Electrical Engineering and Computer Science
EECS373 - Design of Microprocessor-Based Systems

SIXAXIS Quadcopter

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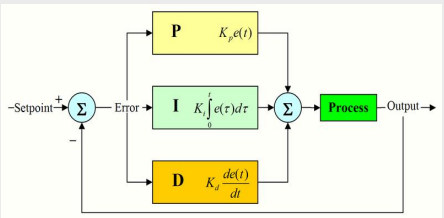
Introduction: Quad-motor vehicle controlled with PlayStation SIXAXIS controller

- **Quadcopter: Rotorcraft propelled by four rotors**
- **SIXAXIS: PS3 controller with built-in single-axis gyroscope and three-axis accelerometer, analog and digital buttons. Communicates over Bluetooth or USB.**
- **Combined: Non-autonomous quadcopter controlled with Bluetooth radio**

Problem Description: Making vehicles fly is hard!!

- **Flight controls are very difficult to implement**
- **Over-compensated feedback from PID controller can lead to crashing**
- **PS3 controller solely designed for communicating with a PS3 console**



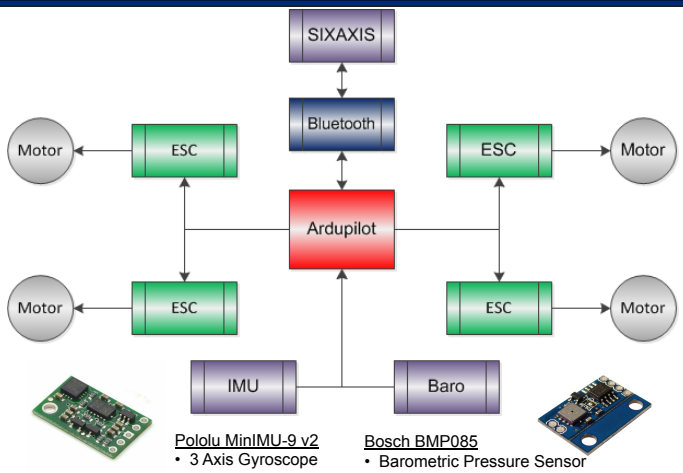
Proposed Solution: Open source flight controls

Hardware:

- **Pololu MinIMU-9 v2**
  - **Inertial Measurement Unit**
  - **Provides aircraft data for maintaining stable flight**
- **Bosch BMP085**
  - **Barometric pressure sensor**
  - **Provides altitude readings**
- **ArduPilot Mega v1**
  - **Arduino microcontroller**
  - **Programmed to manage stabilization and navigation of aircraft**

Software:

- **Supplied Code:**
  - **Ardupilot flight controls**
    http://code.google.com/p/arducopter/
- **Our Code:**
  - **AP_InertialSensor_MinIMU9**
  - **AP_Compass**
  - **Altered configuration files to allow for operation with our sensors**



Pololu MinIMU-9 v2
- 3 Axis Gyroscope
- 3 Axis Accelerometer
- 3 Axis Magnetometer
- I²C Interface

Bosch BMP085
- Barometric Pressure Sensor
- Temperature Sensor
- I²C Interface

ArduPilot Mega
- 16MHz ATMega 2560
- ATMega 328
- 16 Analog Inputs (ADC on each)
- 40 Digital Inputs/Outputs
- 256K Flash
- 8K SRAM
- 4k EEPROM

Conclusion: Issues integrating our sensors

- **Supplied ArduPilot flight controls are pre-configured to work with specific components**
- **Difficulty in integrating our code into existing program to operate with our devices**