Indoor Mapping using The ZEB1 Handheld Laser Scanning System
Flow of Presentation

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- Working
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  - Data Analysis
  - Modeling Techniques (Manual & Au
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Project Overview

Investigate the use of the ZEB1 laser scanner for 3D indoor mapping. The ZEB1 is a handheld 3D scanner which captures accurate 3D point clouds of any scene. Scanning takes place at walking speed.

With the ZEB1 selected areas of building 2 shall be recorded. For that purpose a survey plan must be created to ensure that all selected rooms are completely scanned. Special attention must be given to all areas in which laser scanning might be difficult. After capturing the point clouds a three dimensional model of the recorded areas has to be generated using available 3D scanner software.
About Device

The ZEB 1 handheld laser scanner enables rapid data capture of 3D point cloud without complex setups or requirement for lengthy data processing. It captures accurate 3D point clouds, even in areas of no GPS. It is extremely simple to operate and requires minimal training, unlike traditional survey systems.

<table>
<thead>
<tr>
<th>Hardware Specifications</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Data Acquisition Speed</td>
<td>43,200 points per second</td>
</tr>
<tr>
<td>3D Accuracy</td>
<td>30 mm</td>
</tr>
<tr>
<td>Measurement Range</td>
<td>30 m</td>
</tr>
<tr>
<td>Eye Safety Class</td>
<td>Class 1 Eye Safe</td>
</tr>
<tr>
<td>Angular Field of View</td>
<td>270 degrees</td>
</tr>
<tr>
<td>Weight</td>
<td>665 g</td>
</tr>
<tr>
<td>Dimensions</td>
<td>60 x 60 x 360 mm</td>
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</tbody>
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Data Capturing

Before the start of any mapping project it is necessary to plan the survey.
Data Capturing

Collecting data
The ZEB1 is extremely simple to operate and requires minimal training. ZEB1 has to be in motion to allow the data to process.

<table>
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<tbody>
<tr>
<td>Maximum Range</td>
<td>Up to 30m</td>
</tr>
<tr>
<td>Points per scan line</td>
<td>1080 (0.25° interval)</td>
</tr>
</tbody>
</table>
| Field of view       | Horizontal 270°  
                        Vertical 120° |
| Scan Rate           | 40 lines/sec  
                        43200 points/sec |
| Scan range noise    | +/- 30mm |
| Laser wavelength    | 905nm    |
| Operating conditions| Temperature 0° to +50° C  
                        Humidity < 85% RH |
10 minutes for Pisa
Data Capturing

- **Downloading raw scan data**
  When the scanning is finished place the scanner on a flat surface, and then it starts compiling the last session scanned data. Raw scan data can then be downloaded with the USB stick from the scanner.

- **Uploading raw scan data to the server**
  The raw laser data must be uploaded to GeoSLAM on-line data processing server for conversion to a 3D point cloud using the unique sweep matching SLAM algorithm.
Data Processing

• Outlier and Noise Removal

There are various ways to remove noise and unwanted points from the data. The general three ways are:

i. Automatic (Cloud Compare)

ii. Semi Automatic (GeoMagic Studio)

iii. Manual (Leica Cyclone)
3D Modeling
Bounding Box
To see The Unseen
A sheet in 3D to draw Point, Line and Polygon

It removes the confusion of drawing projection

Elevation, Tilt and Pan place objects on right place

Plan the modeling strategy
Extruding One Object Save The Time
3D Data Model
Uses of 3D Model

A 3D modeling of 3D Data open many ways to use the data and to understand real scenery.

• Indoor Navigation
• Building Information Modeling (BIM)
• Disaster Management
• Remote Tourism
thank you