UAV Obstacle Avoidance and Collision Prevention System

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The drone industry is projected to be worth over 127 billion dollars by the year 2020 (Sun, 2016). This means drones will be everywhere: monitoring our food crops, delivering our packages, and even saving lives. It is imperative that these expensive and possibly dangerous machines have systems in place to avoid collisions with obstacles in their way. This project was aimed at creating a modular and lightweight system capable of detecting and maneuvering UAVs around obstacles in their flight path. A custom algorithm was developed to calculate evasive maneuvers a UAV should take to avoid obstacles in it's path. This algorithm takes in data from onboard sensors, flight commands, and other variables to calculate desired movements of the aircraft. After these calculations are made, the data is sent to the FMU (Flight Management Unit) so the necessary maneuvers can be performed. Specialized sensor hardware was developed to work closely with this algorithm. Due to this algorithm's flexibility, a large range of sensors can be used. In testing, stereo cameras, IR cameras, and ultrasonic sensors were used. A total of 4 different designs were created for testing. I tested each design in various environments with different types of obstacles. This system does allows for sensing in more directions than the industry leading obstacle avoidance system. Innovation like this will create a safer and more productive future for the drone industry.

Awards Won: