Abstract

An Unmanned Aircraft System (UAS) can be used for different purposes including enjoyment, filming, or mapping locations. UAS's usually depend on a Global Positioning System (GPS) and Inertial Measurement Unit (IMU) for navigation and altitude controls. In certain applications like search and rescue missions or transporting cargo in dangerous territory, GPS is vulnerable to being hacked and traced. To remedy this, the United States Navy requested a UAS to carry a payload to a predetermined location without GPS to improve stealth in hostile environments. This project will provide alternative navigation systems where GPS will not be used during UAS flight. Sensors including Light Detection and Ranging (LiDAR) and a barometric altimeter will be used to fly to a predetermined altitude of 40 meters from the ground and any unforeseen obstacles. The IMU will estimate the location of the UAS through calculation of its instantaneous motion. Through visual odometry, the on-board camera can calculate the distance and orientation of landing markers allowing the UAS to land through visual recognition of encoded landing zone. All sensors were sufficiently accurate within desired parameters and will be integrated to address the problems associated with flying without GPS.