

Multi-Agent Reinforcement Learning for Coordinated Drone Search and Rescue Operations

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Abstract—

*Index Terms—*Multi-agent reinforcement learning, drone swarms, search and rescue, coordination, decentralized control

I. INTRODUCTION

- A. Context
- B. Problem Gap
- C. Research Question
- D. Objectives
- E. Contributions

II. RELATED WORK

- A. Prior Work on Swarm Robotics and SAR Optimization
- B. Existing MARL Frameworks
- C. Research Gaps

III. METHODOLOGY

- A. Simulation Framework Design
- B. Individual Environments
 - 1) Environment A: [Name]:
 - 2) Environment B: [Name]:
 - 3) Environment C: [Name]:
- C. Reinforcement Learning Algorithms
 - 1) Single-Agent Baseline:
 - 2) Multi-Agent RL:

IV. RESULTS AND ANALYSIS

- A. Performance Metrics
- B. Quantitative Results
- C. Qualitative Observations

V. DISCUSSION

VI. CONCLUSION AND FUTURE WORK

- A. Summary of Findings
- B. Future Directions

REFERENCES