

# Turning signals for a cyclist

Sofia Andersson 021108-9628

Sara Danielsson 000609-6069

IS1500

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We are unsure if we want to do a basic or advanced project. The requirements in the *must* list should be enough for a basic project. The requirements in the *want* list should be enough for an advanced project.

## Objective and Requirements

The idea is to use a gyroscope to detect when a cyclist is turning and an accelerometer to detect when accelerating or decelerating. We will also use LEDs mounted on the cyclist's back that will light up to indicate which direction the cyclist is swaying/turning. This is to help prevent traffic accidents. All info about the above should be viewable to the cyclist on a display. The project *must* fulfil these requirements:

- Use a gyroscope (PmodGYRO, Module I<sup>2</sup>C/SPI, Digilent)
- Use at least one external button
- Use at least one external LED
- Use the inbuilt display for information to the cyclist (basic I/O inbuilt display)

We *want* it to fulfil these requirements:

- Use an accelerometer (Pmod NAV, Module SPI, Digilent)
- Sound when blinking to simulate a turning signal
- Display flashing arrows on the inbuilt display when the turning indicator is pressed

## Solution

On the inbuilt display debug information will be displayed. The ChipKit will be attached to the handlebar and the screen will show the cyclist that their turn signal is on. On the back of the cyclist the gyroscope and accelerometer will be attached. There will also be LEDs on their back, indicating when they are turning, braking or

when something unexpected happens. On the handlebar there will be buttons that act as turning signals. When the user turns without activating their turn signal a buzzer will make a noise close to their ear (but the sound of the buzzer will not be startling). When they activate their turn signal the buzzer will make a different noise that is similar to the turning noise in cars.

All LED's will be lit up as we did in lab 2 (by using interrupts). The inbuilt display will also be controlled by the cyclists input from the buttons (by using interrupts) on the handlebar and depending on which button is pressed will show a moving arrow in the direction of the signal. We have not used the gyroscope or accelerometer before so this will be a learning experience. The gyroscope has both of I2C and SPI interfaces while the accelerometer only has SPI.

## **Verification**

Move the gyroscope to test if the correct lights lights up. Press the buttons to see if an arrow shows up on the inbuilt screen. Press the buttons to see if the correct LED's on the back light up. Take a bike ride to see if it works in practice. Test edge cases (pressing several buttons at once, what lights up when the cyclist falls). Test if we can detect the difference between a soft brake and a hard brake.

## **Contributions**

## **Reflections**