# SE 339 - Assignment 4
# Architectural Drivers

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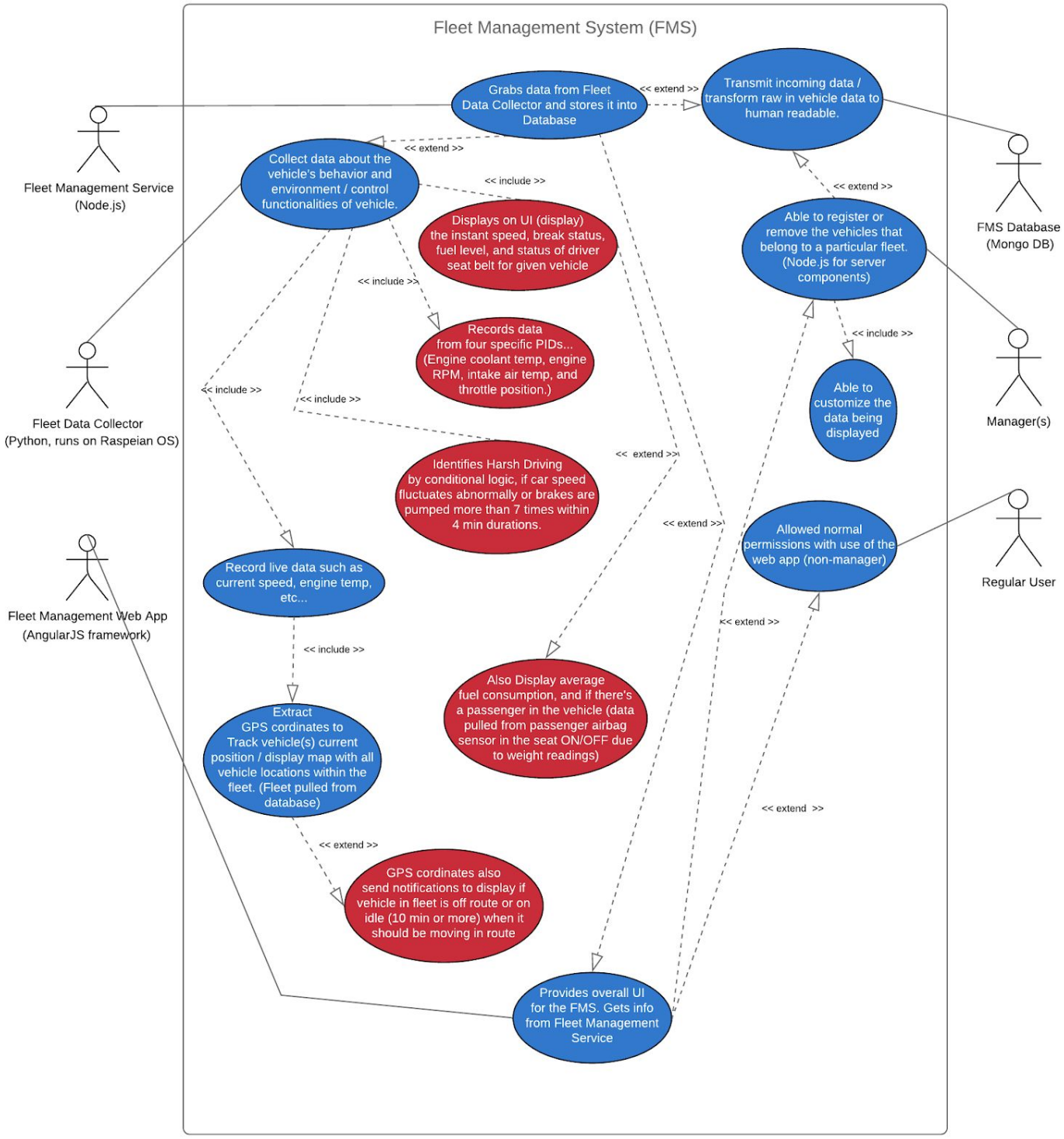
# 1 - New Use Cases



Sorry, I couldn't get it not to be blurry due to it being so large. New Use Cases in the new diagram are in red. All new red use cases are supposed to have an arrow pointing at them. Sorry, I just noticed two of them do not have arrows.

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|---|---|
| **New Case 1** | Displays on UI (display) the instant speed, break status, fuel level, and status of driver seat belt for given vehicle |
| **New Case 2** | Records data from four specific PIDs... (Engine coolant temp, engine RPM, intake air temp, and throttle position.) |
| **New Case 3** | Identifies Harsh Driving by conditional logic, if car speed fluctuates abnormally or brakes are pumped more than 7 times within 4 min durations. |
| **New Case 4** | Also Display average fuel consumption, and if there's a passenger in the vehicle (data pulled from passenger airbag sensor in the seat ON/OFF due to weight readings) |
| **New Case 5** | GPS coordinates are also used to send notifications to display if vehicle fleet is off route or on idle (10 min or more) when it should be moving in route |

# 2 - Quality Attributes

| Use Case | QA Scenario Specification |
|---|---|
| Displays on UI (display) the instant speed, break status, fuel level, and status of driver seat belt for given vehicle | Covers **Modifiability**<br><br>Stimulus – Fleet Data Collector readings<br><br>Stimulus source –Fleet Management Service<br><br>Response–Reads vehicle's current speed, break status, fuel levels and status of drivers seat belt (on or off)<br><br>Response measure – instantaneous<br><br>Environment– Normal and overload conditions<br><br>Artifact–Raspberry PI 3, PICAN2, OBD-II - D89, UI, Fleet Management Service |
| Records data from four specific PIDs... (Engine coolant temp, engine RPM, intake air temp, and throttle position.) | Covers **Modifiability**<br><br>Stimulus –Fleet Data Collector readings<br><br>Stimulus source –Fleet Management Service<br><br>Response–Records Engine coolant temp, engine RPM, intake air temp, and throttle position of vehicle<br><br>Response measure – instantaneous<br><br>Environment–Normal and overload conditions<br><br>Artifact–Raspberry PI 3, PICAN2, OBD-II - D89, Mongo Database, Hologram Nova, UI, Fleet Management Service |
| Identifies Harsh Driving by conditional logic, if car speed fluctuates abnormally or brakes are | Covers **Modifiability**<br><br>Stimulus –Fleet Data Collector readings<br><br>Stimulus source –Fleet Management Service |

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| pumped more than 7 times within 4 min durations. | Response–Records 4 minute intervals of data collector readings for car speed fluctuations and repeated brake pumps<br><br>Response measure – every 4 minutes<br><br>Environment–Normal and Overload conditions<br><br>Artifact–Raspberry PI 3, PICAN2, OBD-II - D89, Mongo Database, Hologram Nova, UI, Fleet Management Service |
| Also Display average fuel consumption, and if there's a passenger in the vehicle (data pulled from passenger airbag sensor in the seat ON/OFF due to weight readings) | Covers **Modifiability**<br><br>Stimulus –Fleet Data Collector readings<br><br>Stimulus source –Fleet Management Service<br><br>Response–read fuel measures and passenger airbag sensor and display information to user<br><br>Response measure – instantaneous<br><br>Environment–Normal and overload conditions<br><br>Artifact–Raspberry PI 3, PICAN2, OBD-II - D89, Mongo Database, Hologram Nova, UI, Fleet Management Service |
| GPS coordinates are also used to send notifications to display if vehicle fleet is off route or on idle (10 min or more) when it should be moving in route | Covers **Modifiability**<br><br>Stimulus –Adafruit GPS readings<br><br>Stimulus source –Fleet Management Service<br><br>Response–detects the moment the vehicle is idle or out of route and starts recording up to 10 minutes, after 10 minutes of still being idle or off route, it will give a notification on the UI<br><br>Response measure – 10 minutes or more of being of route or idle<br><br>Environment–conditions for the response<br><br>Artifact–Adafruit Ultimate GPS, Mongo database, UI, |

| | Fleet Management Service |
|---|---|
| (Only manager logon) has ability to remove or register vehicle to specific fleet | Covers **Security**<br><br>Stimulus –Manager (superuser) logon<br><br>Stimulus source –Manager<br><br>Response–allows registration and removing of specific vehicles<br><br>Response measure – logon time… < 2 sec<br><br>Environment–overload conditions<br><br>Artifact–MongoDB, UI |
| Transmit / Transfer raw in vehicle data to human readable in under 3 seconds | Covers **Performance**<br><br>Stimulus – input/output of data<br><br>Stimulus source – Fleet Management Service<br><br>Response– transmit / transfer the raw in vehicle data to human readable to the database<br><br>Response measure – < 3 seconds<br><br>Environment–normal and overload conditions<br><br>Artifact–Fleet Management Service data pulled from vehicle, Mongo DB, UI |
| Provides overall non laggy UI for FMS, gets info from Fleet Management Service | Covers **Performance**<br><br>Stimulus – manipulation of data to UI<br><br>Stimulus source –Fleet Management Web App<br><br>Response–Gives responsive, fast, user friendly interface<br><br>Response measure – Instantaneous<br><br>Environment–normal conditions |

| | |
|---|---|
| | Artifact–Fleet Management Service data pulled from vehicle, Mongo DB, UI |

# 3 - Constraints

Mandated technologies would be a major constraint in the system. Due to the necessity of specific hardware such as; Raspberry PI 3, PICAN2, OBD-II - D89 cable, Adafruit Ultimate GPS, and the Hologram Nova. These technologies will give us constraints such as what specific types of data that can be pulled / can't be pulled from a vehicle, and overall user capacity for the web app.

Another constraint to the system would be laws and standards that must be complied with. I'm sure there's something in legal terms that will need to be done with, having this type of technology attached to you vehicle. Checking with the law and maybe other companies that have done something similar will help get knowledge about how to legally go about this entire project. Also, developer abilities will have to be taken into consideration. Developers must have at least 4 years of working in some type of professional web application development environment, preferably be familiar with the agile methodology, and developers must have a bachelor's degree in computer science, computer engineering, or software engineering. We need the best brains to be working on this project, there's no margin for error.

A fourth constraint would be deadlines, there has to be a steady schedule of deadlines that the entire team is aware of. Slack will be used for team collaboration along with meetings everyday at 9:30 am to go over what is expected of the day, and what was completed the day before. This will insure deadlines and expectations are met.

A fifth constraint would be budget. Total of parts is only $200. But companies charge either a flat fee of about $10,000 or per unit fee composed of $100 to $600 for the tracking devices and $10 to $30 for the monthly usage fees. So that's what we're looking at in terms of cost for this project.

# 4 - Concerns

My main concern with the overall system has to be the Web application. It will have to have a development team constantly updating and improving it to compete with the market, user needs, bug fixes, etc... Software gets outdated so quickly this day and age so to be able to keep up with performance and device compatibility standards, the web app will require constant maintenance and attention.

Management is another concern that will have a lot to do with the project. This ties into deadlines being met and the overall team staying focused and on task. In order to have the best outcome for this concern, any management in the project that needs to be hired will have a masters in communication, along with 4 years or more experience working with a team in an agile environment. Experience with both coding and hardware implementation is recommended so the management knows reasonable deadlines to get certain features complete.

A third concern would be hardware failure. We need to ensure that we use nothing but the recommended/reliable hardware for this project. Having faulty cheap hardware will just end up costing the project more money and time in the long run.