

Project Title:

Pothole Alarm and Register

Project Members:

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Abstract:

The *Pothole Alarm and Register* will detect potholes and send it to a crowdfunded navigation app that will warn other users of that pothole. The project will also warn users about how much damage the pothole may have done to the vehicle's suspension. The project was inspired by the rocky Chicagoland streets and Chicago's (and surrounding suburbs') unwillingness to do anything about them.

Project Description:

Our project will consist of a pothole detector built from two Arduino boards that will be placed inside of a vehicle that is being driven and detect when a pothole is hit by the vehicle and then automatically recording the coordinates. One idea we had in mind in order to make to project a little more complicated was to report the GPS coordinates of the potholes to the Waze app. Waze is a self-described "community-driven GPS navigation app" because you are able to report a wide variety of traffic-incidents ranging from police traps to accidents, thus it relies on crowdfunded information. Another idea was that the GPS coordinates of the potholes could be sent to the city of Chicago to inform them of which streets should be high priority whenever they decide to repair some of the potholes. Overall, this idea was inspired by the increase in potholes in the aftermath of this brutal winter and the increase in the use of salt due to constant ice showers and icy conditions.

Initial Project Design:

List of Materials Expected to be Needed:

1. Two Elegoo Uno board Microcontrollers
2. Adafruit Ultimate GPS Breakout - 66 channel w/ 10 Hz updates - version 3
3. Seeed Grove - 3-Axis Digital Accelerometer
4. 16x2 LCD Display
5. Jumper Cables

This project will use two microcontrollers for this project. One microcontroller will include the bulk of the components, it will contain the gps sensor and the accelerometer. The other microcontroller will include an LCD screen that will display the severity of the pothole, the severity will be ranked by the amount of force placed on the vehicle's suspension.

Timeline of Development:

Week 1: Order parts. Create a Fritz Diagram for the two arduino boards and build the boards.

Week 2: Testing components to ensure proper individual working components.

Week 3: Develop working code to measure pothole's impact on the vehicle.

Week 4: Begin testing pothole detector in actual vehicle.

Week 5: Work on filtering data and developing algorithm for pothole damage to vehicle suspension.

Week 6: Develop script to automatically upload information to Waze.

Expected Plan for Use and Communication between the multiple Arduinos:

The accelerometer will measure the change of the vertical axis of the vehicle that it is in when a pothole is hit by the vehicle. When the accelerometer detects a change above a certain threshold, then the arduino's GPS sensor will send its coordinates to the LCD screen and then a script will send the pothole's location to Waze. The LCD screen will also display a rating of

severity that will rate how much the impact will damage the vehicle's suspension, if at all. The microcontroller with the GPS and accelerometer will pass the GPS coordinates and the display the severity risk to the second microcontroller containing the 16x2 LCD display

List of References:

1. <http://thegrenze.com/pages/serve.php?fn=100.pdf&name=Design%20and%20Implementation%20of%20Pothole%20Detector%20using%20Multisensor%20System&id=1424&association=McGraw-Hill&conference=MH-ICSIPCA&confyear=2017>
2. <http://www.toptechboy.com/arduino/lesson-22-build-an-arduino-gps-tracker/>
3. <https://www.waze.com/>