

# Abstract

**Shaimaa A Ahmed**

## **Energy Efficient Path Planning Techniques for UAV-based Systems with Space Discretization**

Abstract—Unmanned Aerial Vehicles are miniature aircrafts that have proliferated in many military and civil applications. Their affordability allows for tasks to be held with not just one but a fleet of UAVs. One of the problems that arise with the use of multi-UAVs is the multi-UAV path planning and assignment problem. We propose three algorithms that aim at assigning energy efficient trajectories for a fleet of UAVs. Our optimal path planning solution (OPP) is formulated using a Mixed Integer Linear Programming model (MILP). We also propose two other heuristic solutions that are greedy in nature namely, Greedy Least Cost (GLC) and First Detect First Reserve (FDFR). To aid with collision avoidance, we adopt the concept of space discretization, and present a more realistic view of the space a UAV occupies. The comparative study of our proposed solutions reveals insightful trade-offs between energy consumption and complexity.