ABSTRACT

THESIS: Constrained Time-critical Vehicle Routing Problem for Multiple Mobile Agents

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In the Information Era, integrating technology with the real-world environment is a trending paradigm that attracts researchers in many fields. For example, Smart Cities' applications integrate information technology with existing infrastructures to optimize many aspects, such as time, energy, and cost. However, many difficulties show up, including a time constraint in some of the applications when it is implemented in the real world. One of these applications is smart transportation. This thesis explores Vehicle Routing Problem (VRP) and introduces a variant of VRP that relates to time constraints called VRP with Time Window (VRPTW). Firstly, the problem is formulated into a linear mathematic program with the objective of minimizing the number of agents used in routing and minimizing the time spent in agents' routing. A heuristic approach solves this problem by using a combined of A* Search and Ruin and Recreate algorithms to find the shortest path for agents. Additionally, the Local Search Algorithm is used to minimize the number of agents used in routing. Two case studies test this heuristic approach: a case study

in changing number of nodes, and a case study in changing nodes' duration. The results are represented in numbers to show the reduced number of agents and time cost, while graph plots show the agents' routings.