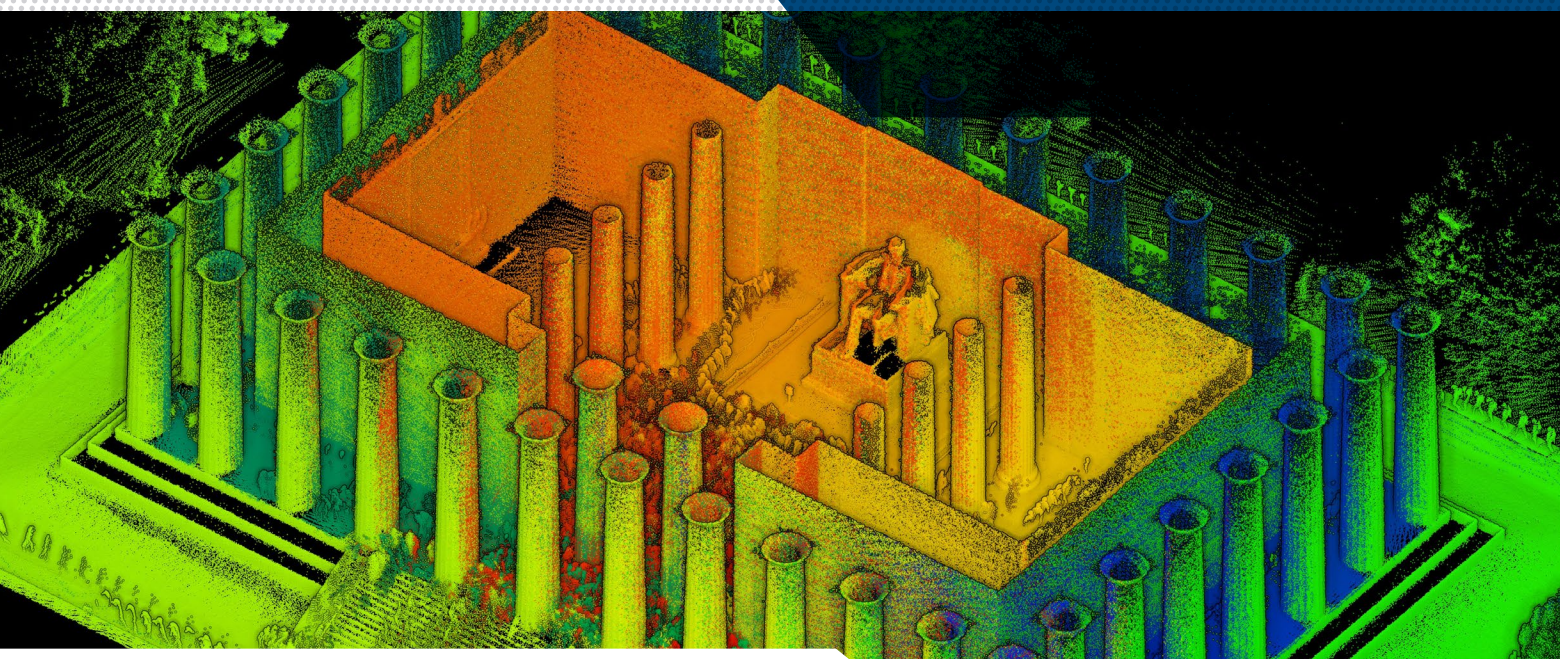


The main advantage of Geospatial SLAM for 3D mapping applications is that scanning can be undertaken whilst mobile, and without the need for GPS.

What is Geospatial SLAM?

So the clue's in the name—here at GeoSLAM we specialise in Geospatial mobile mapping using 3D SLAM technology, but what does this mean?

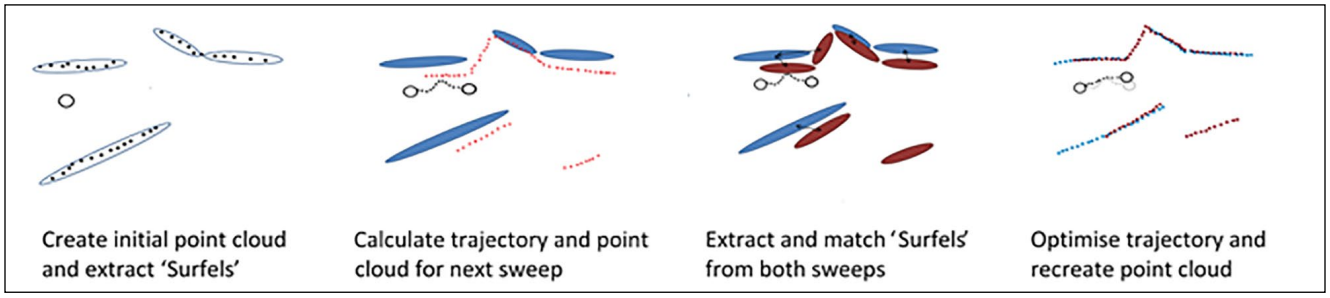
Simultaneous Localisation And Mapping (SLAM) technology was born in the robotics industry and is used by autonomous vehicles to concurrently map and navigate through an unknown environment. To do this, SLAM algorithms utilise information from sensors (often Lidar or imagery) to compute a best estimate of the device's location and a map of the environment around it.

In 2012 CSIRO (Australia's national science agency, inventor of Wi-Fi, and 50% owner of GeoSLAM) developed a powerful and robust SLAM algorithm primarily focused on accurate 3D measurement and mapping of the environment rather than autonomous navigation. This innovative and award winning Geospatial SLAM technology is therefore at the core of all GeoSLAM products.

So how does it work?

First seen working with the ZEB1 and more recently with the ZEB-REVO, GeoSLAM's algorithm utilises data from a Lidar sensor and an industry grade MEMS inertial measurement unit (IMU). The IMU is used to estimate an initial position and create a point cloud from which 'Surfels' are extracted to represent the unique shapes within the point cloud. The trajectory is then calculated for the next sweep of data using the IMU and 'Surfels' extracted again in the same way. The two sets of Surfels are then used to match the point clouds together and subsequently correct and smooth the trajectory estimation. Following this iterative process, the final point cloud is recreated based on the new smoothed best estimate

BY MARK REID



trajectory. In order to further optimise the trajectory and limit any IMU drift, a closed loop is performed such that the start and finish environments are accurately matched together.

So what are the benefits of Geospatial SLAM?

The main advantage of Geospatial SLAM for 3D mapping applications is that scanning can be undertaken whilst mobile, and without the need for GPS. This facilitates rapid and accurate 3D acquisition of complex environments and is particularly effective for indoor mapping or surveys of enclosed environments that would not be possible using current GPS based mobile mapping solutions. When compared to traditional survey methods for measuring indoors, such as tape and Disto, or even static laser scanning, mobile indoor mapping can prove to be up to 10 times faster.

So what makes GeoSLAM's algorithm so good?

As our core technology we are constantly developing and improving our SLAM algorithm to make it more accurate and reliable in a variety of different environments. Typically SLAM works well in feature-rich environments such as buildings, however most algorithms will struggle in open or featureless environments such as carparks or smooth tunnels. However, through its use on thousands of projects, across a variety of applications over the last 3 years, GeoSLAM's algorithm has been honed and tweaked. This means that even the most difficult of surveys are often possible, all while only using a very low grade and inexpensive IMU. At GeoSLAM we also know the limitations and best practise for SLAM surveys and can guide our customers accordingly in order to get the best results. Many SLAM algorithms only work in 2D hence we are very proud of the robust nature of our 3D solution.

So how do we learn more about Geospatial SLAM?

Our SLAM registration engine can be accessed using either the GeoSLAM Cloud or GeoSLAM Desktop registration software which are currently compatible with both the ZEB1 and ZEB-REVO handheld mobile indoor mapping systems.

To learn more about Geospatial SLAM visit our website www.geoslam.com.

Mark Reid
Chief Operating Officer
GeoSLAM

This warehouse montage was produced to illustrate the benefits of GeoSLAM at SPAR 3D.