to stereoscopic data extraction. Some of the users in this segment are focused on selling value added services to third parties, either ortho-imagery as it is or further developed into maps and other GIS products. Some other users manage their own land assets or industrial installations and need to assess, monitor or control their resources. The operators in this segment do not usually sell their products but instead use aerial data intensively to improve their resource management.

Automatic software

EnsoMOSAIC software is one component of the mapping system, and in addition is sold as it is for companies which already have their own aerial camera systems and need image processing software. These companies range from small UAV operators to professional mapping houses. Some want to process just a few images of a small farm while others run huge blocks of tens of thousands of frames. Some require cadastral sub-pixel and sub-metre accuracy whereas for others rough land-use accuracy down to a few metres is enough.

Future of UAV mapping

In recent years, satellite image sales has grown most rapidly as new high-resolution images have become available. In the airborne segment, however, UAV imaging is currently the fastest growing sector and will probably remain so in the near future. The UAV platform market is estimated to grow to USD18 billion over the next 10 years.

UAVs are typically flown at low altitudes of up to 150 metres. This fact, in combination with wide angle sensors, causes very different imaging geometry compared to conventional imaging. Furthermore, as one survey can generate thousands of images, the requirements for photogrammetric software are also very demanding. MosaicMill has developed EnsoMOSAIC UAV software in support of this need, to meet clients'

EnsoMosaic UAV interface, processing

requirements in high-end mapping applications. MosaicMill's vision is to develop tools for UAVs to enable the same measurement precision as for conventional surveys. This is possible only by applying true photogrammetric methods. As a result of careful flight planning, proper GCP measurements, careful camera calibration and automatic photogrammetric processing, horizontal accuracies of 1-2 pixels and vertical accuracies of 2- 3 pixels can be reached. In other words, UAV mapping accuracy is in the level of 5- 10cm in a typical mapping project. Thus it is now possible to apply UAVs in the most demanding survey applications, and this is underlined by the market reactions.

400 UAV images into mosaics.

Hyperspectral mapping

Alongside the platform and software development, the sensors are also making similar progress. Large-frame cameras have evolved into huge pixel counts. Unfortunately, this has also meant that investment costs are too high for many mapping organisations. Luckily, -ize sensors in the consumer camera segment are offering cost-efficient mapping tools in the range of 35-60 megapixels and EUR4,000-50,000. Notably, just a decade ago, these sensors were considered to be large-frame cameras. Consumer cameras naturally differ from metric ones but this is easy to compensate with a proper calibration procedure.

Another path in the development of sensors is in spectral resolution. Especially in forestry and agriculture applications, the standard blue, green, red and CIR bands cannot provide the required details of the target. As a response to this shortcoming, the Finnish Technical Research Center and Rikola Ltd. have developed a frame camera that collects spectral narrow-band images with single exposure. Camera can record up to 50 bands in the range of 500-950nm. This camera will be available in 2013, creating new business

XYZ point cloud of wood-chip pile calculated from

opportunities in fertiliser and pesticide optimisation, forest inventory and environmental monitoring, for example. MosaicMill is currently developing EnsoMOSAIC software to process these hyperspectral images into hyperspectral mosaics and hyperspectral 3D models.

5cm-resolution UAV images, point density 100 points/m2.

3D mapping

Visualisation and 3D mapping is a growing sector which is utilising aerial data to create high-end products such as contours and city models. Rather than producing its own software package, MosaicMill has entered into this business through strategic alliances. EnsoMOSAIC combined with a 3D photogrammetric work station offers a complete production line from imaging to high-end mapping.

End-user needs count

Even if the technology itself is very exciting, the end users tend to be less interested in the technology component; instead, they are mainly looking for high-quality outputs and cost-efficient solutions. There is space for various kinds of technical solutions, from small-format UAV technology to large-scale frame cameras and scanners. MosaicMill is able to provide cost-saving tools for users working within any of these segments.