Team 17's SkyEye: A Flying Indoor Guiding Device

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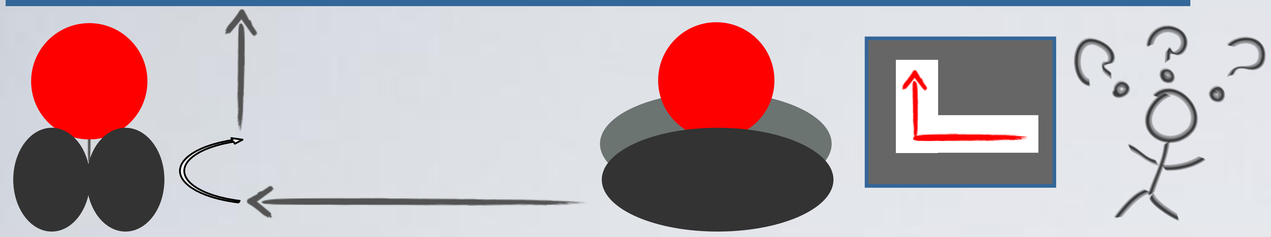
18-549: Embedded Systems Design (Professor Priya Narasimhan)

Motivation



We would like to introduce a product that can guide you in three dimensions to your destination at a walk-along pace.

Objectives

Camera-assisted, autonomous guide capable of

- Taking a desired destination as an input
- Navigating in all three dimensions
- Operating continuously for over an hour

Must be quiet enough for indoor use.

Development Environment

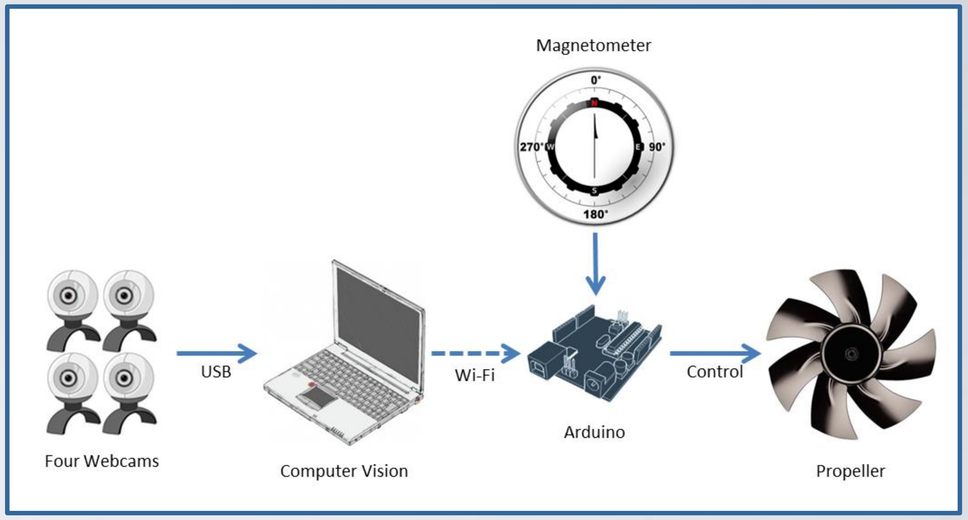
Hardware
- Blimps (2)
- Carbon fiber
- DC motors (4)
- Propellers (4)

Electrical
- Arduino Fio
- Wifly module
- Motor driver
- Webcam
- Magnetometer

Environment
- Indoor flight
- Minimal wind disturbances
- Flight area surveyed by cameras

Software
- Java
- Processing
- OpenCV

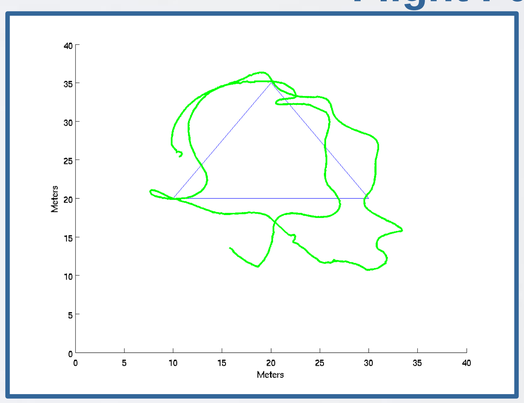
Architecture

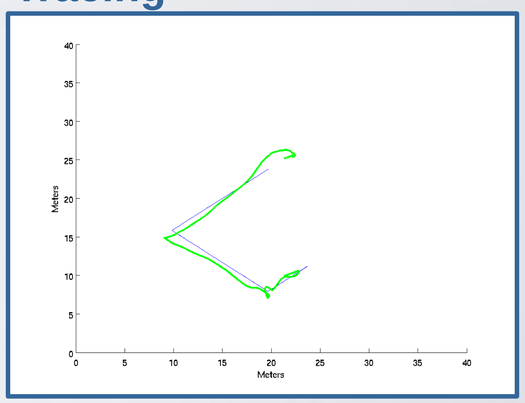


- Localization
  - Multiple cameras track a red balloon to determine position
- Maneuverability
  - Blimp has full degrees of freedom in a 3d space
- Path planning
  - Blimp navigates to targets via waypoints
- Control
  - Blimp can be controlled autonomously or manually

Results

Flight Path Tracing





Initial set of experiments

- Prototype completed, able to traverse a predetermined path autonomously in gymnasium
- Altitude control for height adjustments

http://www.ece.cmu.edu/~ece549/spring12/team17