

## **Laser Scanning Comparison Using CloudCompare**

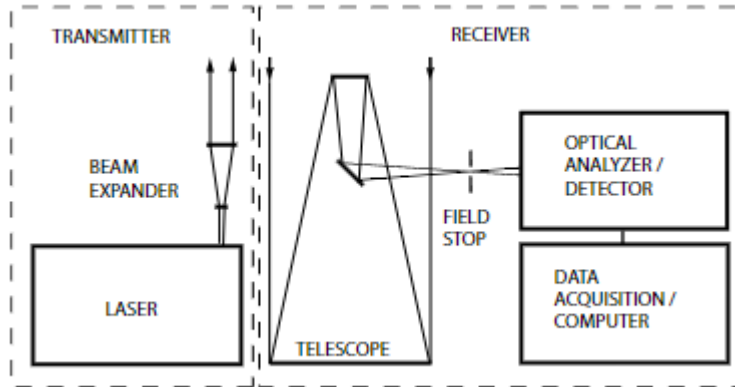
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GEOM90038 - Advanced Imaging

## Laser Scanning Comparison Using CloudCompare

### Introduction

Light detection and ranging (LiDAR) sensor consists of a transmitter and a receiver. The transmitter contains a laser that emits beams of light, while the receiver collects the photons that return from the transmitted laser (Wandinger (2005)). Figure 1 shows a simple representation of a LiDAR system.



**Figure 1**

*Principle setup of a LiDAR system (Wandinger (2005))*

Multiple forms of LiDAR systems can be used for various applications. For example, Conti et al. (2024) compared two applications of LiDAR sensors in the use of an Italian town hall building. The two sensor applications are terrestrial and mobile laser scanners (TLS and MLS respectively). A terrestrial laser scanner uses a LiDAR sensor mounted on a tripod and scans the area around it. Meanwhile, the MLS is a handheld LiDAR sensor that can be carried and transported with one hand. Figure 2 shows a MLS and TLS device.



**Figure 2**

*Hovermap Emesent MLS (left) (Emesent (2024)) and FAROFocus TLS (right) (FARO (n.d.))*

Conti et al. (2024) found that the MLS is able to create a streamlined and efficient workflow that is suitable for the documentation of heritage buildings. However, where a higher level of detail is required, the TLS would be more suitable. In this report, I aim to investigate the differences in the MLS and TLS through using the LiDAR systems shown in figure 2. Dense point clouds will be obtained for each system before being compared using the open source software CloudCompare. This software has been shown to be able to compare two different point clouds and investigate their respective quality (Girardeau-Montaut (2016)).

The overall procedure in investigating both LiDAR systems involves with firstly determining hardware settings and object to be scanned, followed by performing the scan to create a dense point cloud. The resulting point clouds will then be aligned and compared to each other qualitative and quantitatively. More details regarding the project procedure will be discussed in the methods section.

## Method

### Procedure

### Results

Table 1 summarizes the data. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

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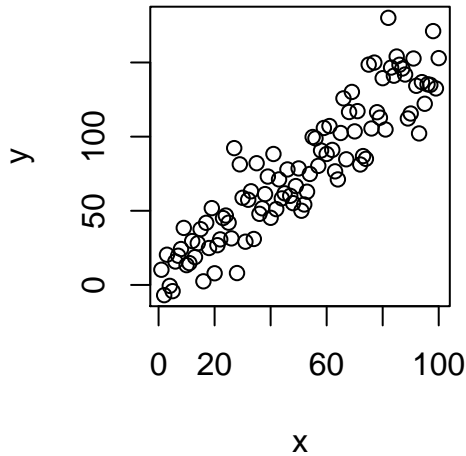
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**Table 1**  
*Sample Basic Table*

Item		
Animal	Description	Price
Gnat	per gram	13.65
	each	0.01
Gnu	stuffed	92.50
Emu	stuffed	33.33
Armadillo	frozen	8.99

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Figure 3 shows this trend.



**Figure 3**

*This is my first figure caption.*

## Discussion

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