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Autonomous On-Demand Transit Services Over Existing Guideways

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The lecture will be held on
Tuesday, November 24, 2020, at 14:00 Via Zoom
https://us02web.zoom.us/j/81629327845?pwd=a3NWNzl4cjd1R09nMCtJL3VZcU5WZz09

Abstract:
Technological advances in vehicle autonomy, vehicle connectivity and vehicle electrification are expected to revolutionize urban mobility by enabling seamless on-demand mobility services. However, due to regulatory, behavioral, moral and cyber-security barriers, a significant adoption of fully autonomous vehicles is only projected to occur in two to three decades. Nevertheless, in the near future, new mobility services that are based on autonomous vehicle technology may be implemented at a large scale, in dense city centers, by deploying them in controlled environments.
In this research, we examine for the first time the potential of transforming existing guideway based public transportation systems (tram, light-rail, regional trains, BRT) to novel on-demand point to point services by utilizing current technological capabilities. In particular, our objective it to reveal the characteristics of existing systems that have high potential to be successfully transformed to the proposed on-demand services. For this purpose, we have developed an approximate model and a simulation model that represent the dynamics of the service. The approximate model is based on the Israeli Queue model which allows accurately measuring the waiting times of the passengers under ridesharing policies. The simulation model replicates in more details the operations of the proposed service while relaxing several simplifying assumptions made in the approximate model. Numerical results obtained for case studies derived from several public transit systems around the world, confirm that the proposed service can indeed improve the quality of service provided to the users. In some cases, such improvements represent up to 50% reduction in the average waiting time. Furthermore, the numerical results highlight scenarios under which the approximate model is accurate. Lastly, some scenarios in which the approximate model is not accurate has opened the door for the exploration of a new queuing model in a future study.
This work was performed under the supervision of Dr. Mor Kaspi

Bio:
Omer Karny is a Master student in Tel Aviv University's Industrial Engineering (Business Analytics) program. He holds a B.Sc. in Mathematics and Computer Science from Ben-Gurion University. Omer is a Major in a combat unit of the IAF, where he has served for the past 12 years. During his time in the IAF, he has received several rewards for outstanding service. Currently, he holds a position in a company that develops cyber-security solutions for industrial automation

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