

The Field Robotics Center

Seminar Series

Thursday 27 Jun GHC 2109 11:30am - 12:30pm

Pizza will be served



Chen "Ken" Friedman

PhD Candidate
University of Maryland

Obstacle Avoidance and Targeted Flight for Rotary Wing MAVs in GPS-Denied Environments

Abstract: The talk focuses on targeted flight of rotary-wing micro aerial vehicles (MAVs), in previously unexplored, GPS-denied environments. Targeted flight is defined as navigating to a goal position, defined by relative distance from a known initial position. It differs from the more common task of mapping, as it may not rely on loop closure opportunities to smooth out errors and optimize the generated map. Therefore, the importance of position estimates accuracy is increased. An original SLAM algorithm is developed, and its accuracy is quantitatively assessed using an original metric, showing significant advantages over current methods. Repeatability and robustness are shown using a set of 12 similar experiments on a benchmark scenario, as well as implementation on a ground, human, and aerial platforms. The algorithm is further tested on multiple different scenarios. The SLAM algorithm is then coupled with a global A* path planner, and applied on a single rotor helicopter, performing targeted flight missions using a pilot-in-the-loop implementation. The pilot is provided with only heading information while artificial (invisible) obstacles are introduced, considered only by the path planner, to prevent the pilot from interfering with the obstacle avoidance task. The resulting path shows the helicopter successfully avoiding both real and artificial obstacles, while following the planned path to the goal.

Speaker Bio: Chen (pronounced "Ken") is a PhD Candidate at the University of Maryland, College Park. His research focuses on SLAM for micro aerial vehicles. Previously, he worked as an engineer for the Israel CFD center and in Helicopter Simulations at the Aerospace Engineering Department at Technion, Israel. He received his BS and MS in Aerospace Engineering from Technion in 2004 and 2006 respectively.



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