

The Mission

To design and construct a stable and flying quadcopter and, a remote communications systems to send flight plans to the drone and receive in-flight drone vitals. In addition, a flight planning and monitoring software that is capable of developing 3D flight plans and summarize status of the drone during flight.

Project Learning

Drone Hardware

Some initial issues were drifting during flight due to misaligned center of gravity. A part holder was designed to center the distribution of weight. The part holder was printed at a lower density plastic to minimize the added weight it would contribute.

Communications

Our system requires two-way communication between computer and the Arduino located on the drone. This system takes an instruction created on the computer, sent over serial to the connected Arduino, pass it to XAPI, XAPI then ships it over XBee to the Arduino on the drone. A flight control service then executes the instruction.

Mission Planner & Flight Monitoring

The planning/monitoring software was developed using C#. C# is widely used and a lot of open source programs were referenced in the making of this software. The planner allows for the development and transfer of 3D mission plans. When the drone is in flight its coordinates and flight details are updated in an instrument panel and coordinate system.

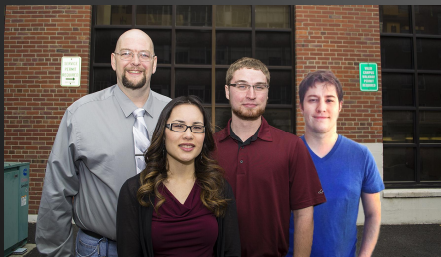
The Team

Members

David Klingenberg – CS
Taylor Trabun – CS
Emeth Thompson – CS
Joe Higley – CS

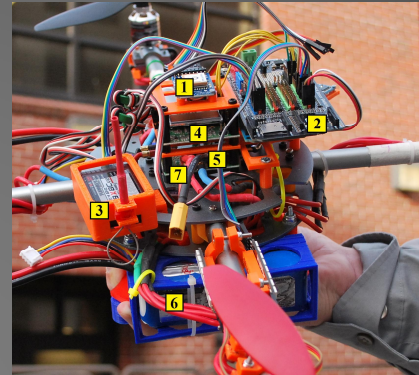
Client

Brandon Ortiz
Advisors
Bruce Bolden
Robert Rinker



The Drone

1. Global Positioning System
 - Currently not implemented
2. Arduino Mega 2560
 - Controls auto pilot subroutines
 - Tells the flight computer where to steer the drone
 - Handles internal & external communications
3. Receiver
 - remote control receiver for handheld manual controller



4. Flight Computer
 - Handles self leveling
5. 10 Degrees of Freedom
 - 3 axis instrumentation sensor
6. Batteries
7. Power Distribution Hub
 - Located central to all systems that require power

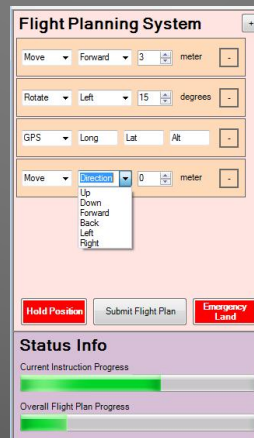
Making a Flight Plan

The Flight Planning System allows the user to make 3D flight plans. Each flight plan is built from individual instructions. There are three instructions types: Move, Rotate, and GPS.

Move – allows for vertical or horizontal movement in meters

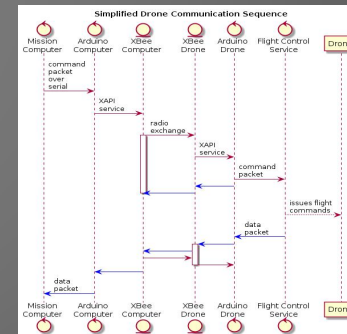
Rotate – turns the drone left or right by a specified number of degrees

GPS – give the drone specific coordinates to move to



Click “Submit Flight Plan” to send instructions in the order they were added.

Sending a Flight Plan



Once the user clicks “Submit”, the flight plan goes thru a number of steps before it is received by the drone.

1. A packet or series of packets are formatted
2. Packets are sent via serial to the connected Arduino
3. The Arduino uses XAPI to interface with XBee wireless communications module
4. XBee then synchronizes the transfer with the XBee on the drone.

Monitoring Flight

During flight the drone reports on data relevant to its position, attitude, and heading. This data is presented to the viewer using the instrument panel and coordinate mapping system. This data is also used to measure the success of a flight plan.

