

**ECE Capstone program
Spring 2019
Project Abstract & Info**

Please provide the following information to be shared with on capstone information exchange platform:

- 1. Project number:** S19-05
- 2. Project title (as will appear on the poster):** Automated Drone Controller Design (ADCD)
- 3. Team members:** Iftidar Miah, Joseph Fitzgerald, Keemo Clarke, Lance Darragh
- 4. Adviser(s) name(s):** Director Zoran Gajic
- 5. Up to 5 keywords that will help to classify the project scope:**

Control Systems Design Autonomous Quadcopter

- 6. Project abstract (up to 250 words) to be shared with judges:**

Our project shows how a digital control system can be used to control the dynamically changing behavior of a quadcopter. We aren't inventing anything new, but we're gaining experience implementing a control system to control the physics of a real device, where the values of our signals have actual importance. This is taking us from abstract knowledge to tangible execution. We're first developing a mathematical model in MATLAB/Simulink, and then we're putting it on a physical device that we've designed from scratch. We're using a Raspberry Pi as the main control unit and an Arduino to collect the data. We're collecting data from several sensors telling us the physical state of the system, position, velocity, and translational and angular acceleration, as well as input from a remote control, and we're mapping all of them to the signals that control each of the four propellers.

The motor control signals use feedback signals from accelerometers, gyroscopes, a GPS unit, a barometer, and the current states of the propeller's rotational velocities. All of these are used to maintain stability during flight. All of these are used to program PID controllers for altitude and each of the three Euler angles, which also control translational motion. Some of these PID controllers are coupled together, so we're gaining experience designing not just a system, but a network of systems that are interdependent on each other. We've taken a modular approach to designing this system, and we'll be happy to show you the drone in action.