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Develop and evaluate gesture-based control of an Unmanned Aerial Vehicles Swarm

Recent advances in multimodal AI models have made it possible to interpret human intent and context in complex environments. One promising application is the control of multi-robot or swarm systems. However, it is still an open challenge to determine how humans can effectively interact with and control such swarms in real-world scenarios. This thesis will focus on developing and analyzing methods for gesture-based control of UAV swarms. It will investigate how hand gestures, captured from an egocentric point of view (e.g., through XR/AR devices or digital twins), can be used to control and coordinate a group of drones. Students will be expected to design interaction methods, implement prototypes, and evaluate their usability and performance in simulated and/or physical UAV swarm experiments.

Your tasks

- Conduct a systematic literature review on machine perception and multimodal interaction methods
- Develop a gesture-based control interface for UAV swarm interaction
- Implement logging tools to track and analyze human–machine interaction metrics
- Evaluate the control interface and performance in both:
  - a digital twin environment (e.g., Meta Quest Pro/Quest 3)
  - a real-world UAV swarm deployment (e.g., ModalAI / Crazyflie drones)

Your profile

- Enrolled in a Master's program in Computer Science, Engineering, AI, or a related field, and entering your thesis semester
- Experience with object-oriented programming, ROS, and simulation software (e.g., Unity3D)
- Interest in human–robot interaction, UAV systems, and XR/AI technologies

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