Precision Delivery Device for Sensors and/or High Value Cargo

Students
Samuel Scherer, Jordan Coult, Thomas Longanecker

Faculty Advisor
Howard J. Chizeck (chizeck@uw.edu), Sumit Roy

Course #
EE 448/449

Sponsor
Applewhite Aero

Applewhite Aero
Unmanned Systems

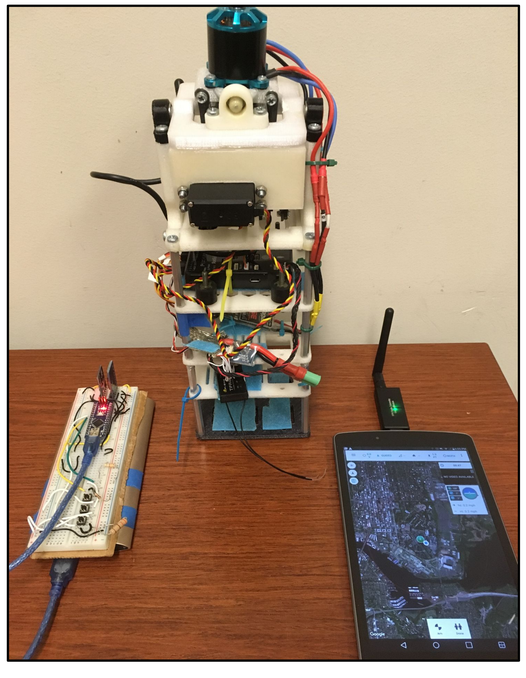
"Development of a motion controller and tablet application for directing a cargo-carrying drone to precise locations."

Introduction

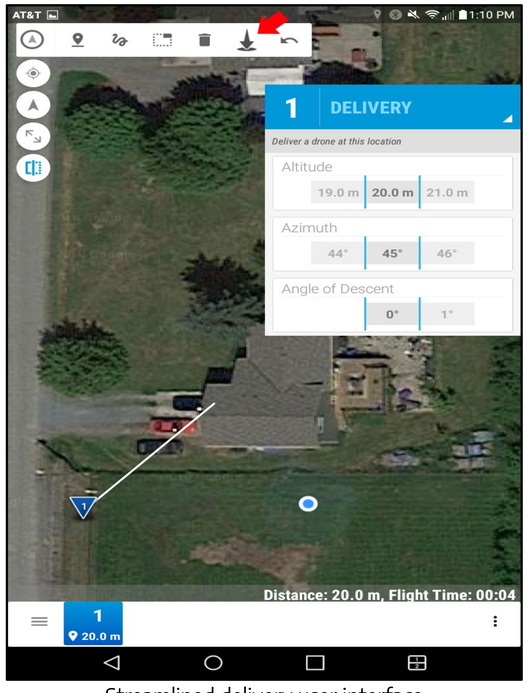
Applewhite Aero, a developer of UAV systems for private and military sectors, wanted easy-to-use control methods for their coaxial copter drone called the "Baton".

Our Objectives

- Develop simple manual controller
- Create streamlined delivery command
- Interface with existing drone-control software



Motion controller prototype circuit (Left)
Applewhite Aero 'Baton' UAV prototype (Center)
Android tablet running drone software (Right)



Streamlined delivery user interface

Auto Delivery

For automatic, easy drone delivery, a feature was added to the existing Android software, "Droidplanner".

The user taps a button, selects a location on the map, and taps launch to send the drone to the desired delivery location. Additional parameters exist for:

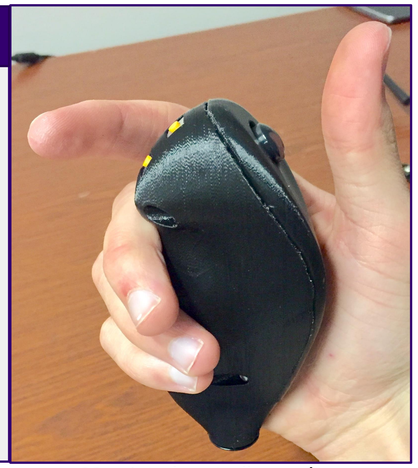
- Angle of descent
- Angle of approach
- Target altitude

Simple Drone Control

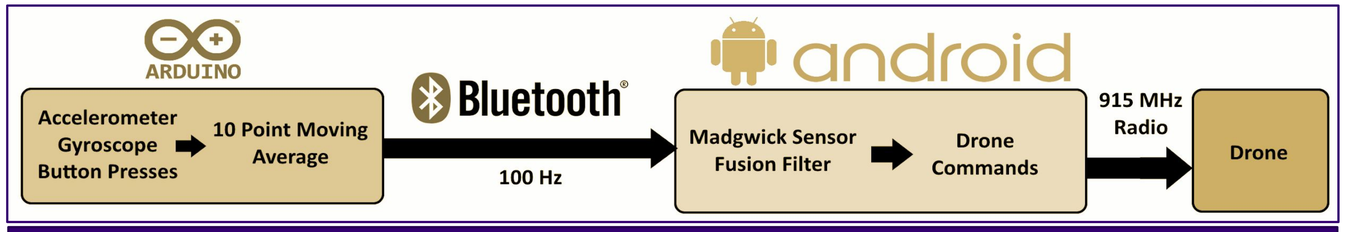
For easy flight control, a motion-controller was built. Its accelerometer & gyroscope data is processed in an Arduino:

1. Sensor data is put through a 10 point moving average
2. Data and button inputs are sent via Bluetooth to an Android device
3. Sensor data is processed by a filter on the device for pitch, yaw, and roll
4. Filtered data and inputs are converted into drone commands
5. Final commands are sent to drone

This controller is a simpler, more effective alternative to traditional RC vehicle control. It contains cheap off-the-shelf components.



3D printed controller casing



Results

Goals reached

- Motion controller external hardware produced
- Orientation of controller processed by device
- Streamlined delivery feature produces flyable missions
- Drone can sustain connection with android devices

Future work

- Fix drone to fly via tablet
- Fix minor bugs on delivery feature
- Carry out flight testing and validation
- Gather user feedback on controller

The initial system design was fleshed out with a working auto-delivery feature and a fully-functional motion-controller with custom casing. Most effort was spent troubleshooting the existing Android software.

Acknowledgements

Yana Sosnovskaya
Course TA, IMU help

Josh Petty
Applewhite Aero

Shruti Misra
Course TA, Purchase Orders

Paul Applewhite
Applewhite Aero