

## The Algorithm Design for Incomplete Needle Point Cloud

### Matching with CAD Model

The needle detection and reconstruction is the key challenge to realize the automatic operation of eye surgery (Figure 1). Currently, *i*-OCT image technology (Zeiss Lumera 700) is an available approach to obtain 3D image of needle with ideal resolution (Fig.2). However, the point cloud obtained by *i*-OCT is incomplete (Fig.3). How to match the known CAD model of the needle to this point cloud becomes both a mathematical and engineering problem.

The successful algorithm can match the CAD model of the needle to the incomplete point cloud, so the pose information of the needle can be easily estimated.

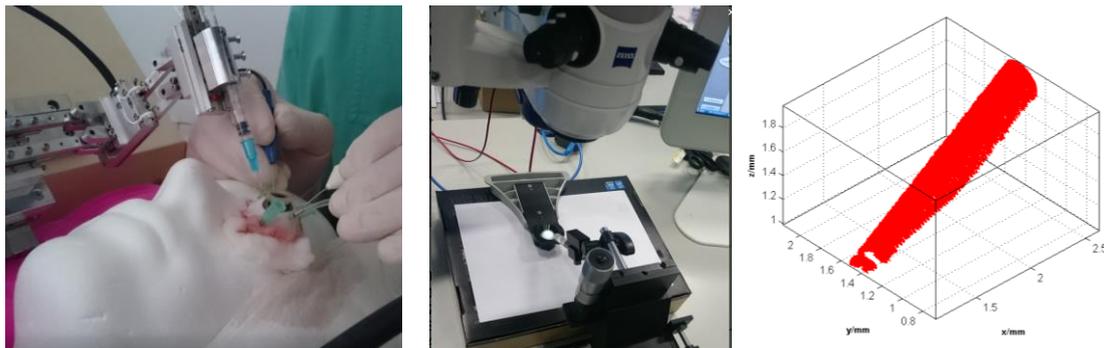


Fig. 1. Operation of robotic-assisted eye surgery in TUM-MRI; Fig. 2. Zeiss Lumera 700; Fig. 3. 3D point cloud from *i*-OCT

The project will include following phases:

1. Take some literature review.
2. Learn the ICP (iterative closest point) algorithm.
3. Improve the ICP for incomplete needle point cloud matching.
4. Write and conclude the results.

We require the candidate having basic knowledge of image processing and good math background.

If you have interest please contact us for further information:

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