Internet of Things: Road Surface Monitoring using MATLAB

Robert Bosch Engineering and Business Solutions Private Limited
IoT Road Surface Monitoring

Agenda

1. Internet of Things: Truth Vs Hype
2. Internet of Things?
3. Matlab & Internet of Things
4. Smart Cities – Potential application area
5. Need of Road Surface Monitoring
6. Problem Statement
7. Approach
8. Infrastructure
9. Benefits
10. Future Scope of Work
IoT Road Surface Monitoring

Internet of Things: Truth Vs Hype

During 2008, the number of things connected to the Internet exceeded the number of people on earth.

2003
2010
2015

By 2020 there will be 50 billion.

Sources: Cisco IBSG, Jim Cicconi, AT&T, Steve Leibson, Computer History Museum, CNN, University of Michigan, Fraunhofer

Image Courtesy: CISCO

Gartner: “IoT Installed Base Will Grow to 26 Billion Units By 2020.” That number might be too low.
IoT Road Surface Monitoring

Internet of Things?

Step Towards Smarter Planet

The Internet of Things (IoT) is generally described as connecting things to the Internet

Examples of “Things” are:
- People
- Devices

By enabling devices to communicate with each other independently of human interaction, the Internet of Things will power up new business models and improve the way existing services across many different sectors are delivered.
Matlab & Internet of Things

When Embedded devices communicate with each other and often collect sensor data usually stored Cloud.

Source: Mathworks.com
IoT Road Surface Monitoring

Internet of Things: Smart Cities – Potential application area

**Smart Parking:** Monitoring of parking spaces availability in the city.

**Traffic Congestion:** Monitoring of vehicles and pedestrian levels to optimize driving and walking routes.

**Smart Lightning:** Intelligent and weather adaptive lighting in street lights.

**Intelligent Transportation Systems:** Smart Roads and Intelligent Highways with warning messages and diversions according to climate conditions and unexpected events like accidents or traffic jams.
IoT Road Surface Monitoring

Need of Road Surface Monitoring

Road surface is the durable surface material laid down on an area intended to sustain vehicular or foot traffic.

Road Transportation system move goods & people to facilitate production & trade.
IoT Road Surface Monitoring

Problem Statement

01
Maintenance of rural & urban roads is a major challenge due to weather & various other conditions

02
Lot of time & money is spent by responsible organizations to identify the potholes & take necessary actions

03
There is serious need to identify the presence of pothole without manual intervention

04
Pothole is most common factor across majority of urban & rural roads. In few cases Pothole are also responsible for accidents & deaths
IoT Road Surface Monitoring

Approach

Data
Mobile Sensors or Telematics System

Data Accumulator
ThingsSpeak

Data Analytics
Identify discontinuities
Identify variations
Mapping the location

Pothole occurrence can be reconstructed with the help of mapping toolbox & the acquired data
IoT Road Surface Monitoring

Infrastructure

01
MATLAB R2015b

02
Mapping Toolbox

03
OPC Toolbox & Java/.net builder

04
Statistics & Machine Learning Toolbox

05
Database & Communication system Toolbox
**Benefits**

- Easy to identify presence of Pothole occurrence
- Manual interface to identify the pothole which is a tedious task can be eliminated
- Necessary information can be conveyed & tracked by the responsible organizations
- Develop IoT applications using Matlab
- Ease of playing with data with Matlab
Future Scope of Work

- Integration of Alert mechanism
- Use of advanced analytics techniques for accurate decisions
- Historical data analysis for better monitoring
- Automated Monitoring Process