

Project I Description

Project Name: Automated Device for Pothole Identification on Various Roadway Classes in Lebanon

Sponsor: LAU/CNRS

Team Size: 2 MEE Students / 1 CIE Student

Project Overview

The main outcome of this project is to design, implement and test a reliable device to automate data collection and mapping of pavement roughness on various functional classification roadways and to quantify fuel consumption for enhanced benefit-to-cost analysis, asset management, and infrastructure investment strategies.

In order to achieve the stated goals, the project is split into two main pillars. First, sensors will be deployed at several locations to measure the vehicles' vertical accelerations over various pavement sections. Fuel consumption will be correlated to the vehicle's vertical acceleration over those pavement conditions. The second pillar will focus on identifying rough pavement potholes and mapping them in real time using GIS/GPS compatible algorithm, a step towards a better asset management system.

Project Areas and Majors needed

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| <ul style="list-style-type: none">Instrumentation/Solid Mechanics (2 MEE Student) | <ul style="list-style-type: none">Pavement Design / Transportation (1 CIE Student) |
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Project Deliverables

- Allocate test sites where two roads exists with similar elevation and curvature while having different roughness (CIE).
- Design the best locations for the accelerometers based on car dynamics(MEE).
- Design and implement an instrumentation system composed of the

accelerometers, GPS and data acquisition. (MEE)

- Assess the possibility of designing an ultrasonic road roughness sensor and acquiring data from car sensors (MEE/CIE)
- Test several vehicles with the proposed system and obtain a correlation between fuel consumption and road roughness as a function of vehicle speed and type (MEE/CIE).
- Design and test an algorithm to detect potholes and their severity from the vertical acceleration data (MEE/CIE).
- Implement an algorithm to use the previous algorithm and GPS data to create in real-time pothole GIS layer (CIE).
- Implement and test the system along with a GPS/GIS system (MEE)

Design Constraints

- Feasible
- Robust algorithm
- Robust instrumentation system

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Students:

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