**Hardware Selection for CPE 656 Train Project**

**Rational:**

The selected sensors provide the most common sensors available in current IMUs. The selected Arduino has both I2c used by the selected sensors and SPI allowing for potential integration of additional sensors at a latter time. The Arduino operates on the 3.3V used by the sensors and contains a voltage regulator that can have an input of up to 12V removing the need for any additional voltage regulation or steeping hardware. Additionally needed are a set of break away headers for each Arduino as it is sold without headers.

**Requested Quantities:**

Qty. Part Name Unit Price

3 SparkFun 6 Degrees of Freedom IMU 39.95

3 SparkFun Triple Axis Accelerometer and Gyro Breakout 39.95

3 Arduino Pro Mini 328 - 3.3V/8MHz 9.95

3 IMUDuino 79.95

3 Breakout Headers 1.50

**Sensors and Processors Selected:**

**SparkFun 6 Degrees of Freedom IMU Digital Combo Board - ITG3200/ADXL345 -** [Link](https://www.sparkfun.com/products/10121)

Range: Accel:±2, 4, 8, 16g Gyro:±2000°/s

Sensors:

ADXL345 accelerometer [Datasheet](https://www.sparkfun.com/datasheets/Sensors/Accelerometer/ADXL345.pdf)

ITG-3200 MEMS gyro. [Datasheet](https://www.sparkfun.com/datasheets/Sensors/Gyro/PS-ITG-3200-00-01.4.pdf)

Price: 39.95

Dimensions: None given. Smaller than a quarter

Notes: I2C interface with no onboard processing. 3.3V. Data update rate 4-8000 Hz

**SparkFun Triple Axis Accelerometer and Gyro Breakout - MPU-6050 -** [Link](https://www.sparkfun.com/products/11028)

Range: Accel:±2, 4, 8, 16g Gyro:±250, 500, 1000, 2000°/s

Sensors:

MPU-6050 MEMS 3-axis gyroscope and 3-axis accelerometer [Datasheet](https://cdn.sparkfun.com/datasheets/Components/General%20IC/PS-MPU-6000A.pdf)

Price: 39.95

Dimensions: 1 x 0.6 x 0.09" (25.5 x 15.2 x 2.48mm)

Notes: I2C output. 3.3V. Register update rate 4-8000 Hz

**Arduino Pro Mini 328 - 3.3V/8MHz -** [Link](https://www.sparkfun.com/products/11114)

Price: 9.95

Dimensions: 0.7x1.3" (18x33mm)

Notes: 3.3V operating voltage. Has voltage regulator that can receive up 12V.

**IMUDUINO -** [Link](http://femto.io/products/imuduino)

Price: 79.99

Dimensions: Width: 39.8 mm Height: 15.72 mm

Notes: 3.3V with a 10V regulator. Has integrated MPU-6050, USB, and Bluetooth module.

**Additional Hardware Needed:**

**Break Away Headers -** [Link](https://www.sparkfun.com/products/116)

Notes: Need 1 per Arduino