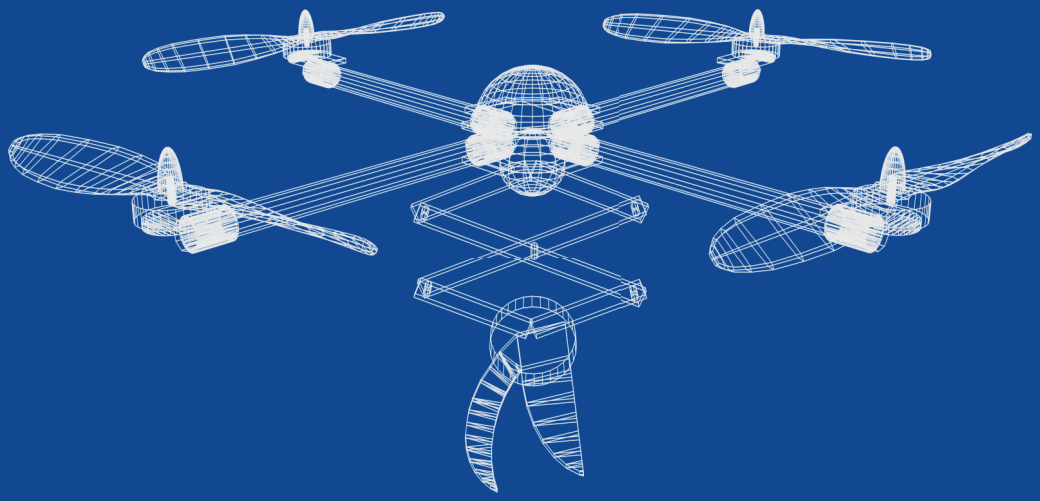
F.E.T.C.H.

Foliage Extracting Tele-Controlled Helicopter



The Team

- Kora Barnes – Electrical Engineering
- Eric Johnston – Electrical Engineering
- Elliot Dickison – Computer Engineering
- Brian Lee – Computer Engineering
- Cable Johnson – Computer Science
- Theora Rice – Computer Science

The Problem

- Sun foliage
  - Tops of trees, pre-dawn hours
- Current methods
  - Crane
  - Tree-climbers
  - Shotgun slugs
- Expensive, dangerous, inefficient

The Solution

- Remote controlled quad-copter
- Extendable arm
- Sheers capable of clipping and holding sample

Requirements

- 2 hours of training
- Trees up to 50 meters in height
- Branches up to 20 cm in length
- Branches up to 2.5 cm thick
- Operate in wind up to 10 mph
- Ability to sample in little/no light

Components

- Quad copter with arm attachment
- Ground station
  - Transmitter
  - Laptop
- Training
- Documentation

Learning

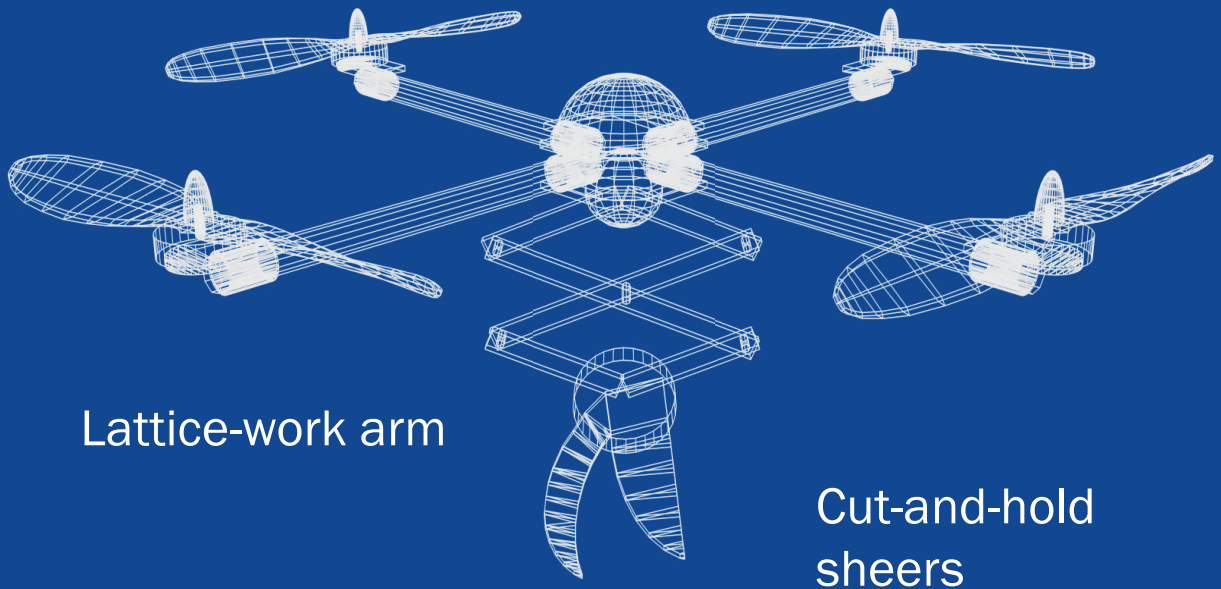
- Budget Management
- Cross Discipline Teamwork
- Hardware Manipulation
- Applied Programming

Research

- Flight design
  - Quad-copter? Hex? Octo?
- Arm design
  - Sideways? Straight?
  - Telescoping? Lattice?
- Cutting attachment design
  - Force measurements
  - Blowtorch? Saw? Clippers?

Design

Quad-copter



Lattice-work arm

Cut-and-hold sheers

Building

- Budget managed, parts ordered
  - Waiting on delivery
- Parts we have:
  - Microcontroller
  - Propellers
  - Flight board
  - Arm framework

Software

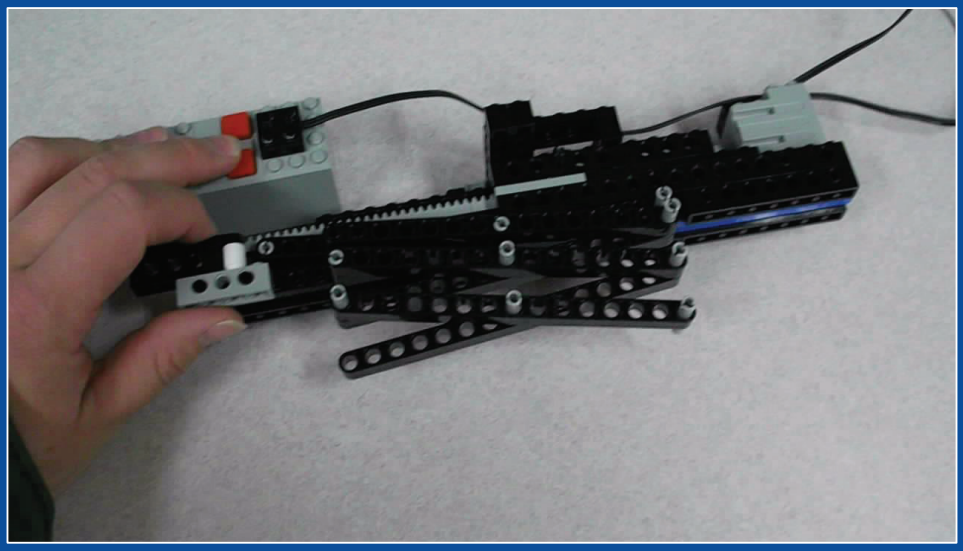
- Flight board
  - Pre-programmed for flight
- Microcontroller
  - Digilent Cerebot MX3CK PIC32
  - Control of the LEDs
  - Lowering/raising arm
  - Controlling cutters

LEDs

- 2 white high-powered LEDs
  - One pointed forward, one next to clippers
- Button-controlled
  - Set on ground

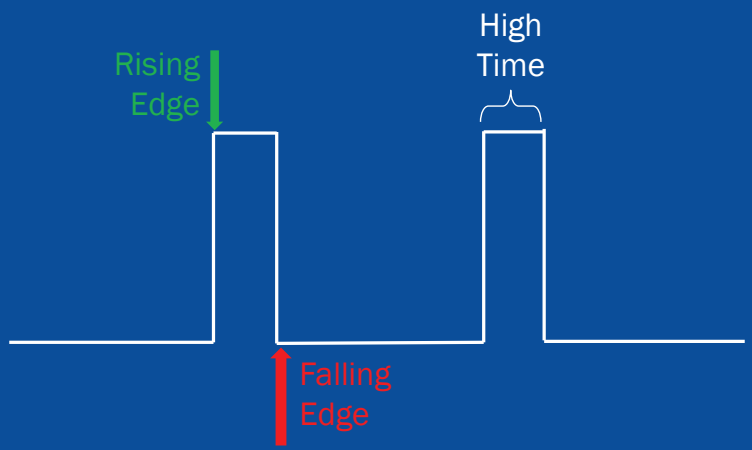
Arm Extension

- One DC Motor
- Remote Control, Receiver



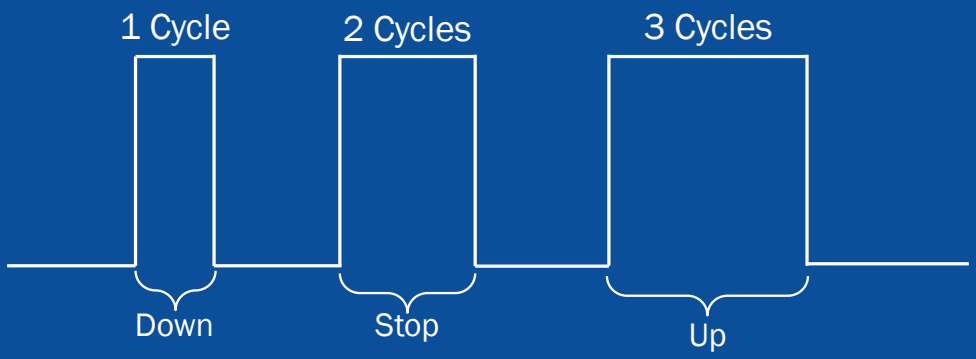
PWM Signals

- Reading
  - Built in function did not work properly



PWM Signals

- Interpretation
  - Up or down?



PWM Signals

- Writing
  - Translation

```
new_signal = translate( pwm );
dc_motor_write( new_signal );
```

  - Conversion

```
if ( motorstate != stop )
    dc_motor_write( const_speed );
```

  - Checking for maximum extension

Cutting

- DC Motor
- Stepper motor
- Read and Interpret PWM fully portable
  - Write PWM requires minimal changes

Documentation

- Modified System and Software Design Document
- Instructions to Download
- Internal documentation for code structure
- Laid groundwork for training video and user manual

Questions?