סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ה' 19.12.2019
(כ"א בכסלו, תש"פ), בניין דן קאהן, חדר 217, 15:00.

מרצה: רום ברץ

מנחה: פרופ'/ח אילון רימון

על הנושא:

Battery Powered Coverage of Planar Environments by an Autonomous Mobile Robot

The seminar will be given in Hebrew

תקציר ההרצאה :

This thesis is concerned with battery powered coverage by an autonomous mobile disc-robot of size D in known and unknown environments, while utilizing a single charging station at which the robot begins and finishes the coverage task. The restrictions imposed on the robot include finite battery capacity which limits the length of each individual coverage path, and a sensory input from a single on-board scanning range sensor.

In this thesis, both the off-line and on-line Battery Powered Descending Coverage (BPDC) algorithms are defined and analyzed. The performance analysis of both algorithms is based on the notion of competitiveness, which measures the algorithm path length, l, relative to the length of the optimal off-line coverage path, $lopt$. The off-line BPDC algorithm developed in this thesis is shown to have a constant factor upper bound: $l \leq 3\sqrt{2} \cdot lopt$. For the on-line BPDC algorithm, a proof sketch is included in this thesis, in which it is conjectured that the algorithms performance is bound by: $l \leq \log 2\ (L2D) \cdot lopt$, where L is the maximal length of a single battery-powered coverage path. Moreover, this bound is tight.

This thesis includes an improved lower bound on the length of the optimal off-line coverage path, $lopt$. The improved bound on $lopt$ is used in execution examples that compare the performance of the BPDC algorithm against existing battery powered coverage algorithms. The results of these simulations show the effectiveness of the BPDC algorithms when compared both to existing algorithms, and to an unknown optimal coverage path. Finally, execution examples demonstrate the compatibility of the BPDC algorithms to implementation with regard to computational resources and robustness with regards to localization errors.

בברכה,

פרופ"מ מתי' סקס

מרכז הסמינרים