



A Wireless Sensor Network for Field Testing of Aftermarket Vehicle Equipment

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Introduction

- Field testing is an essential part of bringing new products to market.
- Traditional methods of field testing rely on human data collection, which can often compromise the accuracy of a data set.
- Compromised field testing can lead to unforeseen future expenses and costly product recalls.
- We propose an automated method of field testing using Wireless Sensor Network (WSN) technology.

Existing Approach

- The existing approach relies on selected product testers to record environmental variables and product performance metrics manually.
- For example, a field tester might maintain paper logs, noting these conditions:
 - ambient temperature
 - relative humidity
 - hours of use.
- This approach introduces the potential for a significant amount of human error, which can compromise data integrity.

Our Approach

- Collect accurate data from a variety of calibrated sensors over time
- Filter raw data to select those which are useful
- Upload data to a central server for further processing and report generation
- Features of our approach:
 - Low cost and reusable sensor equipment
 - Minimal end user interaction
 - Filtration of useless data
 - Generalized solution, capable of accommodating different requirements

Generalized System

There are three components involved in our approach:

- Sensor Node
- Intermediate Device
- Server



Challenges

- Communication across multiple wireless protocols (Bluetooth / WiFi / 3G)
- Generalization of solution to any kind of equipment
- Resource arbitration on Tmote
- Modularization of solution to allow future expansion (both in hardware and software)
- Providing a web-interface that allows for easy report generation

Current Status and Future Work

- Currently, we have implemented a preliminary prototype.
- Testing will involve a major manufacturer of snow and ice control equipment for personal and commercial trucks and SUVs.
- Future work includes developing software applications for various wireless handheld devices.
- Integration of negotiated privacy controls for ongoing maintenance transactions.

Conclusion

- We have presented an automated system for field testing of aftermarket vehicle equipment using a Wireless Sensor Network.
- We have implemented a preliminary prototype.
- Advantages of our system for a company:
 - More reliable data from field testing
 - Cost reduction
 - Efficient maintenance process
 - Improved customer care
 - Ability of system to be customized for use in a variety of applications