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ECE:411 Project Proposals

PROJECT IDEA: "Hands-on Compass"

Point in any direction and there you are.

Product: Wearable electronic hiking glove, using your pointer finger, point in any horizontal direction and get a readable display of your direction and degrees, or have an audio output of the general direction. If the glove is pointed straight into the air (easy to distinguish using the magnetometers z-axis) the output will be temperature and wind speed.

Hardware involved:

- 1x Magnetometer
- 1x LED read out display/or Voice synthesizer and speaker
- 1x Lilypad microcontroller
- e-textiles
- 1x temperature sensor
- 1x anemometer (wind speed sensor)
- 1x source of power.

Ideally, the buckle of the belt would house the

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HMC5843 3-axis magnetometer IC url

E-textiles?

DRV2603 - haptic driver to remove burden of constant pulse signals from the microcontroller

Software involved:

- calculating the compass heading in degrees is fairly straightforward and only uses Hx,Hy output readings of the magnetometer.

$$\begin{aligned}\text{Direction } (y > 0) &= 90 - \left[\arctan\left(\frac{x}{y}\right) \right] \cdot \frac{180}{\pi} \\ \text{Direction } (y < 0) &= 270 - \left[\arctan\left(\frac{x}{y}\right) \right] \cdot \frac{180}{\pi} \\ \text{Direction } (y = 0, x < 0) &= 180.0 \\ \text{Direction } (y = 0, x > 0) &= 0.0\end{aligned}$$

- how to use the Hz output of magnetometer to receive input from different sensors.
- calibration of the sensor.

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Compass heading using magnetometers