

Driving behaviour analysis of young vehicle drivers

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ABSTRACT – Different driver carries different driving behaviour and style. The most dangerous behaviour is the aggressive behavior, normally for young drivers. This behaviour can cause danger to the driver and other people. The driving behaviour can be detected from the way they control the vehicle during cornering, through uneven road and during accelerating and decelerating. How they handle the vehicle can be seen from the values of roll, pitch and yaw moments and x, y, z accelerations. The driving behaviour can be identified and classified according to the data collected. Usually at a higher value of moments and accelerations, the vehicle was controlled by the driver with quite aggressive driving style. In this paper, a number of young vehicle drivers are selected to perform driving test. From the test data, they will be classified based on the range of values.

1. INTRODUCTION

Driving behaviour is the behaviour when the driver drives a car or vehicle and the ways he or she control the car or any other vehicle in accelerating, braking, taking a corner, out of a junction and many more. The behaviour of the driver can be considered in many ways. It can easily be said that whether the driver is a good driver or bad driver based on when he or she control the vehicle on the road [1]. The behaviour also can be based on the driving ability, driving environment, demographic factor personal characteristic and perceived environment that influence the behaviour become a good or bad behaviour [2,3].

Teenagers nowadays can get their driving license as early as 17 years old. At this earliest of age, there are many types of behaviour among these young drivers. This behaviour of the young drivers will affect the traffic safety and increasing of traffic accident that happen almost every day. There were drivers that have a good skill in driving and not. The behaviour of the drivers also was change by time. The driving behaviours were influenced by many factors. The behaviour of the drivers has been determined from all the force from the vehicle that had been driven by the driver. The main objective of this project is to analysis the driving behaviour among teenagers. The behaviours of the drivers relate to the skill of the drivers. The behaviour of the drivers also can be analysed from the way there were control the car at various situations on the road taken.

2. METHODOLOGY

The scopes that need to be done on this project is needed to collect the data of horizontal, vertical, lateral vibrations and pitch, yaw, roll moments of the car using Lego Mindstorms EV3 [4] (Figure 1). Before that the vehicle has been weighed using the DAQ system. From the data taken, graph of these data were made and the graph was analyzed to determine the behavior of the driver [5,6]. In this project, LEGO Mindstorm as shown in Figure 1 will be used as the DAQ in order to determine the values of the moments and accelerations of a vehicle [7]. Five number of drivers (male, 21 years of age) are randomly selected for the experiment.



Figure 1 Lego Mindstorms DAQ and sensors.

Vehicle that makes a journey on the road tend to have a force when they are travelling through various types of road conditions such as go through a bumpy road, taking a cornering, exit of the junction and also when accelerating and decelerating. The force that the vehicle will be having is vibration or acceleration between x, y and z axis and moments that are roll, pitch and yaw moments. Figure 2 shows the driving route for the experiment.

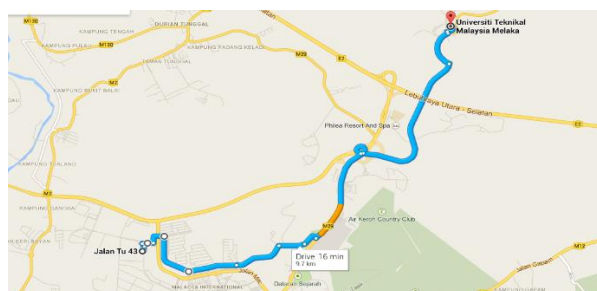


Figure 2 Driving route.

3. RESULTS AND DISCUSSION

Figure 3 and 4 show the vertical vibrations and roll of the vehicle and the offset (idle) value is 10 m/s^2 for the vibration and 0 rad/s for the roll. For Figure 3, the value above the offset is upward motion and the value below the offset is the downward motion of the vibrations. Above and below the dotted horizontal line are considered aggressive. For Figure 4, the value above the offset is moment to the right and the value below the offset is the moment to the left of the vehicle. Above and below the dotted horizontal line are considered aggressive. The highest value is at the point which the time is 401.73 sec that is when the vehicle is taking a corner. The highest value recorded is 87 rad/s with the speed of 52 km/h . As been analyzed, the roll moments are high when the driver is taking a corner and enter a junction. For the Z-accelerations, the highest value recorded at time 577.98 with the value of 7.51 m/s^2 and the speed of 70 km/h . Data Z-acceleration record the high data when the vehicle passing through bumpy roads.

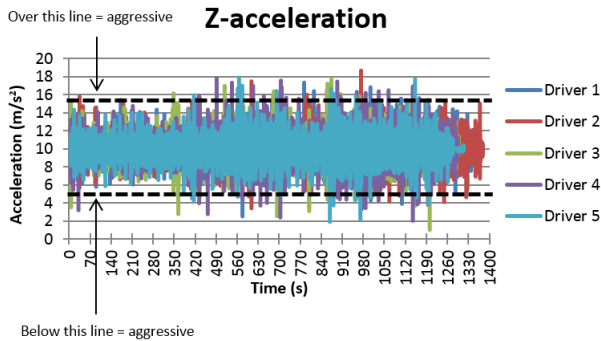


Figure 3 Vehicle vertical vibration.

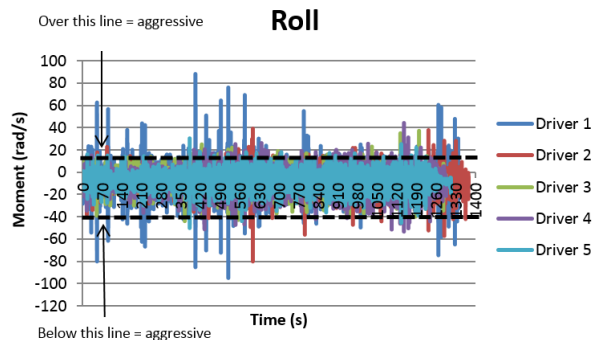


Figure 4 Vehicle roll moment.

4. CONCLUSION

From the experiment that has been done, it can be concluded that the force acting on the car represents the behavior of the driver. For this project, the driver that is doing the driving experiment is from the teenagers and then the driving behavior of these young drivers is being analyzed to know each driver behavior. The driver which has high experience in driving has more skill when driving and manage to control the vehicle with

good manner to prevent the car experience a high force. Thus, this experiment has achieved their objectives successfully despite having some problem to analyze the result. This experiment also can be used by the car manufacturer. Vehicle system such as a suspension system has influenced the vehicle movement to avoid the accelerations and moments acting on the vehicle. This experiment also can be done again with the different type of vehicle and different objective to further the study to prevent the bad behaviour of the driver acting on the car that can lead a danger to the driver, passenger and also to other people.

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