Chair of Computational Modeling and Simulation
TUM School of Engineering and Design
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Tri-modal Point Clouds for Digital Twin Enrichment

Task

We have built a custom tri-modal sensor system to acquire feature-rich point cloud data. In this SWL you will work with this system (see Figure 2) to acquire data and leverage semantic segmentation across sensor modes. The goal is to investigate the recognition and reconstruction of the following subtypes: Walls (exterior, interior, load-baring, partitioning...), Pipes (supply, return, …), Electronics (cables, …) (see Figure 1). .

- Literature review on benefits of thermography for increase level of detail in Scan-to-DT
- Familiarize with **LiDAR, RGB, and TIR** Sensors
- Understand and improve the **sensor fusion**.
- Deploy **semantic segmentation** on point clouds (e.g. PointNext) or images (e.g., Mask RCNN) across sensor modes.
- Acquire data and reconstruct primitive shapes for subtypes.

Project Characteristics

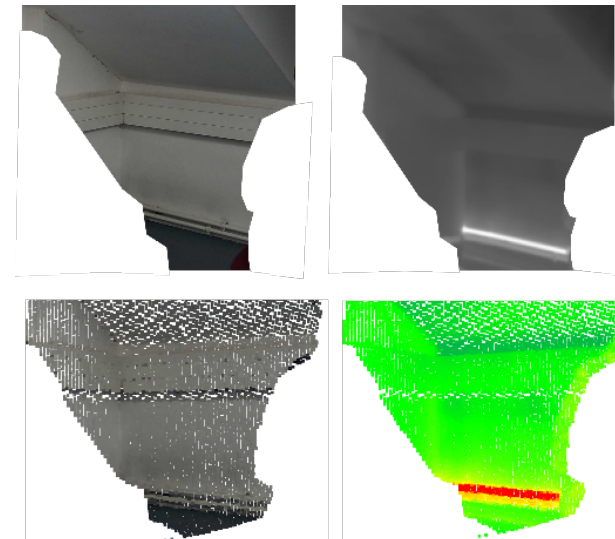|	
Modeling:	▮▮▯▯
Mathematics:	▮▮▮▯
Programming:	▮▮▮▯
Science:	▮▮▯▯

Figure 1: RGB and TIR image modes (top row), enriched point cloud (bottom row). The semantics of the thin pipes can be detailed as supply vs. return.
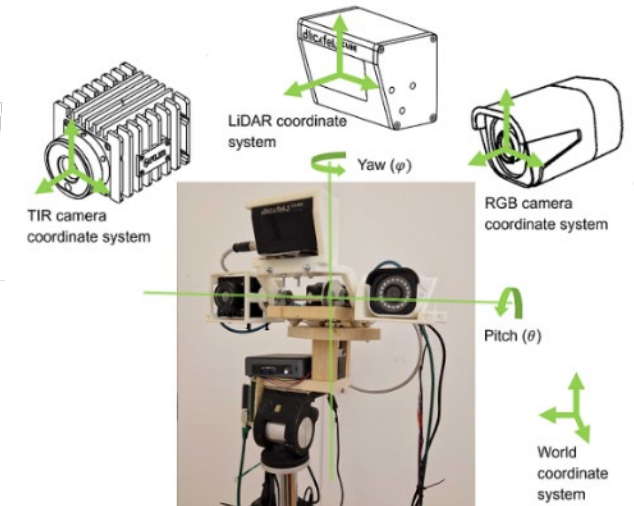

Figure 2: Tri-modal scanning: Setup