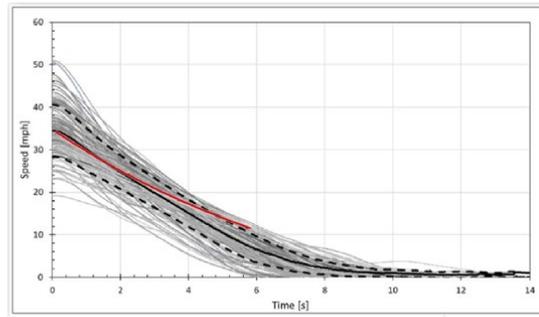


Motorcycle Smart Brake Light

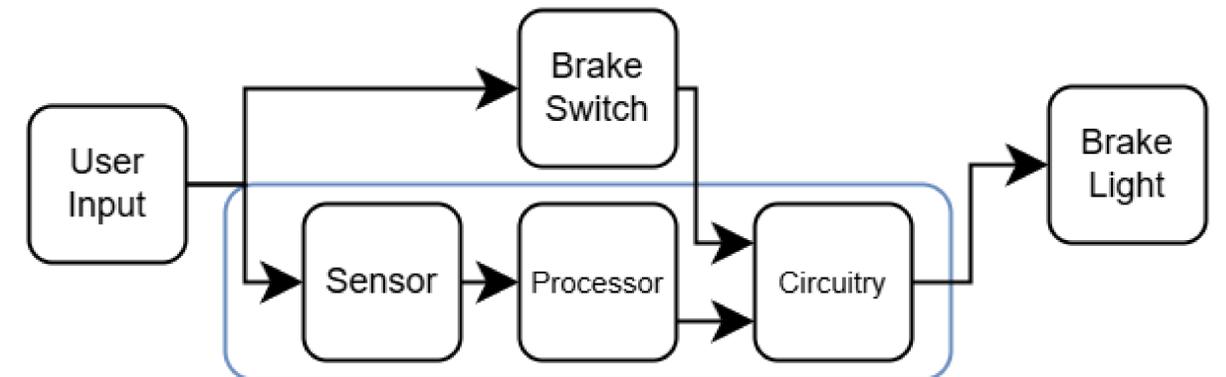
Project

This project is creating a brake light that actuates based on the sensed acceleration of a motorcycle, instead of the standard brake lever switches.

- Motorcycles have strong engine braking characteristics.
- They slow down in most traffic situations sufficiently quickly without use of brakes.
- Drivers behind a motorcycle may not understand when the motorcycle is slowing.



System



Methods

- An IMU is used to measure the acceleration of the motorcycle.
- The IMU data is polled, filtered, and processed with a Teensy 4.0 microcontroller.
- Circuitry is integrated into the existing brake circuitry to actuate the brake light.
- The microcontroller outputs 'pull-down' and 'pull-up' signals.
- The circuit takes these signals as well as a brake lever passthrough signal and decides whether the brake light should be on.
- If the microcontroller were to lose power or otherwise fail to start, the circuit acts as a passthrough for the traditional method of brake light switching.
- The microcontroller creates an attention-grabbing slow flash for marginal braking and a fast flash for emergency braking.

Conclusion

- The result is a brake light that is more meaningful to drivers following a motorcycle.
- The project required understanding interesting concepts, such as how to use a MUX as a truth table and how to create a high-side switch with low voltage I/O.

