

Udgam Goyal

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Professor Kent Larson

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### UROP Proposal

My UROP for this semester under Yan Zhang will be in the MIT Media Lab within the City Scope project. I will be assisting Mr. Zhang in the visual simulation and computational efficiency of the project. This research, conducted by the Changing Places group of the Media Lab, is focused upon virtual simulation and data analysis regarding the interaction of society and the physical environment. More specifically, the research focuses on optimizing different aspects of city life by utilizing cutting edge technology in various time frames, including prior to actual implementation within cities. For example, the research will allow for simulation of everyday life, and can demonstrate changes caused by various disruptive technologies and societal conformations. Overall, the changing places group's research is exciting due to its future possibilities in how such advancements can make a lasting impact on society.

My research will focus on the interaction of personal electric vehicles in various cities across the globe. To begin, I will be utilizing Processing to extend the simulation of the interaction of the vehicles within a city, which in this case will be Hamburg. I will start off by developing a path finding algorithm that optimizes paths for the vehicles based on a desired pick-up location, which we will call a node, to a goal destination. Basically, I hope to implement a simulation similar to Uber within cities through personal

electric vehicles. Such an algorithm will account for the appropriate “cost” of each path based on distance, and will utilize a graph search to choose an empty and nearby PEV to quickly provide the delivery to the final destination. Afterwards, once the algorithm effectively ensures an optimized delivery system for packages and humans, I will develop a logging system that can incur the data of the various deliveries throughout the city as they occur. This will allow for an analysis of the overall simulated system, which will provide researchers with much needed data regarding the impact of such autonomous vehicles in the city, and whether such a technology is viable from many different perspectives. This data will allow for analysis on the cost to return ratio for such technology, allowing for an understanding of the potential capabilities of PEVS once they have been fully developed for transportation purposes. Furthermore, such will assist the overall city scope simulation, as it will be another aspect with which to improve societal communication and efficiency.

Personally, I am extremely motivated by this project for a number of reasons. First and foremost, this opportunity will provide me with a learning opportunity regarding technologies that truly excite me. I’m hoping to garner a better understanding of machine learning and data visualization methods through my time under Dr. Zhang. Furthermore, I am passionate about this project due to its future implications. Throughout my life, I have dreamed of working on technology that can beneficially impact the community. After seeing the widespread implications of this project, I find myself truly enthralled by the idea of making a difference so early in my time at MIT. Very few people have the opportunity to initiate change at a young age. Therefore, I hope to utilize

this opportunity as a stepping stone to increasing the efficiency and prosperity of the global community.