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Advisor: Dr. Robin Murphy
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Research Title: Automated Marsupial Landing for AirRobot Quad-Rotor Helicopter

Description: I am responsible for developing general, modular software to enable the AirRobot to autonomously dock on top of another robot. I will develop three iterations of software, and a fourth if time allows. The first iteration will demonstrate a two-dimensional potential field method for docking. The second iteration will extend the first iteration to three-dimensions. The third iteration will be implemented for simulation in SARGE. If these steps are accomplished in time, the fourth iteration will be implemented on the actual AirRobot Helicopter system a reach goal.

Purpose: To extend the abilities of the AirRobot to land on another robot in a marsupial-style docking maneuver. This topic was given because it is a necessary step in the research projects involving the AirRobot Helicopter.

Project Goals and Implications: I expect to complete simulations for the first three iterations as described above. As mentioned, if this is completed, I will attempt the fourth iteration. Completing this work will facilitate expanded functionality of the AirRobot system, which will in turn contribute to the field of search and rescue robotics.

Personal Goals: The expected deliverables are described under the Project Goals and Implications section. This work will contribute to my personal career goals by providing opportunity to learn by experience about robotics, which is my specific field of interest. The work will also simulate graduate-school-type work, which will aid me in the decision-making process in the upcoming year.

Approach: I will interweave research and implementation to solve the given problems. Since I am inexperienced in graphical application programming, there will be a considerable amount of researching, learning, and practicing before any implementation can occur. As the project progresses, implementation will become more commonplace as I learn more about how to do so. On a daily basis, until the specific iteration I am working on is completed, I will research until I am able to implement the necessary component, and then move on.

Method and Materials: I will mostly just use Google (and Dr. Murphy if necessary) to obtain information on how to solve the problems. I will use NetBeans or Visual Studio as an IDE for these problems.

Work Schedule: I expect to work from 8:00am-4:00pm, Monday-Friday on the project (in the lab unless granted permission by Dr. Murphy for some reason).

Deliverables and Dates: 6/5 – Submit research plan detailing schedule and goals for project.

6/26 – Demonstrate 2D potential fields docking software (both top and side views).

7/17 – Demonstrate 3D potential fields docking software (extend 2D software to a single 3D view).

7/22 – Submit abstract for possible publication and poster. Will be written regarding the first two (possibly three) milestones in the software.

7/31 – Demonstrate 3D docking code modules in the Search and Rescue Game Environment and Robot Simulator (SARGE).

8/3 – Complete and present poster detailing all completed summer research.
8/5 – Complete website describing the REU experience and research.
8/5 – Turn in REU required research paper, as well as IEEE format publication.