

# **Auto-Pilot**

**Autonomous control of a remote  
controlled helicopter**

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- Recap
- Implementation
  - Control
  - Tracking
- Still to do...
- Questions

# Overview

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- Create a system that simulates an auto-pilot for mini R/C helicopter
- Send commands in real-time from PC
- Track helicopter using a camera
- Make helicopter fly in different predefined movements

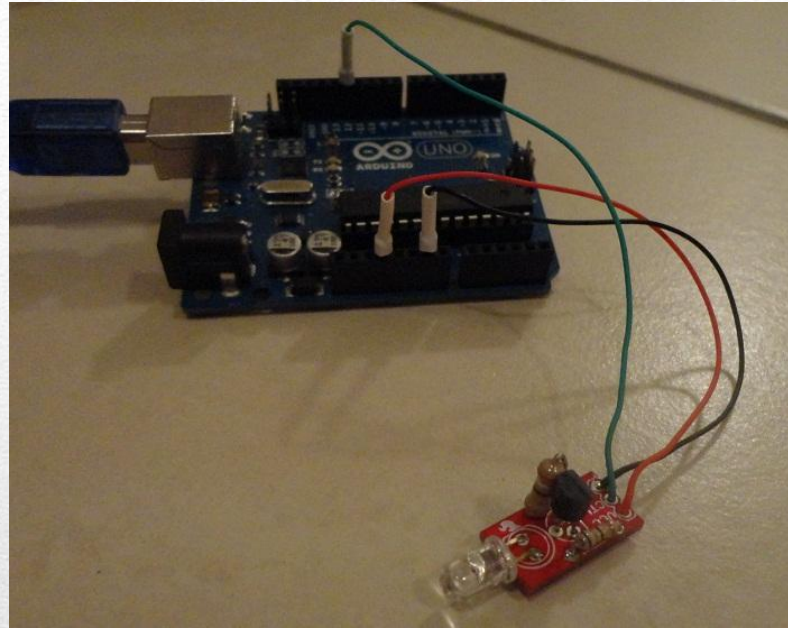
# Problem Statement

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- Computer vision is a very important area of computer science
- Many uses, helps to automate things that previously had to be done by people
- Research into different algorithms used for object tracking
- Building up object tracking skills in a really fun way

**Why?**

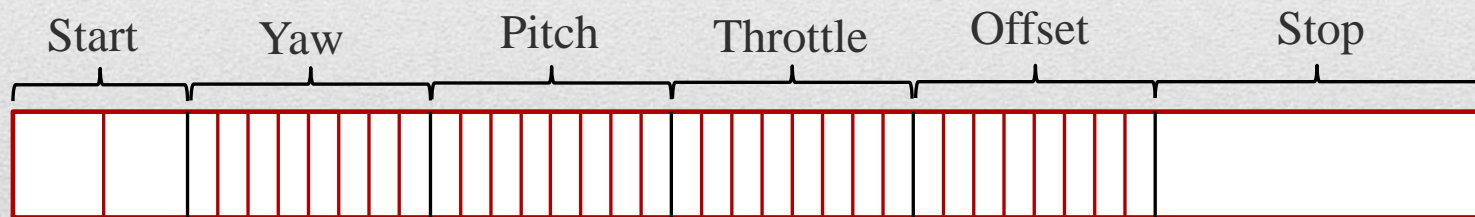
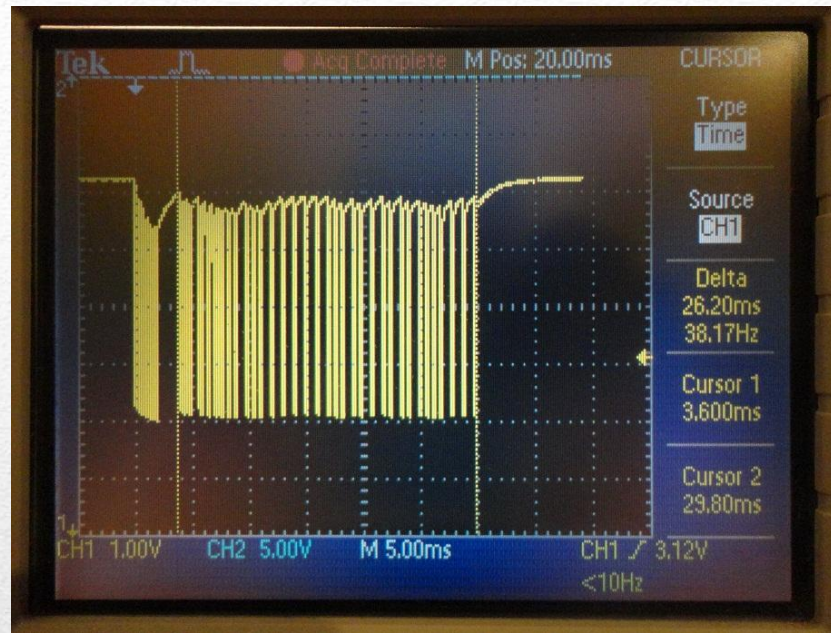




- IR LED used with Arduino
- IR pulses from original remote measured
- Reverse engineered to send the same pulses from PC

# Control





- 32 bit packets, 8 bits for each control

# Control





- White LED attached to back of helicopter

# Tracking

- General Algorithm
  - Identify both LEDs as two blobs
    - Threshold
    - Discarding small blobs
  - Find x and y position of each blob
  - Search for blob with highest no. of red pixels and label as FRONT
  - Find distance between both blobs to estimate orientation



- Assumptions
  - Algorithm relies on the LEDs
  - Nothing can be brighter than LEDs in the background
  - Therefore no bright reflections or very white surfaces

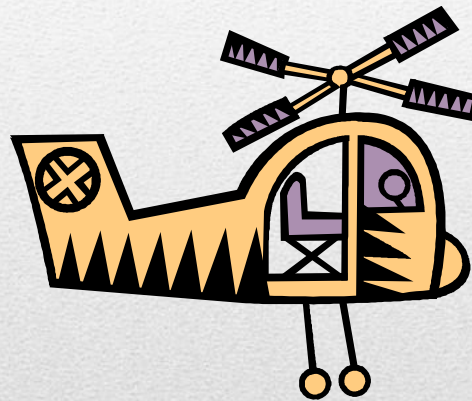
- Bounding boxes around LEDs
- X and y co-ordinates printed next to the LED
- Blue circle indicating which is the front LED
- Red line showing distance between LEDs

# VIDEOS



- Find distance of helicopter from camera using depth map
- Find orientation of helicopter
- Increase robustness of tracking method without losing efficiency
- Make helicopter fly autonomously!

# Still to do...



**Questions??**

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