Overview

- Integrated car maintenance and ambiance data gathering solution
- Vehicle agnostic (1996+)
- Personal (Android) and commercial (AT&T 3G) solutions
- Utilizes a 2.4 GHz mesh network with a tree nodal structure and node forwarding
- Tested with up to 6 sensor nodes with expandable data framework (dynamic package reconfiguration)
- Bluetooth 3.0+ compatible

GOAL: Upgrade Sensor Nodes
- 433MHz transmitters changed to 2.4 GHz transceivers
- Tree nodal network allowing for more robust data delivery and increased throughput.
- Node forwarding implemented to allow network redundancy in communication (prevents loss of data)
- ATtiny85 replaced with ATtiny84 component
  - Allows for additional inputs for remote data collection

GOAL: Upgrade to Bluetooth communication
- Allows for off the shelf OBD Bluetooth modules
- Provides reliable communication between main Arduino smartphone or 3G shield
- Allows for seamless migration between commercial and consumer solutions

GOAL: Improved Data transmission speed
- Offloading of data communication to cloud with either a smartphone or Arduino device via Bluetooth
- This allows for a dedicated transmission device to the cloud
- Simplified data transmission protocol
- All data encoded prior to transmission to cloud using proprietary encoding
  - This allows for a wider range of sensor address spectrum i.e. More sensor support

Responsibilities

Alexander Makarov (Team Lead)
- Project architecture design
- Task assignments/management
- Testing conditions and QC

Mark Duncan
- Established RF tree nodal network
- Built Bluetooth bridge
- System integration / embedded software development

Kyle Smith
- Web user interface designer
- mySQL database design
- Redesigned dataflow

Douglas Payne
- Android app design and development
- Android app testing
- Integrating Android into Bluetooth bridge

Gilbert Estrella
- Administration / Liaison
- Electrical circuit designs
- Parts orders

Hardware

Software

GOAL: Support for a smartphone as a user interface & data transmission device
- Allows for fleet manager data to be viewed via an Android App for status of personal vehicle
- Same information is provided on the web UI available remotely

GOAL: Redesign of Web Application backend
- Hardware redesign allowed for higher data transmission and larger data sets. Backend was redesigned to handle higher traffic load.
- Minors UI fixes based on SD-I input

GOAL: Android App design for personal use
- Fragments for reusable graphic interfaces
- Uses Android Volley library to queue and send GET request to cloud database
- Parses incoming Bluetooth data from Arduino
- Displays received data in user friendly interface

Ethics

All software used during the design of the project was created by the team or verified by source provider to be available for use in accordance to license.

Conclusion

The Fleet Manager promises to deliver two different solutions to the market. Unlike the already-existing devices on the market, the Fleet Manager platform was designed to be easily upgradeable and customizable; ready to satisfy both personal and commercial clients. Due to it’s wireless nature, it is third-party friendly and can be easily integrated within already existing IoT ecosystems, turning any car after 1996 into a connected device.