Project Concept Report

Beatrice Smetana
BSc in Electrical Engineering
Central Michigan University

Loti Ibrahimi
BSc (Hons) in the Internet of Things (IoT)
Waterford Institute of Technology

Justin Lizotte
line 2: *dept. name of organization (of Affiliation)*
Central Michigan University

I. Introduction (*Tasks/Startup*)

For this project, the task at hand is to come up with an idea to solve a problem using IoT in automobiles.

The project could relate to any of the following:

- Vehicle to vehicle
- Vehicle to road infrastructure
- Vehicle to internet
- Vehicle to sensor onboard

This project will require the team to come up with a design concept and build a working prototype to test and demonstrate. It will involve building and connecting sensors, actuators and controllers to perform the tasks as well as the programming for the control, to accomplish this.

Our group consists of two CMU students, Beatrice and Justin, and one WIT student Loti. Together the team will work to design, build and test our prototype by the end of the semester.

II. Concept

A. *Research (First step in our concept development)*

First, to begin the process for this project the team was asked to research related articles on the internet. Related articles would be utilized to demonstrate a basis for different steps that were taken to design a similar concept.

Once a few ideas were found then discussions between the group and professors took place to finalize a concept.

B. *Concept Idea*

The concept for this project revolves around vehicle safety precaution/reminder/action. In this case, safety system and methods of preventing passenger entrapment. This certainly becomes a big problem when you bring the sun/heat into the picture in very warm weather conditions, but also in opposite circumstances, with low temperatures.

The idea is to use the IoT to sense either a child or pet that has been left in a parked car and alerting the guardian once they leave from a certain proximity to the vehicle.

The system would also monitor the interior temperature of the car. If unsafe levels are reached, and a living thing is detected, action will be automatically taken. This is a safety precaution which would be taken regardless.

Possible actions may include, the lowering of windows or contacting emergency services if no measures are taken within a specific time frame.

The goal of this system is to help prevent serious injury or death to passengers that may be left in cars unattended for long periods of time.

Estimated Vehicle Interior Air Temperature v. Elapsed Time

Estimated Vehicle Interior Air Temperature v. Elapsed Time

Elapsed time	Outside Air Temperature (F)					
	70	75	80	85	90	95
0 minutes	70	75	80	85	90	95
10 minutes	89	94	99	104	109	114
20 minutes	99	104	109	114	119	124
30 minutes	104	109	114	119	124	129
40 minutes	108	113	118	123	128	133
50 minutes	111	116	121	126	131	136
60 minutes	113	118	123	128	133	138
> 1 hour	115	120	125	130	135	140

Courtesy Jan Null, CCM; Department of Geosciences, San Francisco State University

III. Project Materials

Materials needed for this project will be:

- Raspberry Pi (for control).
- Heat signature sensor(s) (to detect passengers)
- Bluetooth capabilities/Cellular (alerts)
- GPS (location of vehicle)
- Motors (window control)

IV. Related work literature

- Vehicle and passenger protection through cooperative sensor based vehicular networking. (Joshi, Gujral, Dwivedi, & Devarasetty, 2017).
- System for detecting the operational status of a vehicle using a handheld communication device (Chen and Andreasen, 2014)
- Interior vehicle temperature monitoring. (Smith, 2017)