**Description of application domain**

The automobile industry is one of the biggest industries in the world. Its influence are wide ranging. We can see the industries influence from day to day life to space travel. Even in our little hamlet of Pilani, we can see the extent of vehicles increasing on a day to day basis.

We were surprised to find out that for such an important and lucrative domain, there wasn’t any Domain specific language available to the end user. The end user is provided with buttons and toggles which are pre-defined by the manufacturer but when it comes to the end user tinkering around with the various sensors modern day cars provide, the utility is close to non-existent.

We conducted our research by going through various papers and speaking to our fellow students who are involved in the Formula students association (FSAE) and the BAJA team. Even In a minimal car like theirs the number of sensors and parts involved in data collection and calibration is astounding. Each sensor provides data of its own and it is up to the team to analyse it and make the requisite changes for optimum performance. In such a situation a Domain specific language is ideal; the user can use this DSL which provides him the required tools for getting data from Sensors, analysing them and automatically making required changes to the system.

Presently, as mentioned by our fellow students the cars main microcontroller is something called the ECU (Engine control unit). The ECU comes pre-programmed and is hard/risky to tinker with. In such a situation a DSL which can act as an interface between the ECU and the user is required and of utmost importance.

The DSL can also be integrated with the Navigator/GPS which is present widely in modern day cars. The GPS system in present day cars are very limited to a specific set of tools. A DSL which is able to manipulate such a system vastly increases the GPS’s capabilities. The DSL also acts as a link between the GUI of the Navigator and the various sensors present on the Car.

**Description of problems/tasks identified in the domain that can be solved by a language**

1. The first problem is something which everyday users face in real life. I, personally have faced this problem and have wondered if there was any possibility of making my life easier.

During long road trips or even while driving in the city, a person doesn’t know how many miles he can travel without being worried about running out of fuel. Presently, there doesn’t exist a system which utilizes the various features of the car for this purpose. The car has a GPS unit which provides the location of various Fuel stations, a system which would let the user know the distance between any two stations. This information can be combined with the mileage and fuel level of the car to inform the user the necessity of filling fuel in his car.

1. The gear system is a pillar of the modern day car industry, it influences the fuel efficiency, the condition of the engine, the lifetime of the vehicle, and the driving experience. Modern day cars also come with different modes of driving, for example: Cruise mode, sport mode and fuel economy mode. In such a situation the importance of the Gear system is not to be neglected. Most beginners and even experienced drivers do not know when to Shift from one gear to the next optimally. This is a problem which can be solved with minute amount of work but for no apparent reason hasn’t been done so. The user can be informed when the gear needs to be shifted by a integrating our code with a Green LED, the user can also be informed when the engine is being put under too much load by a Red LED. The option of expanding this system to other areas is considerable.
2. Most present day drivers are naive. They don’t take time to check the various components of the car, the only thing they wish to do is go on a drive which greatly limits their experience. A car needs to be checked regularly and in such a situation the onus to check the car comes down to the driver. If there was an option of automating this process, it would save both the automobile and such impatient drivers a lot of hassle. Once all the sensors are calibrated to a certain default value, then only should the car be started. The system can be expanded into a mini-diagnostic check of the car which can be used to predict the life time of the car and when a car can be put up of resale.
3. When an automobile travels a long distance in unsuitable conditions, a lot of factors affect the performance of the car. In high temperature areas, the engine gets overheated very easily, the driver needs to keep track of when and how to cool the engine, When it starts raining, the driver needs to work with the different setting of the wiper and figure out the optimal setting, When travelling in hill stations or mountainous regions, various regions have fog of different intensity, the driver needs to keep track of this and utilize the fog light. The driver in most cases knows where he is driving and which location he is headed towards, he can use the DSL to program such settings into the car and not worry about doing anything manually which would enhance his driving experience.