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Session 10: University Library - Special Collections Room
Time of Presentation: 3:00 PM

Presentation Type: Oral presentation

Project Title: Quadrotor for Indoor Surveillance and Reconnaissance

Synopsis: The research and development of an indoor quad rotor capable of; autonomous flight, obstacle avoidance, and mapping of indoor environments.

Abstract: Many scenarios, both military and civilian, necessitate the mapping and reconnaissance of possibly hazardous unknown indoor environments. Examples of such scenarios include indoor search and rescue missions after natural disasters and soldiers securing buildings with possible hostile forces. These missions exhibit high risk of human life loss and employing unmanned remote controlled drones has the potential of preventing unnecessary injuries or deaths. However, the lack of obstacle avoidance capability has limited the use of these vehicles, especially in the Unmanned Aerial Vehicles field. The purpose of this research is to develop an autonomous quad copter capable of 3-D mapping enclosed areas and obstacle avoidance. The system will utilize Simultaneous Localization and Mapping (SLAM) as its mapping technique by use of a 3-Dimensional camera. The camera sensor is composed of an infrared projector, an infrared monochrome camera, and a RGB camera which obtain the 3-D images and depth map calculations. The program utilized with the camera is SCENECT, an open source software based on the laser scan software SCENE by FARO. A 3-D depth map is constructed by the infrared monochrome camera’s reception of reflected infrared signals that are produced by the infrared projector. Chromatic and 3-D depth images are obtained simultaneously with the object’s features by using the RGB camera. Ultrasonic rangefinders will later be implemented into the system to avoid collision with other objects. Once the minimum avoidance criterion is met and implementation of 3-Dimensional Camera is complete, flight testing phase will commence.