Concept Design Review

Smart Trip Planning

11/08/2020

3pm

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Objectives

- Safely and conveniently navigate user.
- Predict vehicle range with better accuracy than the vehicle.
- Plan economical trips for users around gas price and predicted range.
- Update user navigation using data read in from vehicle sensors.

Value Proposition

MILLIONS OF CARS ON THE ROAD

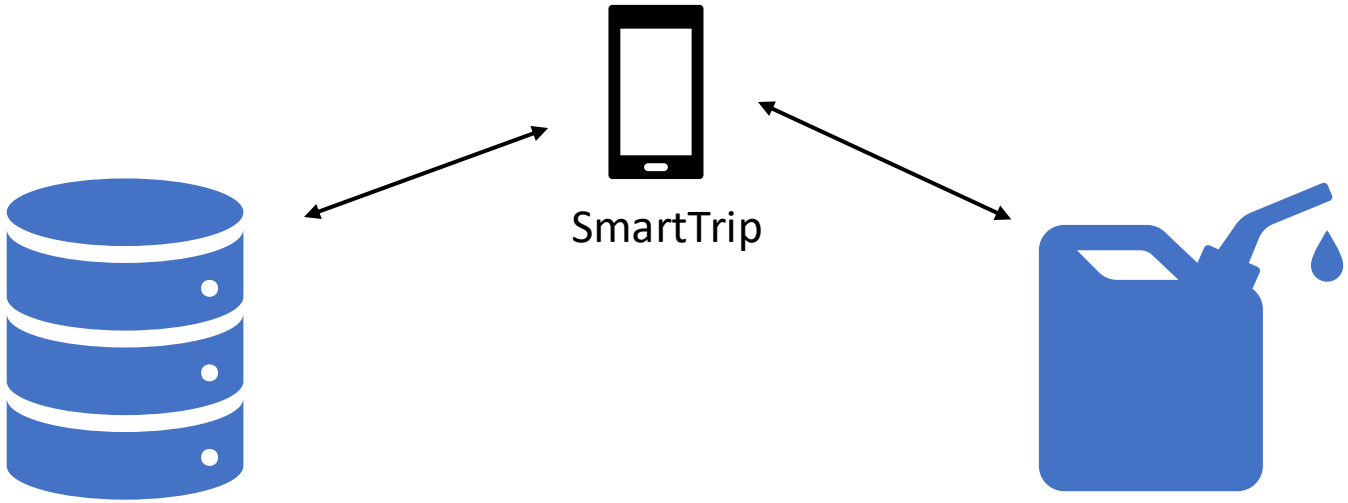
MOST NEED GAS

SOME GAS STATIONS ARE BETTER THAN OTHERS

ESPECIALLY FOR YOUR GIVEN SITUATION

WE WANT TO RECOMMEND THE MOST ECONOMIC STOP FOR YOUR TRIP

Background



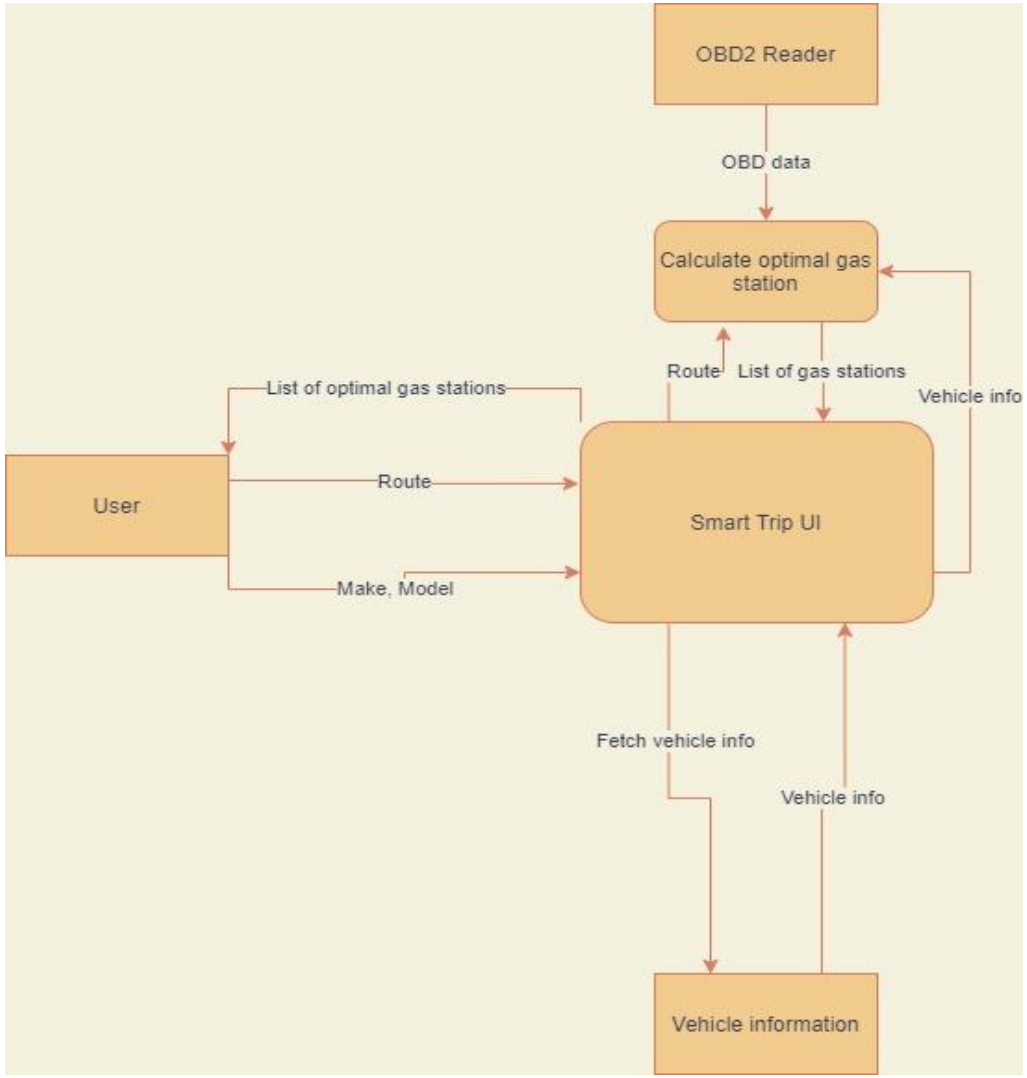
Your car **holds lots of data**

GasBuddy is an app to suggest lowest gas sales in a given area

Requirements

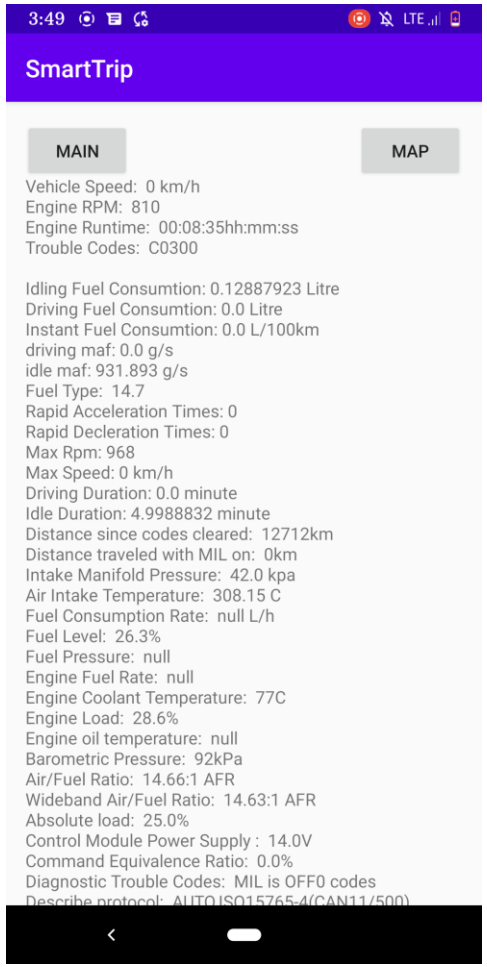
- The Application
  - Functioning Map / Directions
  - Local Gas Station & Price
  - Obtain car fuel information
  - Gas consumption predictions
  - Fuel monitoring and alerts
  - Provide optimal gas station recommendations
- The estimations must be more accurate than range predictions already in cars

Overview of Conceptual Development



Design Validation

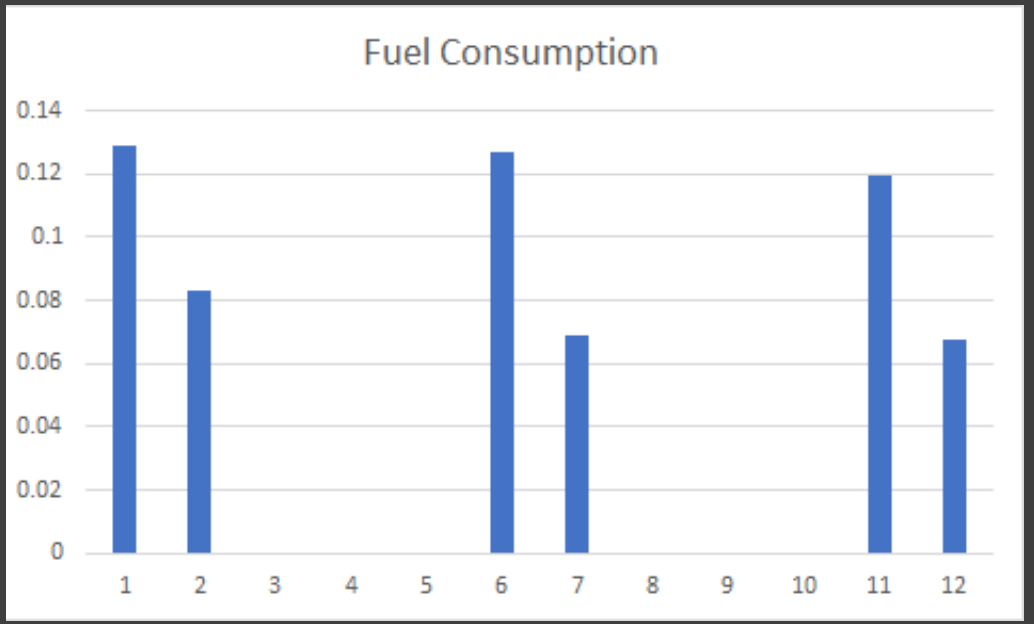
RPM
Fuel Consumption
MAF
Intake Manifold Pressure
Engine Load

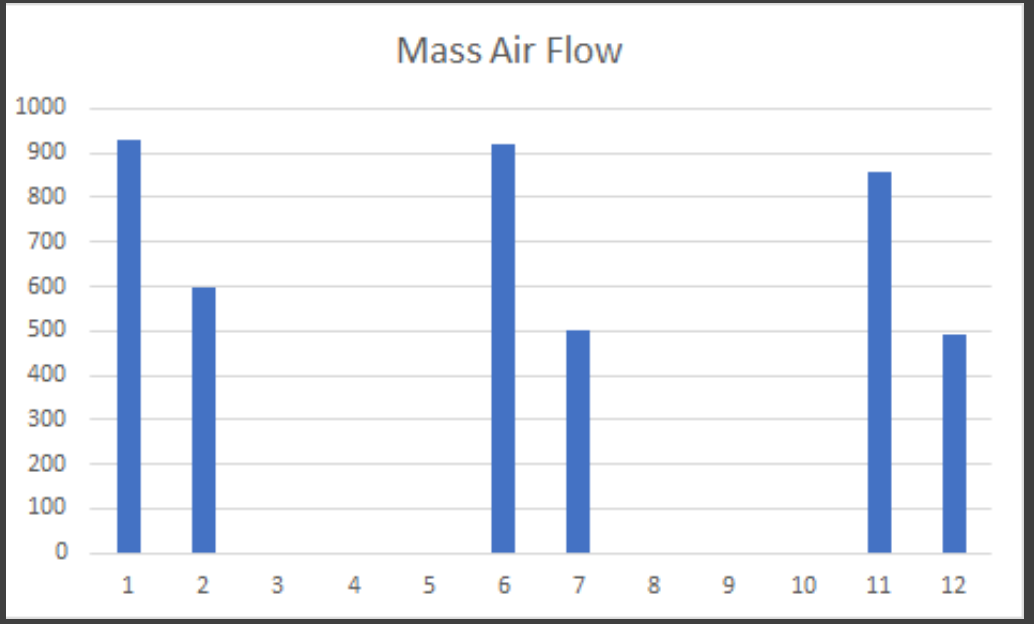


Smart Trip App

OBD Reader

Important Data Points





Design Validation
(More Tests)

FUEL EFFICIENCY

FUEL USE

REACHABLE GAS STATIONS

OFFLINE ROUTES

Why we do not need weight

Mass Air Flow

Air On

idle maf: 855.6973 g/s

Air Off

idle maf: 490.3312 g/s

MAF is comprehensive

Schedule

Schedule

Potential Risks and solutions

Broken MAF sensor

Compare consumption estimations to actual fuel level change

Risks and Solutions

Phone loses service

Downloaded route options

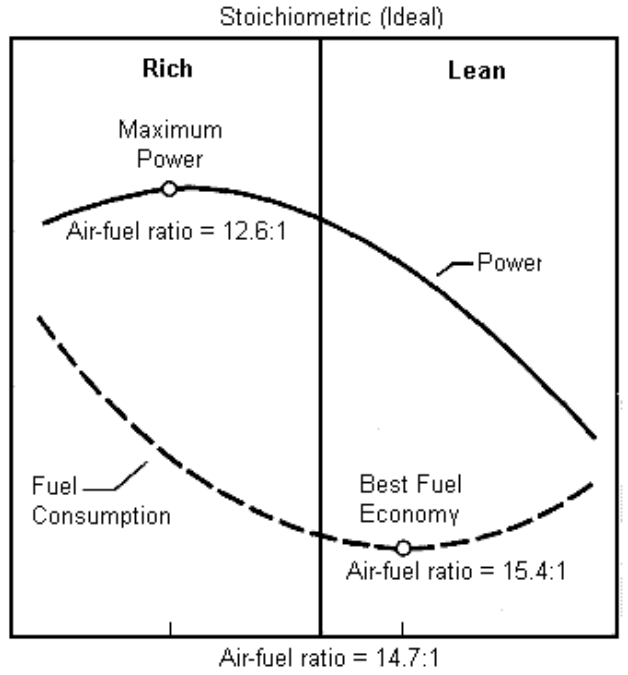
Recommendations / Justifications

Why we are using the OBD2 GitHub:

- Saved us around a semester of work
- Able to progress farther into project quicker
- Approval by client

Why are we using the ELM327/ MAF:

- Accurately calculate fuel consumption despite a large amount of variables
- Amount of air directly relates to fuel consumption (14.7)
- Trial and tested way



Fuel Consumption Calculation Via MAF

```
Fuel Average(totalTankSize){
   mileZero = distanceSinceCodesCleared()       //use this for mileage counter
   while(true){
      FuelList.add(InstantaneousFuelConsumption())
      if(distanceSinceCodesCleared() == mileZero+1){    //check to see if we have driven a mile
         fuelConsump = FuelList.average()               //This is how much fuel we have used in gallons in one mile
         milesUntilEmpty = totalTankSize / fuelConsump  //This will give us a estimated miles until we are empty
      }
   }
   System.out.printf("Miles until empty %d", milesUntilEmpty)
}
```

Example:
TotalTankSize = 27 Gallons
FuelConsumption = .15 of a Gallon
TotalTankSize/ Fuel Consumption = 27 / .15 = 180 miles until empty

Budget

- ELM 327 Hardware
- Trips for Austin to travel to Moscow (if needed)
- Rental Cars (2020 Subaru Forester, 2020 Subaru Impreza, 2020 Subaru Cross trek)

Our Current Budget

Budget

Capstone Project Budget - Fall/Spring

Project: Smart Trip

Last Updated 11/4/2020

	2020-2021								Item		
Expense Items	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**Total**		
Gas				$ 20	$ 20	$ 20			$ 60		
Travel:											
Test drives				20	$ 20	$ 20	$ 20	$ 20	$ 100		Rent a car / Zip Car / Test drive dealership car / School car
									$ -		
Supplies / Parts / Services:											
ELM327 Chip x3	$ 30								$ 42		**Chip:** https://www.amazon.com/obdator-Bluetooth-Sca
OBD2 port splitter		$ 15							$ 15		
									$ -		
									$ -		
									$ -		
									$ -		
									$ -		
									$ -		
									$ -		
									$ -		**Expenses**
										$ 417	**Subtotal**
Shop Usage (est. Hrs):									Hours		
									0		
									0		
									0		
									0		
									0		
									0		
									0		
								Graduate Student Support	$ -		**including fringe**
								Shop Overhead	$ -		
								University Overhead	$ 21		**5% of all expenses**
								Totals	**$ 438**	$ -	$ (438)

Questions?