שם הקורס: Robotics Seminar on Multi Agent Path Finding

מספר הקורס: 236824

סמסטר: אביב תש"פ

מרצה:	**אורן זלצמן**
שעות הרצאה:	2 ד' 1630-1830
שעת תרגול:	-
דרישות קדם:	236501 **Introduction to Artificial Intelligence**
אתר הקורס:	

תאור הקורס

In this seminar we will study recent advancements in Multi Agent Path Finding (MAPF) – The problem of coordinating the movement of a fleet of agents or robots. This decades-old family of problems, which has been intensively studied by the robotics and AI communities, has applications in diverse settings including assembly, evacuation, micro-droplet manipulation and search-and-rescue.

One specific application which we will concentrate on is the logistics domain: Modern warehouses store inventory pods where a large number of robots autonomously pick up, carry and release the pods from their storage locations to designated dropoff locations where needed goods are manually removed from the pods (to be packaged and then shipped to customers). The successful use of robots in warehouses led to a multi-billion industry led by tech-giants such as Amazon robotics and Alibaba.

In the course we will study the algorithmic aspects behind this problem. After introductory lectures on the topic, we will go over recent published work that. The approaches we will study include search-based methods, SAT-based methods and more.

דרישות הקורס

- Attendance in at least 80% of the lectures.
- Presenting 1-2 scientific papers.
- Writing a report at the end of the course.

רשימת ספרות

Here is a partial list of relevant papers:

- P. Surynek, A. Felner, R. Stern, and E. Boyarski. E_cient SAT approach to multi-agent path finding under the sum of costs objective. In ECAI, pages 810-818. IOS Press, 2016.

- E. Erdem, D. G. Kisa, U. Oztok, and P. Sch• uller. A general formal framework for path finding problems with multiple agents. In AAAI, 2013.

- E. Boyarski, A. Felner, R. Stern, G. Sharon, D. Tolpin, O. Betzalel, and S. E. Shimony. ICBS: improved conflict-based search algorithm for multi-agent path_nding. In IJCAI, pages 740-746, 2015.

- J. Li, A. Felner, E. Boyarski, H. Ma and S. Koenig. Improved Heuristics for Multi-Agent Path Finding with Conflict-Based Search. In Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI), (in print), 2019.

- J. Li, H. Zhang, M. Gong, Z. Liang, W. Liu, Z. Tong, L. Yi, R. Morris, C. Pasareanu and S. Koenig. Scheduling and Airport Taxiway Path Planning under Uncertainty. In Proceedings of the AIAA Aviation Forum and Exposition (AIAA), (in print), 2019.

- H. Ma, D. Harabor, P. Stuckey, J. Li and S. Koenig. Searching with Consistent Prioritization for Multi-Agent Path Finding. In Proceedings of the AAAI Conference on Artificial Intelligence (AAAI), (in print), 2019.

- G. Sartoretti, J. Kerr, Y. Shi, G. Wagner, S. Kumar, S. Koenig and H. Choset. PRIMAL: Pathfinding via Reinforcement and Imitation Multi-Agent Learning. IEEE Robotics and Automation Letters, (in print), 2019.

- M. Liu, H. Ma, J. Li and S. Koenig. Task and Path Planning for Multi-Agent Pickup and Delivery. In Proceedings of the International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS), (in print), 2019.

- J. Wang, J. Li, H. Ma, S. Koenig and S. Kumar. A New Constraint Satisfaction Perspective on Multi-Agent Path Finding: Preliminary Results. In Proceedings of the International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS), (in print), 2019.