A Design Proposal of Software to Support Operation of a Driverless Car

The concept of autonomous vehicles presents many opportunities for software designers and engineers to provide meaningful insight to work towards its progress (Serban et al, 2018). The forthcoming diagrams and accompanying text aim to show how some of the functions of these vehicles may work, how the data will be stored and the interactions between each part of the system from a software perspective. The operations I have chosen to diagram and embed within my system are the ability to detect speed change signs and adjust to this, the ability to detect both road and pedestrian hazards and adjust to them, and the ability to input, use and retain destinations for recall and ease of use.

I have chosen the ability to adjust to speed signs as a crucial part of the driverless car system as this will ensure that the vehicle is compliant with existing and future road regulations (European Commission, 2022), as well as providing the best way to avoid potential collisions. The operation for this would be in the form of a sensor (of which there are multiple options such as cameras or LiDAR, as per Ignatious et al, 2022) that, with the aid of a pre-trained AI built into the central computer, would identify the specific shape and characteristics of a speed sign (round shape, red boundary), read the number on this and send a message to the central trip computer that it can adjust the speed of the vehicle, if safe to do so. Hazard detection is another key part of the system that will operate in a similar way to the speed detection sensor. By using AI and training this to identify distances between vehicles, road signs, traffic signals and pedestrian hazards (Milner, 2022), it would send a message to the trip computer to make the needed adjustments for this as required.

Both speed signs and hazard identifies would be stored within lists, as this will provide efficiency for the system. I opted for lists as when the system is trained, very little changes will need to be made, so using an indexed list should avoid potential issues.

I decided that the destination planning and storage would form a key part of the operations of the driverless car as this allows for ease of use for customers who make regular commutes for example. Location data would be stored within a dictionary data structure so that any of these could be recalled as needed, as well as allowing for the most flexibility if edits need to be made (Python.Land, 2023).

I have created diagrams using UML that show the use cases for the system (Appendix 1), showing the interactions within the system, the classes that will be designed (Appendix 2), how these will be sequenced (Appendix 3) and the flow of activities (Appendices 4, 5 and 6). These will form the basis for the software implementation stage at a later stage in the development of the driverless car system I have designed.

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Keywords

Advanced Driver Assistance Systems (ADAS)

Autonomous Car

Pedestrian Crash Avoidance Mitigation (PCAM)

Driverless Car

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