MECHANICAL ENGINEERING STUDENT SEMINAR

Monday, November 28 2022 at 12:30, **Online:** https://technion.zoom.us/j/95431125574

Localization of non-rigid objects in a 3D scene for assembly using learning methods

Roee Anisfeld

Adviser: Prof. Anath Fischer

In the modern world of mass production, assembly process of different parts of various materials, with respect to geometrical and physical properties, is time consuming.
Furthermore, these processes are often done manually and thus time consuming and require qualified workers, making it prone to human errors and cost inefficient.
We wish to integrate computer vision and deep learning methods in automating the process and make it more accurate and less time consuming.
This research work focuses on developing a methodology of a real time pipeline for computing orientation and location of non-rigid objects in a 3D scene for assembly by using learning methods.
The method handles RGB-D images from a LiDAR sensor to extract skeletal points using two convolutional neural networks. The first, Mask RCNN, intended to segment the object of interest from the working environment using the RGB input. The second network, SkelNet, designed to extract high level features using the depth map. The final output is a set of points lying on top of the theoretical skeleton curve.
Furthermore, deep learning methods requires ground truth data. For the data acquisition part, we designed a tool to extract masks out of RGB images and skeletal points out of segmented point clouds.
Practical tests yielded very encouraging results of identifying real life situations of a non-rigid part which proved to be implementable in an assembly environment. For example, the proposed system that was tested can be mounted on a robotic arm in an assembly line to grasp and insert a gasket into its designated groove.

Note: the seminar will be given in Hebrew

Seminars Coordinator: Assoc. Prof. Matthew Suss.