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Title of Poster: Distributed Swarming Robotic System

Abstract: Distributed swarming robotics is a new approach to the coordination of multi-robot systems based on the ideology set forth by the concept of swarming intelligence. The multi-robot system consists of multiple, simple, homogenous robots which follow a set of simple rules to coordinate their movement to accomplish a task. This approach emerged from observations of the behavior of social insects, such as bees or ants, to locally coordinate themselves to perform a task. The robots built by this team will simulate the function and movement of future robots which will focus to resolve the issue of the Kessler syndrome, an idea describing the increasing cascading effect of multiple collisions of space debris with satellites and space artifacts found in low earth orbit. The robotic system uses several enhanced iRobot Creates capable of moving in coordinated patterns as a basis for future applications. The Creates have been modified with a microcontroller, voltage regulator, and a wireless router to bidirectionally communicate with a central computer via a wireless TCP/IP connection. Using triangulation, the location of the robots will be determined by information gathered from two rotating infrared sensors set at fixed locations. Using C++ with Qt, a user friendly GUI was developed to control the functions of the robots and the infrared sensor. In addition to removing and extracting space debris, this project will pave the way for future exploration and research of practical applications including, but not limited to, military or geographical reconnaissance, transportation of supplies, formation flying or movement, gaming, or multiple satellite coordination.