

Sky-Watch:
*A drone-based implementation of MARL
to facilitate 3D reconstruction*

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We plan to implement a wireless network of semi-autonomous drones acting on a Multi-Agent Reinforcement Learning (MARL) framework which will quickly gather images of a scene for 3D reconstruction. The MARL framework will determine the areas of the scene that need more data for a coherent 3D reconstruction and will direct the drones to act accordingly. We are creating the algorithms to run MARL with the Robot Operating System (ROS). ROS is a system that governs the control and data acquisition between ROS-compatible robots and systems. The images we stream from our drones will be compiled in near-real time into a semi-dense 3D model of the scene we are surveying. Applications of our project include quickly reconstructing disaster scenes like hurricane disaster areas or densely reconstructing hard-to-reach but information-sensitive locations like bridges and dams. The project timeline is three months, and at the close we intend to have at least two drones on the network gathering images of a sample scene, such as a scale-model house. Each of these drones will receive feedback about the status of the 3D reconstruction on how best to move to gather new images. We will compare different methods of 3D reconstruction and MARL algorithms for qualities such as speed, accuracy and density of reconstruction.