סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ה' 19.12.2019
(כ"א בכסלו, תש"פ), בניין דן קאהן, אודיטוריום 1, 13:45.

מרצה: גלעד גוטליב

מנחה: פרופ' ענת פישר

על הנושא:

Predicting Human Motion in Human-Robot Collaborative Tasks using Learning Methods

The seminar will be given in Hebrew

תקציר ההרצאה :

In the design of industrial assembly environments, robots carry out many of the physical, repetitive or risky tasks while the human worker performs higher complex manual tasks up or downstream. Furthermore, manufacturing companies facing high demand for customized and personalized products require flexible assembly capabilities which consequently dictate the use of collaborative robots (Cobots). Therefore, there is a need for a real time analysis that will lead to an optimal and adaptable robot-worker collaboration. According to the recent advanced technology of sensors and cameras, spatial data can be captured in real time and analysed for human motion perception.

This research focuses on developing a learning method for human motion prediction that can be used by Cobots for optimal trajectory planning. The method was developed for multi-task missions of both human and robot operating simultaneously. The new features of the method includes: outlier detection, automatic hyper-parameters tuning for performance enhancement.

The approach consists of offline and online phases. In the offline phase: a) Human motion data such as skeletal pose information and a 3D model, is gathered while performing set of tasks; b) This data is used for the construction of Gaussian Mixture Models (GMM) library; and c) The human occupancy volumes are calculated for each task. In the online phase, the acquired GMM models are used for task recognition and human motion prediction. The method was expanded to detect outlier trajectories. In addition, a method for hyper-parameter selection for optimizing prediction performance was developed and tested. A synthetic simulation environment was created to validate the learning method. The method was applied on existing human arm reaching motions. The results show more than 87% success in recognition when only 10% of the human motion was observed. The Cobot human-aware map can be updated according to the recognition results and the predicted human occupancy volume. Priority list of Cobot tasks can be rated according to the interference probability of the human worker with the Cobot.

בברכה,

פרופ"מ מתי' סוסו

מרכז הסמינרים