Collecting Pavement Condition Data Using Technologies Embedded in New Cars and Smart Phones

Jose R Medina Campillo
PhD Student

Shane Underwood, Ph.D.
Associate Professor,
Civil, Environmental, and Sustainable Engineering
North Carolina State University, USA

Kamil Kalouš, Ph.D.
Professor,
Civil, Environmental, and Sustainable Engineering
Arizona State University, USA

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2.6 million miles of paved roads in the United States
Walking Surveys
Automated Equipment
What Google Car “Sees”
Major Arterials
30,000 to 60,000 ADT

Arterials
15,000 to 50,000 ADT

Collector
5,000 to 30,000 ADT

Minor Collector
1,000 to 8,000 ADT
Data Collection Specs

- At least 528 ft straight and level road section, with in \textbf{0.05 percent} of true length.
- Elevation accuracy within \textbf{0.001 in.}
- Perform calibration in a \textbf{monthly basis}.
CROWDSOURCING
Map your road network through **CROWDSOURCING**
Motivation

Data Collection

- **Single** lane condition survey.
- Most local agencies can **not afford expensive** equipment.
- Is **time consuming** and expensive.
- Can we use **smartphones** or **portable devices** to accurately assess pavement condition?
- How can we **integrate** this crowdsourced information into a **pavement management system**?
New Vehicles

- Front Radar for adaptive cruise control and distance warning
- Surround View displayed in infotainment system
- Blind Spot Detection radar with visual warning
- Front Camera with visual or haptic warning
- Driver Monitoring with acoustic or haptic warning
Smartphones
Experiment

Experiment 1
- 1 Vehicle
- 2 Cellphones
- 3 Mounts
- 2 Speeds

Experiment 2
- 45 Vehicles
  - 15 Sedans
  - 15 Trucks
  - 15 SUV-Minivans
- 5 Mounts
- More than 15 Phones
- 2 Speeds
Glendale Ave.

![Graph showing ride quality and number of samples for different vehicles on Glendale Ave.]

Ride Quality (m/km) vs Number of Samples

- **Smartphone**
- **PHX-IRI**
- **Sedan**
- **Truck**
- **SUV**

PHX-IRI line is shown as a dotted red line for comparison.


44\textsuperscript{th} St.

- **Ride Quality (m/km)**
  - **Number of Samples**
  - **Mode**: Smartphone, PHX
  - **Modes**: Sedan, Truck, SUV, PHX-IRI

![Graph 1](image1)

![Graph 2](image2)
What is next?

Determine Sample Size

Link Ride Quality to PCI
What is next?

PCI

IRI (m/km)

Arizona
California
Maryland
Florida
Washington
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jrmedina@asu.edu