



Product Research

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Project Overview

MicroCART: Microprocessor Controlled Aerial Robotics Team

- Design mini quadcopter platform to be used in CPRE 488 and for Controls & Embedded Systems researchers
- Develop mini quadcopter printed circuit board (PCB), containing a Microcontroller, RF, IMU, and Wi-fi chip
- Develop software to stabilize and communicate
- Develop basestation to communicate with quadcopter
- Create documentation and video tutorials for future teams



Problem Statement



- ❖ Design a compact, user-friendly quadcopter platform with integrated hardware and software to be used for hands-on learning in CPRE 488.
- ❖ Ensure both remote accessibility and usability for future users through documentation and tutorials

Related Products

DJJ Mini 4 Pro Drone



- ❖ Lightweight, under 250g (with normal battery)
- ❖ Expensive (\$1000+)
- ❖ Omnidirectional vision sensor arrays
 - Safe for beginners to fly
- ❖ Batteries are short range, extras are expensive

Related Products

Kopis Freestyle FPV Drone



- ❖ Powerful flight controller
 - 6 UARTs
- ❖ First Person View Camera
 - Sticks out of frame slightly
- ❖ Short flight time
 - 5 to 6 minutes
- ❖ Buzzer to help locate when crashed

Related Products

Current CPRE 488 Drone



- ❖ Highly customizable for student learning
- ❖ Testing rigs to help test rig in a safe manner
- ❖ Labs in CPRE 488 based on this drone
- ❖ Lots of latency with communication between base-station and quadcopter

Market Gap

- ❖ Sufficient battery life
 - Due to a limited size, the potential life of the battery is also limited
- ❖ Drone is able to be manipulated for its user (Code-wise)
- ❖ Ability to communicate between quadcopter and base-station with low latency to prevent crashes

New Ideas

- ❖ Use sensors to detect when drone is near obstacles while flying.
 - Slow drone down when near obstacles/ground to prevent crashes
- ❖ Look into how battery is being used and optimize to have longer flight times on a full charge
- ❖ Design drone with secured parts with established parameters and make a program to compensate for any uncentered weight
 - Use sensors to record tilt when not moving

Conclusions



- ❖ Several of the similar products we found had battery life issues.
 - Will work to see if we can remedy this issue
- ❖ Our drone needs to be customizable for our users (CPRE 488 students) to work with for their labs
- ❖ Need to ensure safety for the drone when flying
 - Sensors to detect obstacles / ground
 - Lower latency between base station and quadcopter

Works Cited

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