**Navigation of Multi Copter by Leading the Target Value of PID Controller with Microsoft Kinect**

PROPOSAL

Submitted to Engineering Department

244 Hitchcock Hall

The Ohio State University

2070 Neil Avenue

Columbus, OH 43210

By Hongyun Lee

Advisor: Clifford A. Whitfield, Ph. D.

Department of Mechanical and Aerospace Engineering

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**Abstract**

- Brief summary of PID

- Brief summary of MCU and MS Kinect

- What I do with PID (in MCU) - attitude control

- What I do with another (Slower) PID (computer to MCU) - PID target value leading

- How to merge the two sensors - value numerically calculated (Euler method, ODE, etc.) by MCU and correct the value by Kinect

**Introduction**

[Intro – what is UAV]

Unmanned Aerial System (UAS) is playing an important role in this century due to its versatile functions that can conduct various tasks. Remote-controlled multicopter becomes the mainstream among not only general public like professional photographers, but also marketing-logistics companies such as Amazon.

[Body1 – (why1) Limitation of remote-controlled UAV]

- Hard to learn

- Counter intuitive

[Body 2 - (why 2) Human interaction]

- interact with first-time-humans (intuitiveness)

**Objective**

- Ascend, descend, left, right, advance, and retreat motion in 2D plane with no acceleration.

**Methodology**

[Problems to solve 1]

- Building PID loop in MCU

- MCU, Parallax Propeller chip, using Spin Language. Easy time-control. Muti-cogs, simultaneous, synchronous, and parallel task.

[Problems to solve 2]

- Building Kinect software (C#) for the MCU

- C# software, multi threads. Communication to MCU by USB port, and broad casting the monitored value to ground control monitor.

[Problems to solve 3]

- Math to merge and connect MCU and Kinect

**Expected Results**

- discern object and navigate to the target coordinate

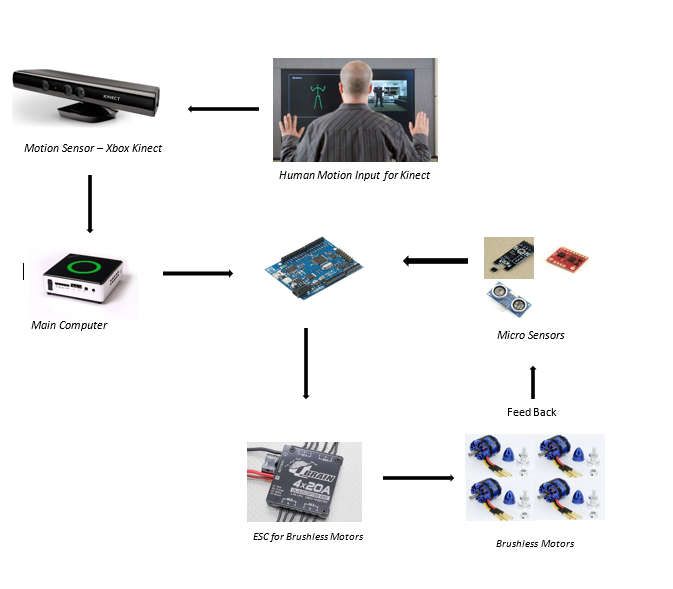
- possible applications

1) move out and move in with multicopters

2) no remote controller but body language and voice.

**Personal Statement (Capability)**

In this undergraduate project, a simple embedded system is built as a form of drone, which enables human motion to interact with control loop. For a dual major student, aerospace and computer engineering, this project will foster myself to integrate the two fields so I can pursue corresponding area for the future graduate program.



**Tentative Schedule (make it visual)**

a) Project Length

Tentative project length is two years from now. The project length is estimated based on the expected graduation year.

b) Long-Term Schedule

First Year:

- Building a drone frame to mount the parts

- Building connection for H/W and S/W

- PID loop

- Kinect software

Second Year:

- Finalizing System

- Finalize Writing

- Presentation/Oral Defense

- Extra Events

c) Short-Term Schedule for 2014 - 2015

- Making Arduino library for each sensor and motor; for object-oriented programming.

- Developing lap-top application to monitor Arduino (matlab, c++, c#, or VB).

- Synchronizing the sensors and motors together via laptop application.

- Kinect software