**Project Proposal**

ECE 411

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# **Project Team**

Michael Walton - is a Computer Engineering major in the embedded systems path.

Benjamin Huntsman - is a Computer Engineering major in the embedded systems path.

Cody Gabriel - is an EE major in the RF/Analog path and is also pursuing a minor in Physics.

John Maseda - is a dual major EE/Physics on the microelectronics path.

# **Project Ideas**

## Idea 1: Electronic Compass

With a magnetometer to sense the Earth’s gravitational field, a gyroscope to measure angular velocity, and an accelerometer to account for drift in measurements of the gyroscope the Atmega328P microprocessor will be able to determine magnetic heading no matter what orientation the compass is. Visual indication will involve an LCD screen that gives the current direction letter and the degree heading measurement in order to present two levels of information to the user.

## Idea 2: Bicycle Brake Light and Turn Signal

This device will take inputs from a pressure sensitive switch on the brake handles and two switches mounted on the handlebars of a bicycle and will output on an LED array a red brake light or yellow turn signals mounted on the rear of the bicycle. So the possible improvements included wireless transmission from the front of the bike frame to the rear where it will be processed and output to the LED array. Another possible addition was to include an LED marquee that would display preset messages and attach to a vest that the bicycle rider would wear.

## Idea 3: Iron Man Repulsor Weapon (Muscle Sensor)

Using a polyester sleeve and grounding straps, electrically sense the use of forearm muscles and transmit a signal via Bluetooth to a robotic “hand” that will actuate “fingers”. The electrical signals in the forearm muscles can be sensed electrically and used as a signal to engage the Bluetooth transmitter. The Bluetooth receiver will then send a signal to actuate robotic fingers using servo motors.

**Idea 4: Oscilloscope**

As electrical engineers, one of the most important tools we use is an oscilloscope. These devices can be quite expensive if one were desire to have one for home use. This oscilloscope would only capture primitive waveforms at low frequencies, but would display the behavior which is sometimes the most important.

**Chosen Project**

**Overview:**

Magnetic heading is done using the Earth’s gravitational field, but for a handheld device there must be compensation for any magnetometer in use that is not held level. A gyroscope coupled with an accelerometer to account for drift in the gyroscopes measurements over time can be used to allow a device using a magnetometer to properly determine magnetic heading despite it’s pitch and longitudinal orientation.

**Requirements:**

Must:

1. Atmega328P interfaced to a magnetometer to calculate magnetic heading.
2. Magnetic heading indicated on an LCD display.
3. Power supplied through mounted battery which can be recharged via USB.

Should:

1. Gyroscope included in design to allow compass to work under any orientation.
2. Accelerometer included to compensate for drift in gyroscopic measurements over time.

**Resources:**

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**Wiki URL:** <https://github.com/spesialstyrker/Electronic-Compass/wiki>