סמינריון

הנך מוזמן/ת להרצאה סמינריונית **במסגרת הדוקטורט** של הפקולטה להנדסת מכונות שתתקיים ביום ה' 7.11.2019 (ט' בחשון, תש"פ), בניין דן קאהן, חדר 217, 15:00.

מרצה: הלל בוניס

מנחה: פרופ'/ח אילון רימון

על הנושא:

Caging via Minimalistic Robotic Grasping Systems

The seminar will be given in English

תקציר ההרצאה:

Caging offers a robust method for grasping objects with multi-finger robot hands. To grasp an object, the robot hand is first configured in a cage formation around the object. The cage formation allows the object some freedom to move within the hand, but prevents it from escaping the hand. The hand is then closed until the object is completely immobilized by the fingers, without any need for a precise placement of the fingers relative to the object. I will present novel caging-to-grasping algorithms for polygonal objects and robot hands comprised of three point or disc fingers that open according to the single parameter σ. The configuration space of such hands is four-dimensional. Given a user specified target immobilizing grasp of an object, the algorithms compute the set of cage formations associated with it, i.e. the caging regions. Starting from any cage formation in the set and closing the hand guarantees that the object will remain caged throughout the caging-to-grasping process, until an immobilizing grasp is reached.

The algorithms are based on the construction of a caging graph embedded in the hand's two-dimensional contact space. Contact space parameterizes all the hand configurations at which at least two fingers contact the object. The nodes of the caging graph represent frictionless equilibrium grasps of the object, as well as finger contacts at vertices of the polygonal object. The caging graph edges represent feasible hand motions between hand configurations corresponding to the caging graph nodes. Starting from the target immobilizing grasp and gradually opening the hand, the set of cage formations is determined by the maximal cage formation that allows the object to escape the hand for the first time, termed the escape puncture grasp. The maximal cage formation forms an equilibrium grasp of the object, and is hence represented by a graph node. The difficult task of computing the caging set in the hand's four-dimensional configuration space is thus reduced to a simple task of searching the caging graph for the maximal cage formation.

The first caging-to-grasping algorithm that will be presented considers a three-finger robot hand that squeezes a polygonal object in order to immobilize it, while forming any family of similar triangle finger formations. This allows the user a rich choice of grasps that can be used to immobilize the object. The second algorithm considers locking polygonal objects against a linear wall using robot hands having two point or disc-fingers. The wall is treated as a third finger of an equivalent three-finger hand. The caging-to-grasping algorithms will be demonstrated on real world objects.

בברכה,

פרופ"א מתי סאס

מרכז הסמינרים