

## STUDY ON DRIVER BEHAVIOUR IN PRE-CRASH SCENARIO INVOLVING PEDESTRIAN AND MOTORCYCLE BY USING UC WIN ROAD SOFTWARE



## BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (AUTOMOTIVE TECHNOLOGY) WITH HONOURS

2023



### Faculty of Mechanical and Manufacturing Engineering Technology



Ahmad Abdullah Bin Muhamad

## Bachelor of Mechanical Engineering Technology (Automotive Technology) with Honours

#### STUDY ON DRIVER BEHAVIOUR IN PRE-CRASH SCENARIO INVOLVING PEDESTRIAN AND MOTORCYCLE BY USING UC WIN ROAD SOFTWARE

#### AHMAD ABDULLAH BIN MUHAMAD



Faculty of Mechanical and Manufacturing Engineering Technology

#### UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2023

#### DECLARATION

I declare that this Choose an item. entitled "Study On Driver Behaviour In Pre-Crash Scenario Involving Pedestrian And Motorcycle By Using Uc Win Road Software" is the result of my own research except as cited in the references. The Choose an item. has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.



#### APPROVAL

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the Bachelor of Mechanical Engineering Technology (Automotive Technology) with Honours.

Signature : Hazwani Supervisor Name : Dr. Nur Hazwani Binti Mokhtar 10 JANUARY 2023 Date : UNIVERSITI TEKNIKAL MALAYSIA MELAKA

#### **DEDICATION**

I dedicate my dissertation work to my family and all my friends. Enormous gratitude to my father, Muhamad Bin Doraman, who believe in me and always encourage me to be self-assured. I also dedicate this report to my entire BMMA KOHORT 9 classmate, who provided me with numerous ideas and tips throughout the semester to help me improve my report. Not forgetting to all my lecturers who had taught and gave a knowledge directly or indirectly. Last but not least, thousands of thanks to my PSM supervisor, Dr.Nur Hazwani Binti Mokhtar, always guided me to finish these thesis.

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

#### ABSTRACT

Driving simulators are widely used around the world for many purposes. The main purpose of the driving simulator is commonly for research, such as a study on road safety in Malaysia. In Malaysia, road accidents have increased over the last ten years. Meanwhile, the number of fatalities has been steadily decreasing since peaking at 7,152 in 2016 and dropped to its lowest point of 6,167 in 2019. Basicaly, this research is to analyze the market survey, design, develop and study driver's behaviour reaction time, braking time, and participant mental workload using NASA Task Load Index (TLX) based on driving simulator pre-crash scenario on UC Win Road Software. Based on previous research, certain things have been studied, such as validating a driving simulator for research into human factors issues on automated vehicles. The main findings of this research are to get information from society about the driving simulator product preferences and specifications and driving behaviour based on virtual reality to obtain data on recognition time and braking time. Besides that, to obtain workload from participants in experiment. The method used in this research is by conducting a survey questionnaire based on driving simulator product preferences, creating pre-crash scenarios consisting of pedestrian and motorcycle scenarios and providing a NASA TLX questionnaire to determine the participant workload involved in the experiment that has been conducted. The result from this research states that the speed of an object oncoming toward the driver influences the driver's behaviour based on recognition and braking time. As for the workload before and after the experiment conducted based on NASA TLX shows that the null hypothesis is accepted based on the t-test as there is no connection between workload before and after the experiment. In conclusion, the driving simulator can measure driver behaviour based on reaction and braking time. 10 10 0 - 10 . O. V - an

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

#### ABSTRAK

Simulator memandu digunakan secara meluas di seluruh dunia untuk pelbagai tujuan. Tujuan utama simulator pemanduan biasanya untuk penyelidikan, seperti kajian tentang keselamatan jalan raya di Malaysia. Di Malaysia, kemalangan jalan raya telah meningkat sejak sepuluh tahun yang lalu. Sementara itu, jumlah kematian semakin berkurangan sejak memuncak pada 7,152 pada 2016 dan menurun ke tahap terendah iaitu 6,167 pada 2019. Pada asasnya, penyelidikan kami adalah untuk menganalisis tinjauan pasaran, mereka bentuk, membangun dan mengkaji masa tindak balas tingkah laku pemandu, masa brek, dan beban keria mental peserta menggunakan Indeks Beban Tugas NASA (TLX) berdasarkan senario pra-crash simulator memandu pada Perisian UC Win Road. Berdasarkan kajian terdahulu, perkara tertentu telah dikaji, seperti mengesahkan simulator pemanduan untuk penyelidikan isu faktor manusia pada kenderaan automatik. Penemuan utama penvelidikan kami adalah untuk mendapatkan maklumat daripada masyarakat tentang pilihan dan spesifikasi produk simulator pemanduan dan tingkah laku pemanduan berdasarkan realiti maya untuk mendapatkan data mengenai masa pengecaman dan masa brek. Selain itu, untuk mendapatkan beban kerja daripada peserta dalam eksperimen kami. Kaedah yang digunakan dalam penyelidikan ini ialah dengan menjalankan soal selidik tinjauan berdasarkan keutamaan produk simulator memandu, mewujudkan senario prarempuh yang terdiri daripada senario pejalan kaki dan motosikal serta menyediakan soal selidik NASA TLX untuk menentukan beban kerja peserta yang terlibat dalam eksperimen vang telah dijalankan. Hasil daripada kajian ini menyatakan bahawa kelajuan sesuatu objek yang datang ke arah pemandu mempengaruhi tingkah laku pemandu berdasarkan pengecaman dan masa brek. Bagi beban kerja sebelum dan selepas eksperimen yang dijalankan berdasarkan NASA TLX menunjukkan hipotesis nol diterima berdasarkan ujiant kerana tiada kaitan antara beban kerja sebelum dan selepas eksperimen. Kesimpulannya, simulator pemanduan boleh mengukur tingkah laku pemandu berdasarkan tindak balas dan masa brek.

#### ACKNOWLEDGEMENTS

In the Name of Allah, the Most Gracious, the Most Merciful

First and foremost, I would like to thank and praise Allah the Almighty, my Creator, my Sustainer, for everything I received since the beginning of my life. I would like to extend my appreciation to the Universiti Teknikal Malaysia Melaka (UTEM) for providing the research platform. Thank you also to the Malaysian Ministry of Higher Education (MOHE) for the financial assistance.

My utmost appreciation goes to my main supervisor, Dr. Nur Hazwani Binti Mokhtar, Universiti Teknikal Malaysia Melaka (UTeM) for all his support, advice and inspiration. Her constant patience for guiding and providing priceless insights will forever be remembered.

Last but not least, from the bottom of my heart a gratitude to my beloved parents, Muhamad Bin Doraman and Bastiah Binti Ami, for their encouragements and who have been the pillar of strength in all my endeavors. Finally, thank you to all the individual(s) who had provided me the assistance, support and inspiration to embark on my study.

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

#### **TABLE OF CONTENTS**

PAGE

DECL	ARATION	
APPR	OVAL	
DEDIO	CATION	
ABST	RACT	i
ABST	RAK	ii
ACKN	IOWLEDGEMENTS	iii
TABL	E OF CONTENTS	iv
LIST (	OF TABLES	vi
LIST (	OF FIGURES	vii
LIST (	OF APPENDICES	xi
СНАР	TER 1	12
1.1	Background	12
1.2	Problem Statement	13
1.3	Research Objective	14
1.4	Scope of Research	14
СНАР	TER 2 I ITERATURE REVIEW	15
2 1	Introduction	15
2.1	Type of Driving Simulator	16
<i>L</i> • <i>L</i>	2.2.1 Train Simulator	16
	2.2.2 Static 2DOF 3DOF and 6 Driving Simulator	17
	2.2.3 Cabin Driving Simulator	20
	2.2.4 Manufacture Driving Simulator	21
2.3	Related research	22
	2.3.1 Validation of Vehicle Driving Simulator from Perspective of Velocity	
	and Trajectory Based Driving Behavior under Curve Conditions	22
	2.3.2 Validation of a driving simulator for research into human factors	
	issues of automated vehicles.	24
	2.3.3 Building and validation of a low-cost driving simulator	25
СНАР	TER 3 METHODOLOGY	26
3.1	Introduction	26
3.2	Questionnaire and NASA TLX	28
	3.2.1 Product Survey Questionnaire	28
	3.2.2 Questionnaire NASA TLX	30

3.3	Driving Simulator Software and Hardware	31
	3.3.1 Simulation software - UC/Win software	31
	3.3.2 Camera recorder software	32
	3.3.3 Driving Simulator	33
	3.3.4 Driver Seat	34
	3.3.5 Steering Wheel	35
	3.3.6 Accelerator and brake pedal	36
	3.3.7 Display (SAMSUNG SMART TV)	37
	3.3.8 Computer	38
3.4	Pre-Crash Driving Scenario	39
	3.4.1 UC/WIN Setting For Driving Scenario	41
	3.4.2 Road Dimension	43
	3.4.3 Type of Building	45
3.5	Experiment Set Up	46
	3.5.1 Driving Simulator Information	47
3.6	Participant	48
3.7	Procedure ALAYSIA	49
3.8	Parameter	50
2.0	S V	20
CHAI	PTER 4 RESULTS AND DISCUSSION	52
4.1	Introduction	52
4.2	Results and Analysis of Data	53
	4.2.1 Section 1 Demographic	53
	4.2.2 Section 2 Product Preferances	56
	4.2.3 Section 3 Product Specification	63
4.3	NASA TLX Questionnaire Analysis	64
	4.3.1 Consent and Demographic	64
	4.3.2 NASA TLX: Mental Demand	68
	4.3.3 NASA TLX: Physical Demand MALAYSIA MELAKA	70
	4.3.4 NASA TLX: Temporal Demand	72
	4.3.5 NASA TLX: Performance	74
	4.3.6 NASA TLX: Effort	76
	4.3.7 NASA TLX: Frustration	78
	4.3.8 T- Test Result	80
4.4	Reaction Time and Braking Time	81
	4.4.1 Raw Graph	81
	4.4.2 Box Plot Graph	84
CHA	PTER 5	87
5.1	Conclusion	87
5.2	Recommendation	88
5.3	Project Potential	88
REFE	CRENCES	89

#### LIST OF TABLES

TABLE	TITLE	PAGE
Table 3.1	Survey templete	29
Table 3.2	Questionnaire templete	30
Table 3.3	Participant pre-crash scenario.	51
Table 4.1	F-test on mental demand.	68
Table 4.2	T-Test on mental Demand.	69
Table 4.3	F-test for physical demand.	70
Table 4.4	t-Test for physical demand.	71
Table 4.5	F-Test on temporal demand.	72
Table 4.6	T-Test on temporal demand.	73
Table 4.7	F-Test for performance.	74
Table 4.8	T-test for performance.	75
Table 4.9	F-test on effort TI TEKNIKAL MALAYSIA MELAKA	76
Table 4.10	T-Test for effort.	77
Table 4.11	F-test on frustration	78
Table 4.12	T-test for frustration.	79
Table 4.12	t-Test result comparing NASA TLX before and after experiment.	80

#### LIST OF FIGURES

FIGURE	TITLE	PAGE
Figure 2.1	Train simulator (Locsim – Führerstand-Simulatoren, n.d.).	16
Figure 2.2	Static Driving Simulator (What Can Driving Simulators Contribute to	
	Driver Training?.n.d.).	18
Figure 2.3	Driving Simulator 2DOF (e.g. Parker2005).	18
Figure 2.4	Driving Simulator 6DOF (Infinity Technology and Amusement	
	Company Limited, n.d.).	19
Figure 2.5	MIROS Cabin Driving Simulator ( <i>MIROS Cabin Driving Simulator</i> ( <i>CabinDS</i> ) _ <i>Download Scientific Diagram</i> , n.d.).	20
Figure 2.6	TOYOTA Driving Simulator (Toyota Showcases Safety R&D – Oblique	e
	Crash Test, Advanced Driving Simulator and THUMS Model Range	
	Toyota-Simulator-4 - Paul Tan's Automotive News, n.d.).	21
Figure 3.1	Motorcycle Scenario KNIKAL MALAYSIA MELAKA	26
Figure 3.2	Methodology flowchart	27
Figure 3.3	UC-WIN/Road 16 Software	31
Figure 3.4	UC-WIN/Road 16 Software Specification	31
Figure 3.5	Ice cream screen recorder apps.	32
Figure 3.6	All recorded data.	32
Figure 3.7	Driving simulator.	33
Figure 3.8	Driving seat.	34
Figure 3.9	TX racing wheel leather edition.	35
Figure 3.10	Accelerator and brake pedal from thrustmaster.	36

Figure 3.11 Accelerator and brake pedal specifications.	36
Figure 3.12 Samsung smart tv.	37
Figure 3.13 Computer setup.	38
Figure 3.14 Computer specification.	38
Figure 3.15 Pre- crash driving scenario.	39
Figure 3.16 Scenario flow chart.	40
Figure 3.17 Manual mode setting.	41
Figure 3.18 Autonomous mode setting.	41
Figure 3.19 Test event setting.	42
Figure 3.20 Road detail information.	43
Figure 3.21 Road design.	44
Figure 3.22 Type of building.	45
Figure 3.23 Building use in scenario.	45
Figure 3.24 Experiment setup	46
Figure 3.25 Driving simulator component.	47
Figure 3.26 Participants	48
Figure 3.27 Reaction time.	50
Figure 3.28 Message Appeared	51
Figure 4.1 Gender	53
Figure 4.2 Age	53
Figure 4.3 Occupation	54
Figure 4.4 Race	54
Figure 4.5 Residence	55
Figure 4.6 Product preference question 1.	56

Figure 4.7 Product preference question 2.	56
Figure 4.8 Product preference question 3.	57
Figure 4.9 Product preference question 4.	58
Figure 4.10 Product preference question 5.	59
Figure 4.11 Product preference question 6.	60
Figure 4.12 Product preference question 7.	61
Figure 4.13 Product preference question 8.	62
Figure 4.14 Products specification.	63
Figure 4.15 Consent.	64
Figure 4.16 Gender.	64
Figure 4.17 Age.	65
Figure 4.18 State.	65
Figure 4.19 Driving experience.	66
Figure 4.20 Accident experience.	66
Figure 4.21 Does participant own a car?	67
Figure 4.22 Motion dizzines	67
Figure 4.23 Participant reaction time graph.	81
Figure 4.24 Graph reaction time for pedestrian and motorcycle scenario	82
Figure 4.25 Graph Braking Time for Pedestrian and Motorcycle Scenario	83
Figure 4.26 Box plot reaction time for 30 participant	84
Figure 4.27 Box plot reaction time for motorcycle and pedestrian scenario.	85
Figure 4.28 Box Plot Braking Time for Motorcycle and Pedestrian Scenario	86

#### LIST OF SYMBOLS AND ABBREVIATIONS

DOF - Degree of freedom	om
-------------------------	----

- -
- -
- -
- -
- -
- -
- \_



UNIVERSITI TERMINAL MALATSIA MELAN

#### LIST OF APPENDICES

APPENDIX	TITLE	PAGE
APPENDIX A	Demographic data obtained from survey (n=55)	92
APPENDIX B	Product preferences data obtained from survey (n=55)	93
APPENDIX C	Product specification data obtained from survey (n=55)	95
APPENDIX D	Data collection participants for reaction time	96
APPENDIX E	Table of reaction and breaking time for driving scenario	130



#### **CHAPTER 1**

#### **INTRODUCTION**

#### 1.1 Background

Driving simulator is a tools that use to make a research for example to study car accident on the road that provide realistic, safe and controlled environment. Driving simulation system is typically represented by a vehicle driving simulator. It conducts manned simulation and research, including vehicle driving behavior, dynamic performance, and traffic systems, using electronic computer images with the help of electronic control and other technical support. Over the last 40 years, advances in technology have enabled higher-quality computer processing and graphics, as well as more sophisticated and precise control devices. The majority of simulators are now dynamic, with the driver's actions causing changes in the driving environment. Current simulators can include elements like controllable traffic, various road users (vehicles, motorcycles, bicycles, pedestrians), and interactive modifiable features like billboards and railway level crossings. These elements can be programmed to modulate in response to the driver's actions or as a pattern that the driver must respond to traffic simulation modelling integration into the driving simulator. (Jeihani et al., 2017). Although, driving simulator provide safe and realistic results as real world driving it is expensive and high cost. Driving simulators have been used extensively in research on intelligent vehicle control, road traffic facilities, and intelligent transportation systems up until now. They've evolved into a useful tool for studying human efficiency, civil engineering, traffic engineering, psychology, and other related fields.(Wynne et al., 2019)

#### **1.2 Problem Statement**

In Malaysia, the number of road accidents has increased over the last ten years. Meanwhile, the number of fatalities has been steadily decreasing since peaking at 7,152 in 2016 and reaching its lowest point of 6,167 in 2019. The identification of various risk factors, including road conditions, is required for the development of effective strategies to reduce such fatal accidents. Road tests may be impossible in some countries due to liability concerns. Road tests are frequently allowed only after a first simulation of potentially dangerous situations. In many countries, for example, it is illegal to conduct a roadside investigation into the effects of alcohol or drugs on driving performance.

Besides safety concerns, driving simulator that available in market is expensive and high cost. Simulator fidelity is only half of the equation when comparing simulators to real-world driving. The operational definition of "real-world" driving is another factor that influences the comparison of simulated and real-world driving. Self-reported driving behaviour (e.g., Ba et al., 2016; Szlyk et al., 1992), allied health assessments (e.g., Lauridsen et al., 2016; van Wolffelaar et al., 1988), and on-road drives in instrumented vehicles are all mentioned in the literature (e.g., Helland et al., 2016).

#### 1.3 Research Objective

Specifically, the objectives are as follows:

- a) To design, develope and analyze questionnaire study to determine user requiremant on driving simulator
- b) Design and developed scenario including, road condition and surrounding by using UC-Win Software.
- To analyse the driver behaviour in term of reaction time and braking time in various scenario and pre crash scenario.
- d) To compare driver workload before and after in the experiment.

#### 1.4 Scope of Research

The scope of this research are as follows:

- a) Study limited to driving simulator and not a real driving
- b) Study limited to pre-crash scenario on pedestrian and motorcycle.
- c) Limitation on reaction time and braking time.
- d) The experiment and questionnaire is conducted at Melaka, Malaysia.

#### **CHAPTER 2**

#### LITERATURE REVIEW

#### 2.1 Introduction

Simulators are a standard tool for studying driving habits because they provide a realistic, safe, and controlled environment. Driving simulators frequently use in research, and there is only a little evidence confirming their validity. There is also a comparison of how accurately driving simulators are compared to real-world driving. Simulators were first originally developed (Lauer, 1960). Researchers have widely used them to study a variety of driver behaviours, including the effects of technologies, devices, and road infrastructure, ranging from variable message signs (e.g., Comte and Jamson, 2000) and in-vehicle systems (e.g., Abe and Richardson, 2005; Lin et al., 2009) to mobile phone use (Choudhary and Velaga, 2019). The validity and reliability of the apparatus, that is, the extent to which they accurately and consistently represent real-world performance is an issue with any laboratory-based experiment. Based on the driving simulator, reliability refers to the ability of a simulator to evaluate consistent results over time. Validity refers to the ability of a simulator to represent real-world driving accurately. There are two types of validity which are absolute validity and relative validity. Absolute validity is when the values obtained in a simulator (for example, speed or lateral position) match those obtained in an actual vehicle in absolute terms. Absolute validity requires a direct comparison of simulated and real-world driving, with statistical tests showing no significant difference between the values for the two types of driving. Relative validity occurs when the results of simulator driving show the same effects as real-world driving.

#### 2.2 Type of Driving Simulator

#### 2.2.1 Train Simulator

There are several type of driving simulator that are in use such as train simulators (Figure 2.1), bus simulators, car simulators, truck simulators, etc. Besides that, there are also modular design simulator and multi driving simulator. Modular design simulator can be configured for use as dump trucks, tractor, and other construction transports, airports operated vehicles, emergency response and police vehicles chase, buses, subway trains, passenger vehicles and heavy equipment such as cranes. Next, multi-driving simulator station allows one to train more driver instructors in a limited time. The system is equipped with an instructor station that allows centralized control of all the driving stations. The advantage of this type of system is that a coach can guide several students driving at the same time thus saving time and reducing costs.



Figure 2.1 Train simulator (Locsim – Führerstand-Simulatoren, n.d.).

#### 2.2.2 Static, 2DOF, 3DOF and 6 Driving Simulator

Next, there are also static driving simulator (Figure 2.2) and motion type of driving simulator such as 2DOF (Figure 2.3), 3DOF and 6DOF (degree of freedom) (Figure 2.4) which is more realistic to real-world driving. Degree of freedom of this simulator describing how something moves in relation to a set of fixed parameters (consider x and y-axis on a graph, except in 3-dimensions). To put it another way, it categorizes how something moves. In total, there are 6 degrees of freedom, and as said above, each of these essentially represents a different type of movement such as elevation, strafing, surging, yawing, pitching and rolling. First, elevation when driving on an uneven surface, your tires will rise and fall as they pass over the undulating surface. The elevation is represented by this vertical displacement. Second, strafing is movement on the horizontal axis (left or right, or 'laterally'). Whenever you turn a corner, inertia means you are pushed into the side of your seat. Third, surging forward and backward motion. Acceleration 'pushes' you back into your seat, while braking/deceleration 'pushes' you out of your seat. Fourth, yawing (oversteer) where the rear axle slides, simulating traction loss at the rear, which consequently changes the direction of motion of the car. Fifth, pitching (tilting forward and backwards) nose of the car dip down and the rear of the car lift up, as the weight of the car is transferred over the front axle. Lastly, rolling which involves the car pivoting on one side. Also consider body roll in a car. In the context of a motion platform, it will tilt from side to side to simulate roll.



Figure 2.2 Static Driving Simulator (*What Can Driving Simulators Contribute to Driver Training*?.n.d.).



Figure 2.3 Driving Simulator 2DOF (e.g. Parker2005).



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA** 

#### 2.2.3 Cabin Driving Simulator

Moreover, as show in Figure 2.5 there are also type of driving simulator used by manufacture or organization for research purpose. For example driving simulator that use in Malaysian Institute of Road Safety Research (MIROS) for road safety purpose



Figure 2.5 MIROS Cabin Driving Simulator (MIROS Cabin Driving Simulator (CabinDS) \_ Download Scientific Diagram, n.d.).

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

#### 2.2.4 Manufacture Driving Simulator

Besides that, based on Figure 2.6 there are also automotive company that use driving simulator for research and development purpose for example TOYOTA MOTOR CORPORATION (TMC). The driving simulator used for analyzing the driving characteristics of average drivers to aid in the development and verification of active safety technology that reduces traffic accidents. The driving simulator, located at TMC's Higashifuji Technical Center in Susono City, Shizuoka Prefecture, Japan, uses video, an acceleration simulator and other technology that allows vehicle researchers and developers to conduct driving tests that would be too dangerous to perform in the real world or that require specific driving conditions.



Figure 2.6 TOYOTA Driving Simulator (Toyota Showcases Safety R&D – Oblique Crash Test, Advanced Driving Simulator and THUMS Model Range Toyota-Simulator-4 - Paul Tan's Automotive News, n.d.).

#### 2.3 Related research

## 2.3.1 Validation of Vehicle Driving Simulator from Perspective of Velocity and Trajectory Based Driving Behavior under Curve Conditions

Driving simulators are becoming increasingly important in scientific research, such as road traffic environment safety evaluation and driving behavior characteristics research, due to their advantages of high experimental safety, convenient scene setting, and easy extraction of control parameters. Meanwhile, as driving simulators become more popular, demand for validation services is growing. Curve road conditions with various radii are used as experimental evaluation scenarios to validate a driving simulator in a complex environment. To do so, this paper examines the accuracy and reliability of an experimental vehicle speed of a driving simulator. The cosine similarity method is then used to perform a qualitative and quantitative analysis of the lateral deviation of the vehicle trajectory.

Furthermore, a data-driven method was used, with the lateral offset as the output and the longitudinal displacement, lateral displacement, vehicle speed, and steering wheel angle as inputs. As a result, in the simulator validation, this method can solve problems that cannot be realized in real complex scenes. Selecting the trajectory as the validation parameter allows the simulator's curve driving state to be reflected more comprehensively and intuitively. Using a speed and trajectory model instead of a real car experiment can improve simulator validation efficiency and lay the groundwork for simulator standardization.

Total of 27 drivers with different genders, ages, driving years and driving mileages are selected as the test subjects in the experiment, and they are numbered 1–27. Among them, all drivers are with corrected visual acuity of 1.0 and can skillfully complete the driving tasks. The experiment recruited 16 skilled drivers, which were test numbers 1, 2, 3, 4, 5, 7,

10, 11, 13, 15, 16, 17, 18, 19, 21, and 26, including 11 male drivers and 5 female drivers. There are 11 new drivers, and the test numbers are 6, 8, 9, 12, 14, 20, 22, 23, 24, 25, and 27, including 7 male drivers and 4 female drivers. Drivers' age, driving experience, annual vehicle kilometers traveled total mileage, number and gender all meet the basic conditions of driving simulation experiments.

The experimental section consists of a nineteen-kilometer two-way highway with no central separation zone. The maximum speed is 40 km/h, with a lane width of 3.5 meters. Straight road sections and various horizontal curved road sections make up the experimental road types. The driver can adjust their speed to enter the next curve with the expected speed as the entry speed by setting a straight-line section with a length of 700 meters between each characteristic road section (different horizontal curved sections). A symmetrical basic type and a simple type of curve exist, with straight lines, circular curves, and transition curves being the most common. Through sampling analysis, it is found that the overall reliability of the speed simulation for the tested driving simulator is relatively high, but the reliability of the speed simulation is low when turning in a small-radius curve(Chen et al., 2021)

# 2.3.2 Validation of a driving simulator for research into human factors issues of automated vehicles.

The Monash University Accident Research Centre automation driving simulator was evaluated for research into the human factors issues associated with automated driving in this study. On-road and simulated driving were both used in the research. Along the drives, twenty participants rated their willingness to resume control of an automated vehicle and their perception of safety in a variety of situations. Each situation was classified separately, and ratings were calculated. In terms of the similarity of the on-road and simulator data, statistical analysis of the ratings confirmed the simulator's behavioral validity. The research took place at Monash University's Accident Research Centre. The data was collected in a semi-controlled experimental environment. The on-road drive took place on real roads and in real traffic, but it followed a predetermined route. In terms of length, road conditions, and other controllable parameters, the simulator drive was programmed to replicate this on-road test route. The experimental drives did not include any safety-critical events. (Tomasevic et al., 2019)

#### **UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

There were 20 participants, 11 males and 9 females, ranging in age from 21 to 64 years, with an average age of 36.8 years (SD = 11.2) and a range of age from 21 to 64 years. The average number of years driving was 14.5 years (IQR: 9-24.75). Monash University (post-graduate and undergraduate students or staff) and personal contacts were used to recruit participants. Monash University's Human Research Ethics Committee gave their approval. Participants had to have a full driver's license and drive at least 6,000 kilometers per year to qualify. They were compensated \$30 for their time. The experiment lasted between 90 and 105 minutes in total. There were no significant statistical differences between the on-road and simulator environments when traffic density (TD) and situation complexity (SC) were tested.

#### 2.3.3 Building and validation of a low-cost driving simulator

The design and manufacture of a low-cost driving simulator device that achieves results comparable to high-cost advanced simulation devices are presented in this study. The goal is to use it in a variety of laboratory studies to better understand driver and vehicle behavior and performance, as well as to design road infrastructure elements and use it as a driving training device. The experiment lasted 30 minutes, and 51 participants of both genders and ages participated in the performance of driving experiences in a city environment scenario, with the purpose of evaluating the validity of the manufactured simulator by filling out a questionnaire with (9) questions. The results show that every participant (100%) was impressed by the device's design, ease of use of the device's controls (steering wheel, gearbox, and pedals), and realism of the approved driving simulation programed, with 52.9 percent rating the simulated experience as excellent. They rated the device as (realistic - very realistic) (100 percent) with a percentage of 96.1 percent, and the participants rated the device on a scale of 1 to 10. (0-100).

When asked if they had ever driven a simulator, all (51) said no. This is a very unusual circumstance, which contributes to the novelty of the current work. This device is believed to be the first built in an Iraqi university. As their response was in a distinct classification, the majority of the participants (51) and by (100%) liked the device's design. Giving their first experience with a driving simulator, this is extremely positive feedback, indicating the realism that the simulator is attempting to deliver.(Khadeir et al., 2021)

#### **CHAPTER 3**

#### METHODOLOGY

#### 3.1 Introduction

There are several methods use in this research to obtain data and do analysis. First, conducted a survey form which is distributed to 55 respondents by Google form through social media like WhatsApp and Facebook. The survey questionnaire used to obtain data on acknowledgment of society upon driving simulator and its product preferences. Secondly, conduct experiment on pre-crash driving scenario were created to get data on reaction time and braking time. Reaction time may be defined simply as the time between a stimulus and a response. This experiment involves two different type of driving simulations which is motorcycle scenario (Figure 3.1) and pedestrian scenario. This experiment involved 30 participants. Lastly, the method use in this research is give questionnaire to participant before and after the experiment were conducted based on NASA Task Load Index.



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Figure 3.1 Motorcycle Scenario 26

The methodology in Figure 3.2 show the flowchart of this research start from product survey question, distribute survey question and collect data. After that, start to design and developed scenario, pre-test experiment, conduct experiment, collect data from scenario and questionnaire and lastly do the data analysis.



Figure 3.2 Methodology flowchart

#### 3.2 Questionnaire and NASA TLX

#### 3.2.1 Product Survey Questionnaire

The survey method is by using Google form and distribute to 55 respondents. The survey method is used to collect data and analyze the respondent opinion. The survey questions are distributing through social media like WhatsApp and Facebook. All the collected data are exported from CSV file and transfers directly to Excel. The time to obtain all 55 respondents results take almost one week. The collect data such as demographic, product preferences and product specification.



The survey question is as shown in Table 3.1. The survey consists of two sections. The first section is demographic data. It has five questions that are age, gender, occupation, race, and residence. Sections 2 focus on product preference. In Section 2, there are seven set of question. Next, Section 3 focus on product specification. In Section 3, there are six set ofquestion. Each question will reflect to five rating number from strongly disagree to strongly agree.

Section 1: Demographic							
Gender:							
Age:							
Occupation:							
Race:							
Residence:							
Section 2: Product preferences							
Preferences	Y	es	N	lo	Others		
1. Do you ever play driving simulator game?							
2. Prefer this product available on your home?							
3. Can improve your driving skill?	57						
4. Price for driving simulator rm3000 is affordable?							
5. Can replace the old style driving learning in driving school?							
6. Improve your behavior driving on the road?							
7. Reduce the number traffic accident in Malaysia?							
8. Do you think this product can be implement in school for road safety study?							
Section 3: Product Specification							
	Str	ongly	disagr A	ree → gree	• Strongly		
Specification	1	2	3	4	5		
1. Affordable							
2. Economy							
3. Easy to use							
4. Aesthetic							
5. Light weight							
6. Moveable							

#### 3.2.2 Questionnaire NASA TLX

The survey question is as shown in Table 3.2 distributed to 30 participant that conducted in the experiment. Besides that, questionnaire were conducted before and after the experiment. The questionnaire consists of three sections. The first section is consent and demographic data consist of eight questions. Sections 2 and 3 focus on NASA Task Load Index (TLX) Questionnaire to know participant rates perceived work load before and after the experiment or task. Each question will reflect to 10 rating number from low to high.

Table 3.2	Questionnaire	templete
-----------	---------------	----------

Section 1: Consent & Demographic										
Name: Gender: Age: State: Driving Experience: Accident Experience: Do you have a car? : Do you have motion dizziness? :		6	2		V					
Section 2/ Section 3: Before/ After Experiment NASA TI	LX Q	uest	ionn	aire						
كتيكل مليسيا ملاك	R	3 /1	~~	e co	Low -	→ Hig	gh	-		
Preferences	1	2	3	4	5	6	7	8	9	10
1. Mental Demand How mentally demanding is the task?	LA	YS	AI	ME	LA	KA				
2. Physical Demand How physically demanding is the task?										
3. Temporal Demand										
How much time pressure did you feel as a result of how quickly tasks or task element occurred? Is the tempo slow or fast?										
4. Performance How successful will you in performing the task?										
5. Effort How hard did you have to work (mentally and physically) to accomplish your level of performance?										
6. Frustration How insecure, discouraged, irritated, stressed, and annoyed will you?										
#### 3.3 Driving Simulator Software and Hardware

#### 3.3.1 Simulation software - UC/Win software

The simulation software utilised in this study was FORUM 8's UC-WIN/Road 16 ver.10.1.2, which used extensive 3D visual technology and an interactive virtual reality design approach. This software also includes Log Export Plug-in, which allows the user to export simulated data to a.csv file on the computer. The export data include the time, distance, velocity, and position of the user's car, the leading vehicle, as well as the surrounding and other objects in the scenario.



UNIVERS Figure 3.3 UC-WIN/Road 16 Software

ogo	Plugins and DLLs	OpenGL Credits		
		File version	Company name	
UCwinRoad.exe		16.0.1.0	FORUM 8 Co.,Ltd.	^
Oper	nGL Control	16.0.1.0	FORUM8 Co.,Ltd.	
UCw	inRoad.JPN	No version inf		
UCw	inRoad.KOR	No version inf		
UCw	inRoad.CHS	No version inf		
UCw	inRoad.CHT	No version inf		
F8bk	. dll	1.0.1.0 *	FORUM8 Co., Ltd.	
F8Fb	x2016_1_2.dll	No version inf		
F8Fb	x2017_1.dll	No version inf		
F8Fb	x2020_1.dll	No version inf		
F8FE	Wrapper.dll	No version inf		
f8ms	g.dll	1.0.5.0 ×	FORUM 8 Co., Ltd.	
f8p.d	311	8.0.0.0	FORUM8 Co., Ltd.	
INNO	_ASWS.dll	1.2.0.1 ×	INNO	
liba3	s.dll	No version inf		
liba3	s_archive.dll	No version inf		
liba3	s_audio.dll	No version inf		
liba3	s_codec.dll	No version inf		

Figure 3.4 UC-WIN/Road 16 Software Specification

## 3.3.2 Camera recorder software

Ice Cream Screen recoder software (Figure 3.5) were use to record participant activity during conduct the experiment. Besides that, all recorded data (Figure 3.6) were stored in a file to ease the data collection.

🟓 icecream apps				Produc	cts 🗸
<mark>[]</mark> s	Screen	Reco	orde	7.21	
MALAYSIA Icecream	Screen Record	ler is an eas	y-to-use s	software to	
Figure 3.5 Ico	e cream scre	en recorde	er apps.	live streams	×
Capture video 💌 🮯 Game capt	ure 💿 Screer	nshot 💌 🤇	Capture a	udio 🔫	
Simulation Prac2 December.webm	Path Edit Mo	ore Size 75 MB	Duration 00:01:04	Resolution 1920x1080	Ē
30.BICYCLE ZUL.webm	• • =	55 MB	00:00:46	1920x1080	Ē
30.UMBRELLA ZUL.webm		81 MB	00:01:06	1920x1080	Ē
30.MOTORCYCLE ZUL.webm	• / =	68 MB	00:00:56	1920x1080	Ē
ice_video_20221221-152656.webm		23 MB	00:00:28	1920x1080	Ē
30.LORRY ZUL.webm		114 MB	00:01:31	1920x1080	Ē
30.RT ZUL.webm		89 MB	00:01:05	1920x1080	Ī
29.BICYCLE AZIM.webm		54 MB	00:00:36	1920x1080	Ē

Figure 3.6 All recorded data.

#### 3.3.3 Driving Simulator

Based on figures 3.7 shows a driving simulator hardware. Samsung Smart televisions supply the visual and audio system. The simulation software that have been used was FORUM 8's UC-WIN/Road ver.16, which used 3D visual and virtual reality design. This software also includes Log Export Plug-in, which allows the user to export simulated data to a.csv file on the computer. The export data include the time, distance, velocity, and position of the user's car, the leading vehicle, as well as the surrounding and other objects in the scenario.



UNIVERSITI TEKNIKAL MALAYSIA MELAKA Figure 3.7 Driving simulator.

#### 3.3.4 Driver Seat

The simulator's driver's seat comes from a 1996 Honda Civic Ferio. This seat was chosen because it can be changed for headrest height, back cushion angle, seat height, and seat-to-steering distance. Driving simulator seats on the market are more analogous to gaming chairs, and they cannot be modified to the driver's preferred posture. The dimension seat is shown in Figure 3.8. This seat weighs 28 kg, which is spread between four screw locations.



#### 3.3.5 Steering Wheel

Figure 3.9 shows the Thrustmaster TX Racing Wheel Leather Edition used in the driving simulator. The steering wheel measures 280mm in diameter. As the official licence promises, Thrustmaster is giving a pair of incredibly accurate racing controllers, which are well-liked by racers for their ability to create unrivalled immersion in the world of racing simulators for PC and Xbox One, in a single, limited-edition bundle.



# 3.3.6 Accelerator and brake pedal

The accelerator and braking pedals are components of the driving simulator. Figures 3.10 and 3.11 display the specification, model name, and component details.



Figure 3.11 Accelerator and brake pedal specifications.

# 3.3.7 Display (SAMSUNG SMART TV)

One of the driving simulator components is the display. Samsung Smart TV (Figure 3.12) have been used as the audio and display system



#### 3.3.8 Computer

The computer setup and specifications of the computer used in the driving simulator, model name, and components information are shown in Figure 3.13 and Figure 3.14.



Figure 3.14 Computer specification.

#### 3.4 Pre-Crash Driving Scenario

Based on Figure 3.15 the scenario begins with the manual driving mode. After certain distance the system goes into full automation mode. The driving simulator continues to operate at a constant velocity of 60 km/h for a given distance. At 150m distance traveled, notification will appeared and the participant wil notified the message appeared, participant will presses button 2, and takes complete control of the car by braking or accelerating to obtain data on reaction time and braking time.



Figure 3.15 Pre- crash driving scenario.

The scenario flow chart in figure 3.16 begins with the manual driving mode. After certain distance the system goes into full automation mode. The driving simulator continues to operate at a constant velocity of 60 km/h for a given distance. At 150m distance traveled, notification will appeared and the participant wil notified the message appeared, participant will presses button 2, and takes complete control of the car by braking or accelerating. The subject need to complete a questionnaire focusing on Nasa Task Load Index (TLX) at the end of the session.



Figure 3.16 Scenario flow chart.

# 3.4.1 UC/WIN Setting For Driving Scenario

Creating and design driving scenario.

1. The initial setting, as illustrated in Figure 3.17, will start the car in manual mode. The driving mode was changed to autonomous driving mode after 3m of travel, as indicated in figure 3.18.

and a source of the source of	-		
ommand:	launch a new vehicle 🗸 🗸		
ew vehicle			
itial speed:	0 km/h	Model: Trailer	
ax speed limit:	0 km/h		
oad / Start point	Dover Rd 🗸		
	Start with stopped engine	Coupe	
	Start with parking brake ON	Driving Mode	
	Allow off road driving	Manual mode V	
ane:	1 0	TTC: 10.0 # \$	
itial position:	0 m 0	Release ACC on user brake input	
irection:	Drive from the start of road to the end of road	Brake release threshold 0.10 C	
	O Drive from the end of road to the start of road		
No.			
revious vehicle ) leave the vehicle > delete the vehicle		View Mode [fdo nothing]	
revious vehicle b leave the vehicle c delete the vehicle		View Mode [do nothing]	
revious vehicle D leave the vehicle D delete the vehicle		Verv Mode (do nothing)	Ma
revious vehicle Disave the vehicle Dideter the vehicle		View Mode [do nothing]	He
tevious vehicle D leave the vehicle D delete the vehicle		View Mode (do nothing)	He
tevicus vehicle Dieve the vehicle Diede the vehicle		View Mode (do nothing)	He
trevious valida Disave the validat Didete the validat	Figure 3.17 M		He
tevicus vehicle Dieve the vehicle Dietee the vehicle	Figure 3.17 M	View Mode (do noting) anual mode setting.	He

2. The autonomous mode will continue till a distance of 150m is reached. The vehicle speed

remains constant at 60km/hr while in autonomous mode.

Jser simulation	Moving Models	Model Control	Command Execution	Multimedia	Traffic Signals	Extensions	User Variables	Others
Simulation cor	mmand							
Command:	change	ACC settings	~					
Automated Cru	ise							
Driving mode:		Forc	e automatic mode	~				
Use dynan	nic model and driv	ing input cross fa	ade function					
Speed:		60 k	m/h 🖨					
TTC:		0.2 s						
Release A	CC on user brake	input						
Brake release	threshold:	0.10	*					

Figure 3.18 Autonomous mode setting.

3. Participant notifies the notification appears at 150m, presses button 2 as represented in figure 3.19, and takes total control of the car by braking or accelerating. The accident will occur if the person fail to press button 2.

nario name:	Scenario	cenario				
vent list						
Events	Number of exits	Exit 1	Exit 2			
Start event	1	Change to Auton				
Change to Auton	1	Test event				
Test event	2	Test result 2 🗸 🗸	Test result 1			
est result 1	1					
fest result 2	0					
End test	1					
Event	0					
Add	NEGY SIA III	isert Copy	Import	Delete		
Add xit conditions Condition	Target moc	del Argument 1	Import Argument 2	Delete Argument 3		
Add xit conditions Condition Controller button ev	Target moc ent User avatai	del Argument 1 Button 2	Import Argument 2 On button up	Delete Argument 3		
Add xit conditions Condition Controller button ev	Target moc ent User avatai	del Argument 1 Button 2	Import Argument 2 On button up	Delete		
Add xit conditions Condition Controller button ev	Target moc ent User avatai	del Argument 1 Button 2	Import Argument 2 On button up	Delete		
Add xit conditions Condition Controller button ev	Target moc ent User avatai	del Argument 1 Button 2	Argument 2 On button up	Delete		
Add xit conditions Condition Controller button ev	Target modent User avatai	del Argument 1 Button 2	Argument 2 On button up	Delete		
Add xit conditions Condition Controller button ev	Target mod	del Argument 1 Button 2	Argument 2 On button up	Delete		
Add xit conditions Condition Controller button ev	Target mod	e 3 19 Test even	Argument 2 On button up	Delete		
Add xit conditions Condition Controller button ev	ent User avata	e 3.19 Test even	Argument 2 On button up CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	Delete		

#### 3.4.2 Road Dimension

The road dimensions considered in this experiment were the same for all environments and conditions in this study. Below represents the road detail information (Figure 3.20) and road design (Figure 3.21) in the scenario. The road width was 3.2 metres in each lane, the sidewalk length was 1 metre, and the overall road length was 538.4 metres.



Figure 3.20 Road detail information.



Figure 3.21 Road design.



# 3.4.3 Type of Building

There are numerous type of building (Figure 3.22) available in this software that can be deployed in the scenario as shown in figure 3.23. Buildings are used in a variety of scenarios. The list of models displayed can be selected by type.



Figure 3.23 Building use in scenario.

# 3.5 Experiment Set Up

The system for this experiment is shown in Figure 3.24. The system consists of a driving simulator, audio system and screen recording.



# 3.5.1 Driving Simulator Information

The driving simulator contains two subsystems, a physical component and software component, as shown in Figure 3.25.



## 3.6 Participant

There were 30 participants (Figure 3.26) in this session. Males responded with 96.7%, while females responded with only 3.3%. 90% of participants are between the ages of 21 and 25. The vast majority of participants (46.7%) have held their licence for one to five years. Every participant has agreed to take part in this experiment.



#### 3.7 Procedure

Each participant participates in five studies and one test drive in four different scenarios: a lorry, a pedestrian, a motorcycle, and a bicycle. For the past three days, the experiment has been going (Monday, Tuesday & Wednesday). The studies were done in the mornings on Monday and Wednesday for participants, while others were conducted in the evenings (participants Tuesday). Before the experiment, all participants were given briefings and pre-experiment (perception time) sessions. The author went over the specifics, guidelines, directives, and rules of the experiment during the briefing session.

Participants who have agreed to participate must sign the paperwork and provide personal information as verification of their agreement. The participants also took a five-minute test drive to acquire a feel for the drivving simulator. The main experiment began after a brief interval. This was done following the practice sessions. The experiment will conduct around 20 minutes for one participant to complete. At the end of each session, participants were given a questionnaire to fill out on how they felt about the task.

**UNIVERSITI TEKNIKAL MALAYSIA MELAKA** 

## 3.8 Parameter

#### 1. Reaction time

Reaction time (Figure 3.27) is taken when vehicle change the autonomous mode to manual mode & applied brake / take over vehicle.

	С	AC	AM	AN	AO	
1	scenarioTime	distanceTravelled	brake	appliedBrake	rawBrake 🔺	Data
1577	14.9941472	172.4893494	0	0	0	
1578	15.0032757	172.6664276	0	0	0.4	Notification 1
1692	16.0293794	192.2603302	0	0	0	
1693	16.0387836	192.4370575	0.0400782	0.0400782	0.0400782-4	Brake applied
1921	18.0575895	211.3539886	1	1	1	
1922	18.1051556	0.001251115	0	0	14	Start 2
2445	23.1027328	22.63087654	0	0	0	
2446	23.1123655	22.75675964	0	0	04	Notification 2
2569	24.3115056	40.27642059	0	0	0	
2570	24.3204363	40.41029358	0.0039 <b>10</b> 068	0.003910068	0.00391 <mark>01-4</mark>	Brake applied
2790	26.3915947	54.7776947	0.247311831	0.247311831	0.2473118	
2791	26.4364456	0.001156401	0	0	04	Start 3
3815	36.4312523	87.42532349	0	0	0	· · · · · · · · · · · · · · · · · · ·
3816	36.4409986	87.57875824	6	0	04	Notofication 3
3873	37.017915	///n 96.79140472	0	0	0	
3874	37.0287893	96.96608394	0.030303031	0.030303031	0.0303034	Brake applied
3875	37.0383368	97.1193161	0.030303031	0.030303031	0.030303	اودوه
3876	37.0484194	97.28112793	0.110459432	0.110459432	0.1104594	
3877	37.0589083	97.44933319	0.246334314	0.246334314	0.2463343	AKA
3070	17.0000300	07.74100104	A 100007 400	n sources upo	0 1000054	LANA

Figure 3.27 Reaction time.

#### **Example Calculation**

RT 1: 16.04s -15.00s (Notification 1) =**1.04s** Notification 2: 18.11 + 5s = 23.11s RT 2: 24.32s -23.11s =**1.21s** Notification 3: 26.44s + 10s = 36.44s RT 3: 37.03s - 36.44s = **0.59s** 

#### 2. Recognation Time

Recognation time is when the driver notify the massage.



Figure 3.28 Message Appeared

## 3. Braking Time

Based on table 3.3, reaction time is taken when vehicle change from autonomous (grey colour) mode to manual mode (green colour) and the driver start to take over the car. Braking time is measured after the changing of manual mode and the brake is applied (red colour). Example of data obtain for reaction time (13.61s - 13.12s = 0.49s) and for braking time (16.08s - 13.61s = 2.47s)

Table 3.3 Participant pre-crash scenario.

1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2	
2	0.1	0.001621	0	0	0	Manual	FALSE	
1487	13.1151	150.0634	0	0	0	ForceAutc	FALSE	
1488	13.12432	150.2149	0	0	0	ForceAuto	FALSE	Ι
1542	13.60687	158.1176	0	0.116406	0	Manual	TRUE	
1543	13.61513	158.2504	0	0.116383	0	Manual	FALSE	Ι
1812	16.08332	194.4354	0.009775	0.009775	0.009775	Manual	FALSE	
1813	16.0929	194.5685	0.009775	0.009775	0.009775	Manual	FALSE	T
1814	16.10214	194.6967	0.022483	0.022483	0.022483	Manual	FALSE	

### **CHAPTER 4**

## **RESULTS AND DISCUSSION**

## 4.1 Introduction

This chapter preliminary presents the results and analysis based on the survey questionnaire obtain from 55 participants. The survey questions are being distributed via social media platforms such as WhatsApp and Facebook. The majority of those who respondent are students (49.09 percent). The CSV file is used to export all of the collected data, which is then transferred to Excel.



## 4.2 Results and Analysis of Data

#### 4.2.1 Section 1 Demographic

Based on figure 4.1 shows pie chart gender amongst 55 respondents. The blue colour will be prefer to the "Male" and the orange colour prefer to "Female" respondents participants. Majority respondent is the Male (81.82%) and the minority is Female (18.82%)



Based on figure 4.2 shows age pie chart. There are three different group age. Blue colour present age between 21-30 years old. Orange colour present as age between 31-40 years old and grey present as age between 41-50 years old. The highest respondent is age between 21-30 years old.



Figure 4.2 Age 53

Based on figure 4.3 shows occupation amongst respondents. Graph occupation contain four type of occupation which is student (orange) ,engineer (grey) ,lecturer(blue) and others (yellow). Student (49.09%) get the highest response compare to the other three occupations which are engineer (9.09%) ,lecturer (5.45%) and others (36.36%)





Figure 4.4 Race

Based on figure 4.5 shows residence pie chart. The orange colour present as rural and the blue colour present as urban type of residence. Most of respondent are urban residence. The percentage of urban residence (87.27%) is higher compare to the rural residence (12.73%).



55

## 4.2.2 Section 2 Product Preferances

Based on figure 4.6 shows the pie chart with tittle "Do you ever play driving simulator game?" Graph consist two different anwers which is "YES" or "NO". Probably most respondent choose Yes (72.7%) compare to No (27.3%).







Figure 4.7 Product preference question 2.

Based on figure 4.8 shows pie chart with tittle "Do you think product can improve your driving skill?". Pie chart is based on likert scale which are strongly agree (dark blue), agree(yellow), neutral (grey), disagree (orange) and strongly disagree (light blue). All the answer are select by respondents. Based on graph shows 29.1% strongly agree while 3.6% strongly disagree. Next 40% agree with this statement while 1.8% disagree. 25.5% are neutral response.



Based on figure 4.9 shows pie chart with the tittle "do you think price for driving simulator rm3000 is affordable?" The pie chart based on scale Likert strongly agree until strogly disagree. The dark blue present of strongly agree while the light blue present of strongly disagree. Yellow colour present as agree and the gray colour present as neutral. Orange colour present as disagree. From the graph, mostly respondent pick neutral for the price.



Based on figure 4.10 shows pie chart with tittle "simulator can improve your behavior driving on the road?" This graph contains two different answer which yes or no. The blue colour present for 'Yes' and the orange colour present 'No'. Mostly respondent pick yes. This is because driving simulator easy to handle and less risk compare than driving on the road.



Based on figure 4.11 shows graph with the tittle "Do you think driving using a simulator can replace the old style driving learning in driving school?" The graph based on likert scale which is strongly agree (dark blue), agree(yellow), neutral(grey), disagree(orange) and strongly disagree (light blue). Most respondent choose disagree.



Based on figure 4.12 shows a pie chart with tittle "Do you agree by using this driving simulator can reduce the number traffic accident in Malaysia?". This pie chart based on likert scale with five different answer which is strongly agree(dark blue), agree(yellow), neutral(grey), disagree(orange) and strongly disagree(light blue). Highest respondent choose agree (30.9%).



Do you agree by using this driving simulator can reduce the number traffic accident in malaysia?

Based on figure 4.13 shows pie chart with the tittle "Do you think this product can be implement in school for road safety study?" This pie chart based on Likert scale with five different answer colour which is strongly agree(dark blue), agree(yellow), neutral(grey), disagree(orange) and strongly disagree(light blue). Based on graph, the most choosen answer by respondent is agree with the statement.



# 4.2.3 Section 3 Product Specification

Based on figure 4.14 shows graph product specification. Graph consist of five type product specification which is affordable, economy, easy to use, light weight and moveable. Most respondent choose moveable and easy to used to be a main product specification



## 4.3 NASA TLX Questionnaire Analysis

### 4.3.1 Consent and Demographic

Based on figure 4.15 shows pie chart consent amongst 30 respondents. It show that 100% of participant agreed to participate in this study.



Figure 4.16 Gender.

Based on figure 4.17 shows age pie chart. There are two different group age. Orange colour present age between 21-25 years old. Grey colour present as age between 26-30 years old. The highest respondent is age between 21-25 years old.



Based on figure 4.19 shows pie chart driving experience amongst 30 respondents. The blue colour will be prefer to the "1-5years", orange colour prefer to "6-10years", green colour prefer to "11-15years", purple colour prefer to "others" and light blue colour prefer to "No" rspondents participants. Majority respondent driving experience is 1-5 years (46.7%)



Based on figure 4.20 shows pie chart accident experience amongst 30 respondents. The blue colour will be prefer to the "Yes" and the orange colour prefer to "No" respondents participants. Majority respondent had experience accident (56.7%).



Accident Experience

∎Yes ∎No

Figure 4.20 Accident experience.
Based on figure 4.21 shows pie chart does participant own a car amongst 30 respondents. The blue colour will be prefer to the "Yes" and the orange colour prefer to "No" respondents participants. Majority respondent own a car (70%).



Based on figure 4.22 shows pie chart motion dizzines amongst 30 respondents. The blue colour will be prefer to the "No" and the orange colour prefer to "Yes" respondents participants. Majority respondent is the have no motion dizzines (86.7%).

UNIVERSITI TEK Motion Dizzines AYSIA MELAKA



■No ■Yes

Figure 4.22 Motion dizzines

## 4.3.2 NASA TLX: Mental Demand

In this case, F (1.0806) is smaller compared to F criticial (1.8608). Therefore, there is no significant difference. The variances of the two populations are unequal. Table 4.1 F-Test for mental demand.

	F-Test Two-Sample for Variances			
		Variable 1	Variable 2	
	Mean	4.333333	4.466667	
AA	Variance	7.954023	7.36092	
and a start	Observations	30	30	
TEK	df	29	29	
FIRST	F	1.080575	5	Y L
de l	P(F<=f) one-tail	0.418067	-	
ا ملاك	F Critical one-tail	1.860811	رسيتي ا	ويبق
UNIVE	RSITI TEKNIK	AL MALA	YSIA ME	LAKA

Table 4.1	F-test	on mental	demand.
-----------	--------	-----------	---------

A two-tail test (inequality). If t Stat < -t Critical two-tail or t Stat > t Critical two-tail, reject the null hypothesis. This is not the case, -2.0017 < -0.1866 < 2.0017. Therefore, do not reject the null hypothesis. The observed difference between the sample means (4.33 - 4.47) is not convincing enough to say that the average number of mental demand on participant differ significantly. Table 4.2 T-Test for mental demand.

t-Test: Two-Sample Assuming U	Jnequal Varia	ances
	Variable 1	Variable 2
Mean	4.333333	4.466667
Variance	7.954023	7.36092
Observations	30	30
Hypothesized Mean Difference	0	
df <sub>n/nn</sub>	58	
کنیکل ملیسیا tStat	-0.18661	رنىۋىرىس
P(T<=t) one-tail	0.426308	
NIVERSITI TEKNIKAL M	ALAYSIA	MELAK
t Critical one-tail	1.671553	
$P(T \le t)$ two-tail	0.852615	
t Critical two-tail	2.001717	

Table 4.2 T-Test on mental Demand.

## 4.3.3 NASA TLX: Physical Demand

In this case, F (1.1794) is smaller compared to F criticial (1.8608). Therefore, there is no significant difference. The variances of the two populations are unequal. Table 4.3 F-Test for physical demand.

	F-Test Two-Sample for Variances			
		Variable 1	Variable 2	
	Mean	4.266667	4.166667	
AL MA	Variance	8.547126	7.247126	
-Kulik	Observations	30	30	
FIL	df	29	29	VI.
SA AIN	F	1.179381		
املاك	P(F<=f) one-tail	0.3299	ر سېټې ا	اونو
	F Critical one-tail	1.860811	9. V	
UNIVE	RSITI TEKNIK	AL MALA	YSIA ME	LAKA

Table 4.3 F-test for physical demand.

A two-tail test (inequality). If t Stat < -t Critical two-tail or t Stat > t Critical two-tail, reject the null hypothesis. This is not the case, -2.0017 < -0.1378 < 2.0017. Therefore, do not reject the null hypothesis. The observed difference between the sample means (4.27 - 4.17) is not convincing enough to say that the average number of physical demand on participant differ significantly. Table 4.4 T-Test for physical demand.

	Variable 1	Variable
Mean	4.266667	4.166667
Variance	8.547126	7.247126
Observations	30	30
Hypothesized Mean Difference	0	
df	58	
كنيكل مليسياً t Stat	0.13782	بورس
P(T<=t) one-tail KNIKAL N	0.44543	MELA
t Critical one-tail	1.671553	
P(T<=t) two-tail	0.89086	
t Critical two-tail	2.001717	

Table 4.4 t-Test for physical demand.

# 4.3.4 NASA TLX: Temporal Demand

In this case, F (1.1012) is smaller compared to F criticial (1.8608). Therefore, there is no significant difference. The variances of the two populations are unequal. Table 4.5 F-Test for temporal demand.

	F-Test Two-Sample for Variances			
		Variable 1	Variable 2	
	Mean	4.366667	4.3	
AT WA	Variance	7.757471	7.044828	
EKIN	Observations	30	30	
119	df	29	29	
V3AIN	F	1.101158		
ملاك	P(F<=f) one-tail	0.398517	رسىتى ن	اونيق
	F Critical one-tail	1.860811	10	
JNIVE	RSITI TEKNIK.	AL MALA	YSIA ME	LAKA

A two-tail test (inequality). If t Stat < -t Critical two-tail or t Stat > t Critical two-tail, reject the null hypothesis. This is not the case, -2.0017 < -0.09491 < 2.0017. Therefore, do not reject the null hypothesis. The observed difference between the sample means (4.3 – 4.37) is not convincing enough to say that the average number of temporal demand on participant differ significantly. Table 4.6 T-Test for demand.

	Vari	able 1	Variable
Mean	4.3		4.366667
Variance	7.04	4828	7.757471
Observations	30	6	30
Hypothesized Mean Difference	0	V	7 I V
df '''n	58		
کنیکل ملیسیا Stat	-0.09	9491	بونر س
P(T<=t) one-tail KNIKAL M	0.46	2357	MELA
t Critical one-tail	1.67	1553	
P(T<=t) two-tail	0.92	4715	
t Critical two-tail	2.00	1717	

Table 4.6 T-Test on temporal demand.

## 4.3.5 NASA TLX: Performance

In this case, F (1.8333) is smaller compared to F criticial (1.8608). Therefore, there is no significant difference. The variances of the two populations are unequal. Table 4.7 F-Test for performance.

	F-Test Two-Sample for Variances			
		Variable 1	Variable 2	
AL MAI	Mean	7.166667	7.766667	
EK IN	Variance	5.522989	3.012644	
FIE	Observations	30	30	M
*BAINI	df	29	29	
املاك	F Jahn	1.83327	رستى	اونىق
	P(F<=f) one-tail	0.054143	U. V	
UNIVE	F Critical one-tail	1.860811	YSIA ME	LAKA
				I.

Table 4.7 F-Test for performance.

A two-tail test (inequality). If t Stat < -t Critical two-tail or t Stat > t Critical two-tail, reject the null hypothesis. This is not the case, -2.0057 < -1.1249 < 2.0057. Therefore, do not reject the null hypothesis. The observed difference between the sample means (7.17 - 7.77) is not convincing enough to say that the average number of performance on participant differ significantly. Table 4.8 T-Test for performance.

	Variable 1	Variable
Mean	7.166667	7.766667
Variance	5.522989	3.012644
Observations	30	30
Hypothesized Mean Difference	0	
df ' <sup>M</sup> n	53	
کنیکل ملیسیا Stat	-1.12485	بنوس
P(T<=t) one-tail	0.132861	MELA
t Critical one-tail	1.674116	
P(T<=t) two-tail	0.265722	
t Critical two-tail	2.005746	

Table 4.8 T-test for performance.

#### 4.3.6 NASA TLX: Effort

In this case, F (1.0018) is smaller compared to F criticial (1.8608). Therefore, there is no significant difference. The variances of the two populations are unequal. Table 4.9 F-Test for effort.

5.433333	5 (22222
1	5.633333
7.633333	7.61954
30	30
29	29
1.00181	
0.498074	
	7.633333 30 29 1.00181 0.498074

Table 4.9	E-test on	effort
1 auto 4.9	r-lest on	enon

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

A two-tail test (inequality). If t Stat < -t Critical two-tail or t Stat > t Critical two-tail, reject the null hypothesis. This is not the case, -2.0017 < -0.2805 < 2.0017. Therefore, do not reject the null hypothesis. The observed difference between the sample means (5.43 – 5.63) is not convincing enough to say that the average number of effort on participant differ significantly. Table 4.10 T-Test for effort.

t-Test: Two-Sample Assuming U	Jnequal Varia	ances
	Variable 1	Variable .
Mean	5.433333	5.633333
Variance	7.633333	7.61954
Observations	30	30
Hypothesized Mean Difference	0	-W
<sup>c</sup> df <sub>1/Nn</sub>	58	
کنیکل ملیسیا Stat	-0.28049	بنوس
P(T<=t) one-tail	0.39005	
IVERSITI TEKNIKAL M	ALAYSIA	MELAK
t Critical one-tail	1.671553	
P(T<=t) two-tail	0.780101	
t Critical two-tail	2.001717	

Table 4.10 T-Test for effort.

## 4.3.7 NASA TLX: Frustration

In this case, F (1.784) is smaller compared to F criticial (1.8608). Therefore, there is no significant difference. The variances of the two populations are unequal. Table 4.11 F-Test for frustration.

	F-Test Two-Sampl	e for Variand	ces	
		Variable 1	Variable 2	
	Mean	4.266667	3.666667	
	Variance	6.685057	3.747126	
MA	Observations	30	30	
A. M.	df	29	29	
TEX	F	1.784049		
E. O.S.	P(F<=f) one-tail	0.062414	5	
- MI	F Critical one-tail	1.860811		
املاك	Table 4.11 F	-test on frust	ration	ونيو

**UNIVERSITI TEKNIKAL MALAYSIA MELAKA** 

A two-tail test (inequality). If t Stat < -t Critical two-tail or t Stat > t Critical two-tail, reject the null hypothesis. This is not the case, -2.0049 < 1.0175 < 2.0049. Therefore, do not reject the null hypothesis. The observed difference between the sample means (4.27 - 3.67) is not convincing enough to say that the average number of frustration on participant differ significantly. Table 4.12 T-Test for frustration.

t-Test: Two-Sample Assuming U	Inequal Varian	ces
	Variable 1	Variable 2
Mean	4.266667	3.666667
Variance	6.685057	3.747126
Observations	30	30
Hypothesized Mean Difference	0	-WI
df	54	
فنيكل مليسيا ملاك	1.017476	ونبوتر س
P(T<=t) one-tail	0.156732	
<b>NIVERSITI TEKNIKAL I</b>	MALAYSIA	MELAKA
t Critical one-tail	1.673565	
P(T<=t) two-tail	0.313464	
t Critical two-tail	2.004879	

Table 4.12 T-test for frustration.

#### 4.3.8 T- Test Result

As show in the table below there are 30 participant took part in the experiment. A NASA Task Load Index (NASA TLX) questionnaire we distributed to the participant to answer it before and after the experiment. Based on the result obtain from the t-test it shows that there is no significiant different on workload between before and after the experiment conducted. Thus the null hypothesis on this t-test is accepted because there is no connection between the pre and post workload index sample.

	n	Р	re	Po	ost	t stat	t critical	df	Decision
		Expe	riment	Expe	riment		two tail		
5	MALAY	S/M	SD	М	SD				
Mental	30	4.33	2.82	4.47	2.71	-0.19	2	58	Accept
Demand							VI I		
Physical	30	4.27	2.92	4.17	2.69	0.14	2	58	Accept
Demand	بها ما	alm	$\leq$	کنید	تح	in.	اونيوم		
Temporal	30	4.37	2.79	4.3	2.65	0.09	2	58	Accept
Demand	VERS	ITI TE	KNIK	AL M	ALAY	SIA M	ELAKA		
Performance	30	7.17	2.35	7.77	1.74	-1.12	2	53	Accept
Effort	30	5.43	2.76	5.63	2.76	-0.28	2	58	Accept
Frustration	30	4.27	2.59	3.67	1.94	1.01	2	54	Accept

Table 4.13 t-Test result comparing NASA TLX before and after experiment.

#### 4.4 Reaction Time and Braking Time

#### 4.4.1 Raw Graph

The graph depicts the number of 30 participants in the experiment as well as their reaction times. Three colours are used to differentiate between reaction times. Blue colour represent reactions time for 5s. The orange colour represent the reaction time for 10s. Lastly, the grey colour represent the reaction time for 15s. Based on the raw data its show variety of participant reaction data from the slowest reaction time which is 2.01s to the fastest reaction time 0.01s.





Figure 4.23 Participant reaction time graph.

Figure 4.24 shows the reaction times for scenarios involving a pedestrian and a motorcycle. This experiment were conducted by 30 participant. Reaction times for pedestrian scenario indicated by blue colour and reaction time for motorcycle scenario indicated by orange colours. Taking example from participant 28 show that the reaction time for pedestrian scenario is lower than the reaction time in motorcycle. Factors that influence the driver reaction time to be abnormally high is due to lack surrounding awwarness towards motorcycle that was in bound at high speed.



Figure 4.24 Graph reaction time for pedestrian and motorcycle scenario

Figure 4.25 shows the braking times for scenarios involving a pedestrian and a motorcycle. This investigation had 30 people. Braking time for pedestrian scenario indicated by blue colour and braking time for motorcycle scenario are indicated by the orange colour. From the raw data it show that more participant motorcycle scenario show higher braking time and for pedestrian it show lower braking time.



#### 4.4.2 Box Plot Graph

Based on Box Plot graph below its shows the reaction time (RT) for 30 participant that have conduct the experiment. In this analysis the variable that change was the time of the notification which were set after 5s, 10s and 15s. Participant requires to put a brake on every notification to obtain their recognition time. The recognition time for 5s shows that minium reaction time is 0.7s, maximum reaction time is 2.01s and median is 1.1s. As for 10s the minimum reaction time is 0.34s, maximum reaction time is 1.48s and median is 0.83s. Lastly for 15s scenario the minimum reaction time is 0.01s, maximum reaction time is 1.57s and median is 1.05s. It shows that for the 5s notification is the slowest recognition time because of the time to notification to appear is short meanwhile the 10s notification is long and besides that 5s notification can affect the recognition time of participant.



Figure 4.26 Box plot reaction time for 30 participant

Based on Box Plot Reaction Time for Motorcycle and Pedestrian Scenario there are svereal data that obtain. The minimum value for motorcycle reaction time is 0.47s maximum value is 4.02s and the median is 0.93s. Next, minimum value pedestrian reaction time is 0.34s, maximum value is 2.84s and the median is 0.68s. Basically, the reaction time of participant for pedestrian scenario is less than motorcycle scenario. In both scenario, the manipulated variable that change are velocity for motorcycle and pedestrian. Thus, it can be said that velocity of object will affect the driver reaction time.



Figure 4.27 Box plot reaction time for motorcycle and pedestrian scenario.

Based on Box Plot Braking Time for Motorcycle and Umbrella Man Scenario there are svereal data that obtain. The minimum value for motorcycle braking time is 0.02s, maximum value is 3.81s and the median is 1.02s. Next, minimum value pedestrian braking time is 0.45s, maximum value is 2.38s and the median is 1.085s. Basically, the braking time of participant for pedestrian scenario is less than motorcycle scenario. In both scenario, the manipulated variable that change are velocity for motorcycle and pedestrian. Thus, it can be said that velocity of object will affect the driver braking time.



Figure 4.28 Box Plot Braking Time for Motorcycle and Pedestrian Scenario

#### **CHAPTER 5**

#### **CONCLUSION AND RECOMMENDATIONS**

#### 5.1 Conclusion

Based on the study, the data obtain and analysis from pre crash scenario shows that driver awarness towards incoming object or obstacle can be measured by their reaction time and braking time. Each participant data on reaction time and braking time are different thus variety of result obtain from the experiment. Besides that, this study result shows that velocity of an oncoming vehicle can affect the reaction time and braking time of the driver. If the oncoming object onto the vehicles is fast such as high speed motorcycle the reaction time and braking time for the driver is slow but if the oncoming object onto the vehicles is slow such as pedestrian the reaction time and braking time of the driver is faster. It can be said that the high the speed on oncoming object onto the driver the slower the reaction time and braking time of the driver. Therefore, it can be said that the velocity of an oncoming object to the vehicles may affect the driver behaviour based on their reaction time and braking time. Next, for the work load before and after the experiment conducted based on Nasa TLX its shows that there accept the null hypothesis based on t-test as there is no connection on workload before and after the experiment. In conclusion, driving simulator can be used as a tools to measure driver behaviour based on recognition time and braking time.

#### 5.2 Recommendation

For future imporvement,

i) Thesis research can be improvise by taking reaction time and braking time data on cornering road scenario as this research only focusing on straight road scenario.

ii) Thesis research can be improvise by taking reaction time and braking time data on different type of weather such as rain scenario as this research weather only focusing on sunny scenario

### 5.3 Project Potential

The study finding on this project could be applied on real world driving situation to improved driving behaviour. Besides that, help researchers to create new technology to improved driver reaction time and braking time to avoid oncoming object or obstacle during driving.

اونيوم سيتي تيكنيكل مليسيا ملاك

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

#### REFERENCES

Jeihani, M., NarooieNezhad, S., Kelarestaghi, K.B., 2017. Integration of a driving simulator and a traffic simulator case study: exploring drivers' behavior in response to variable message signs. IATSS Res. 41 (4), 164–171. https://doi.org/10.1016/j.iatsr. 2017.03.001.

**Systematic review of driving simulator validation studies**Wynne R, Beanland V, Salmon PSafety Science (2019) 117 138-151.

Friedel,8., and K. Reker. Test Drives in the Daimler-Benz Driving Simulator under Influence of Alprazolam and Alcohol (in German). Zeitschrift für Verkehrssicherheit, Vol. 41, No. 3, 1995, pp. 98-109.

Lauridsen, M.M., Thacker, L.R., White, M.B., Unser, A., Sterling, R.K., Stravitz, R.T., Bajaj, J.S., 2016. In patients with cirrhosis, driving simulator performance is associated with real-life driving. Clin. Gastroenterol. Hepatol. 14, 747–752. https://doi.org/10. 1016/j.cgh.2015.11.007.

Helland, A., Jenssen, G.D., Lervåg, L.-E., Moen, T., Engen, T., Lydersen, S., Slørdal, L., 2016. Evaluation of measures of impairment in real and simulated driving: results from a randomized, placebo-controlled study. Traffic Inj. Prev. 17 (3), 245–250. https://doi.org/10.1080/15389588.2015.10659

Lauer, A.R., 1960. The Psychology of Driving: Factors of Traffic Enforcement. Springfield: C. C. Thomas.

Comte, S.L., Jamson, A.H., 2000. **Traditional and innovative speed-reducing measures for curves: an investigation of driver behaviour using a driving simulator**. Safety Sci. 36 (3), 137–150. https://doi.org/10.1016/S0925-7535(00)00037-0. Abe, G., Richardson, J., 2005. The influence of alarm timing on braking response and driver trust in low speed driving. Safety Sci. 43 (9), 639-654. https://doi.org/10. 1016/j.ssci.2005.04.006

Choudhary, P., Velaga, N.R., 2019. Effects of phone use on driving performance: a comparative analysis of young and professional drivers. Safety Sci. 111, 179–187. https://doi.org/10.1016/j.ssci.2018.07.009

Validation of vehicle driving simulator from perspective of velocity and trajectorybased driving behavior under curve conditions. Chen L., Xie J., Wu S., Guo F., Chen Z., Tan W. (Energies, (2021). 14(24).

Validation of a driving simulator for research into human factors issues of automated vehicles Key Findings. Tomasevic N, Horberry T, Young, Kristie, Fildes, Brian. Journal of the Australasian College of Road Safety, (2019), 30(2)

Building and validation of a low-cost driving simulator. Khadeir, A. M., Saehood, Z. A., Mutar, H. S., Abduljabbar, A. S., Al-Dahwi, A. M., Abdulameer, R. H., Mohammed, A. A, Journal of Physics: Conference Series, (2021) وىوثر س

ы.

Building and validation of a low-cost driving simulator. Khadeir, A. M., Saehood, Z. A., Mutar, H. S., Abduljabbar, A. S., Al-Dahwi, A. M., Abdulameer, R. H., Mohammed, A. A, Journal of Physics: Conference Series, (2021)

Bohari, Z. A., S. B., & Osman, M. M. (2016). Simulating the Pedestrian Movement in the Public Transport Infrastructure. Elsevier. https://doi.org/https://www.sciencedirect.com /science/article/pii/S1877042816302415

Brijs, T., Mauriella, F., Montella, A., Galante, F., Brijs, K., & Ross, V. (2022). Studying the effects of an advanced driver-assistance system to improve safety of cyclist's overtaking. Elsevier.

Carpenter, M. G., Feldmann, M., Moury, M. T., Skvarce, J. R., Struck, M., Zwicky T. D., & Kiger, S. M. (2013, July). **Objective tests for forward-looking pedestrian crash avoidance/mitigation systems: annual report.** (Report No. DOT HS 811 793). Washington, DC: National Highway Traffic Safety Administration.

Ghanbary, G. S., MSc, Ashnagar, M., MSc, Habibi, E., PhD, & Sadeghi, S., MSc (2017). **Evaluation of Rating Scale Mental Effort (RSME) effectiveness for mental workload assessment in nurses**. ELSEVIER. https://doi.org/https://www.researchgate.net/ publication/320563310\_Evaluation\_of\_Rating\_Scale\_Mental\_Effort\_RSME\_effectiveness \_for\_mental\_workload\_assessment\_in\_nurses

Pawar, N. M., & Velaga, N. R. (2021). Investigating the influence of time pressure onovertakingmaneuversandcrashrisk.Elsevier.https://doi.org/https://www.sciencedirect.com/science/article/abs/pii/S1369847821002035

Gaojian, H., & Brandon, P. J. (2022). The effects of age and physical exercise on multimodal signal responses: Implications for semi-autonomous vehicle takeover requests. Elsevier. https://doi.org/10.1016/j.apergo.2021.103595

ونيؤمرسيتي تيكنيكل مليسيا ملاك

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

## APPENDICES

Demographic aspec	Percent %	
Gander	Male	81.82
	Female	18.18
Age	12-20	0
	21-30	81.82
	31-40	14.55
	41-50	3.64
Occupation	Lecturer	5.45
AWA	Students	49.09
	Engineer	9.09
V & JAINO	Others	36.36
كل مليسيا ملاك	Malay	83.64
		5.45
UNIVERSITITERNI	Chinese	10.91
	Others	0
Residence	Urban	87.27
	Rural	12.73

# APPENDIX A Demographic data obtained from survey (n=55)

Product preferences		Percent %
Do you ever play driving simulator game?	Yes	72.7
	No	27.3
	Yes	87.3
Would you prefer this product available on your	No	12.7
home?		
	Strongly agree	29.1
Do you think this product can improve your	Agree	40
driving skill?	Neutral	25.5
	Disagree	1.8
	Strongly disagree	3.6
	Strongly agree	12.7
Do you think price for driving simulator rm3000	Agree	27.3
is affordable?	S Neutral	38.2
UNIVERSITI TEKNIKAL M	ALAYS Disagree AKA	16.4
	Strongly disagree	5.5
Do you think this simulator can improve your	Yes	60
behavior driving on the road?	No	40

# APPENDIX B Product preferences data obtained from survey (n=55)

Product preferen	Percent %	
Do you think driving using a simulator can	Strongly Agree	16.4
replace the old style driving learning in	Agree	25.5
driving school?	Neutral	21.8
	Disagree	25.5
	Strongly Disagree	10.9
	Strongly Agree	16.4
Do you agree by using this driving simulator	Agree	30.9
can reduce the number traffic accident in	Neutral	25.5
malaysia?	Disagree	20
TEKN	Strongly Disagree	7.3
	Strongly Agree	29.1
Do you think this product can be implement in	Agree	41.8
school for road safety study?	اوىيۇمNeutralىتى ئېگ	20
UNIVERSITI TEKNIKAL I	Disagree	5.5
	Strongly Disagree	3.6

Product Specification					
Specification	S	trongly disag	$ree \rightarrow S$	trongly Ag	ree
		I	Percent (%)	)	
	1	2	3	4	5
1. Affordable	0	3.6	16.4	34.5	45.5
2. Economy	0	3.6	16.4	34.5	45.5
3. Easy to use	1.8	1.8	10.9	34.5	50.9
4. Aesthetic	0	7.3	16.4	30.9	45.5
5. Light weight	0	5.5	14.5	36.4	43.6
6. Moveable	0	3.6	9.1	29.1	58.2
18 au				VI	

# APPENDIX C Product specification data obtained from survey (n=55)

اونيوم سيتي تيكنيكل مليسيا ملاك

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

1	scenarioTi	distanceTi	brake	appliedBr	rawBrake
2	0.066852	0.001216	0	0	0
1611	15.00122	133.9897	0	0	0
1612	15.01087	134.1546	0	0	0
1760	16.34309	157.3566	0	0	0
1761	16.35292	157.5304	0.006843	0.006843	0.006843
1762	16.36386	157.7237	0.052786	0.052786	0.052786
1982	18.37072	176.3166	0.683284	0.683284	0.683284
1983	18.40928	0.00076	0.206256	0	0.206256
1984	18.42287	0.001423	0.1652	0.000605	0.1652
2524	23.40771	18.31945	0	0	0
2525	23.41679	18.39685	0	0	0
2526	23.4267	18.48165	0	0	0
2647	24.62759	30.72796	0	0	0
2648	24.6377	30.84783	0.022483	0.022483	0.022483
2649	24.6479	30.96872	0.211144	0.211144	0.211144
2862	26.65019	39.56804	0	0	0
2863	26.6867	0.000671	0	0	0
2864	26.69843	0.001197	0	0	0
8885	36.68444	61.19086	0	0	0
8886	36.69329	61.29626	0	0	0
8887	36.70166	61.39609	0	0	0
8963	37.45842	70.75161	0	0	0
3964	37.46956	70.89317	0.086999	0.086999	0.086999
8965	37.4808	71.03597	0.234604	0.234604	0.234604
3966	37.49998	71.2793	0.402737	0.402737	0.402737
8967	37.51044	71.41147	0.640274	0.640274	0.640274
3968	37.52141	71.54945	0.801564	0.801564	0.801564
3969	37.53271	71.6906	0,963832	0.963832	0.963832

## APPENDIX D Data collection participants for reaction time

UNIVERSITI TEKNIKAL MALAYSIA MELAKA Figure 1. Raw Reaction Time Data



Figure 2. Legend

Calculation Example

RT 1: 16.35s – 15.00s (notification brake1) = 1.35s

Notification Brake 2: 18.41s + 5s =23.41s

RT 2: 24.64s - 23.41s= 1.5s

Notification Brake 3: 26.69s + 10s = 36.69s

RT 3: 37.47s - 36.69s = 0.78s

Table Participant's Reaction Time

NO	REACTION TIME 1 (s)	REACTION TIME 2 (s)	REACTION TIME 3 (s)
1.	1.37	2.01	1.25
2	0.83	0.97	
3	÷.	0.79	1.04
4	1.17 Lett	ک <u>تر 1.5 کل</u> م	ينور 1.46 يتي تيح
5	UNIVERSITI	TEKNIKAL MA 0.91	LAYSIA MELAK
6	0.55	0.77	0.70
7	1.35	1.23	0.79
8	0.79	1.04	0.68
9	1.22	0.7	0.41
10	0.01	0.87	0.85

I		0.04	1.22	0.76	
	11	0.01	1.32	0.76	
	12	0.97	1.08	0.80	
	13	1.33	1.03	0.59	
	14	1.33	1.57	1.48	
	15	0.12	1.47	0.44	
	16	1.04	1.21	0.59	
	17	1.57 NALAYSIA	0.98	0.89	
	18	1.42	1.36	1.21	
	19	1.38 1.38	1.26	1.21	
	20	ليسيا ملاك	ڪنيڪل م	ينوم سيتي تيد	او
	21	UNIVERSITI	TEKNIRAL MA	LAYSIA MELA	KA
	22	1.3	1.31	1.08	
	23	1.21	0.71	1.31	
	24	0.01	1.12	0.6	
	25	0.14	0.8	0.34	
	26	1.06	0.9	0.92	
1			1		

27	1.29	1.03	0.69
28	1.1	1.58	0.62
29	0.87	1.91	1.33
30	1.31	1.75	1.35



## Participant Monday

Participant 1

	С	AC	AM	AN	AO	CF
1	scenarioTi	distanceT	brake	appliedBr	rawBrake	
2	0.047335	0.000469	0	0	0	
1741	14.99713	102.8096	0	0	0	
1742	15.00579	102.9061	0	0	0	
1892	16.37088	117.8051	0	0	0	
1893	16.38014	117.9041	0.001955	0.001955	0.001955	
2131	18.46132	130.2971	0.487781	0.487781	0.487781	
2132	18.49248	0.000458	0	0	0.487781	
2713	23.48792	12.18913	0	0	0	
2714	23.49605	12.21973	0	0	0	
2943	25.49439	21.26387	0	0	0	
2944	25.5029	21.30791	0.079179	0.079179	0.079179	
3192	27.5049	24.09784	0.727273	0.727273	0.727273	
3193	27.53649	0.000491	0	0	0.727273	
4343	37.52486	37.75077	0	0	0	
4344	37.53429	37.82817	0	0	0	
4484	38.77036	49.30909	0	0	0	
4485	38.78104	49.41427	0.017595	0.017595	0.017595	
5197	44.69605	58.54097	0.8739	0.8739	0.8739	

RT 1: 16.38-15.01s (Notification 1) =1.37s Notification 2: 18.49+ 5s = 23.49s RT 2: 25.50-23.49=2.01s Notification 3: 27.53+ 10s = 37.53sRT 3: 38.78-37.53= 1.25s Participant 2

	С	AC	AM	AN	AO
1	scenarioTi	distanceT	brake	appliedBr	rawBrake
2	0.148996	0.003464	0	0	0
1908	15.00127	290.1269	0	0	0
1909	15.00879	290.3458	0	0	0
2012	15.82866	314.2207	0.091887	0.091887	0.091887
2013	15.83723	314.4699	0.091887	0.091887	0.091887
2264	17.86354	0.000458	1	0	1
2265	17.87514	0.000894	1	0.002383	1
2891	22.86494	37.98377	0	0	0
2892	22.8734	38.12126	0	0	0
3009	23.83447	54.97704	0.040078	0.040078	0.040078
3010	23.84242	55.12798	0.040078	0.040078	0.040078
3250	25.88496	0.000395	0	0	1
3251	25.89656	0.000801	0	0	1
4490	<b>3</b> 5.88334	136.5356	0	0	0
4491	35.89178	136.7476	0	0	0
4610	36.88454	162.3857	0.113392	0.113392	0.113392
4611	36.89379	162.631	0.113392	0.113392	0.113392
1612	36 90166	162 8397	0.326491	0 326491	0.326491

RT 1: 15.83 -15.00s (Notification 1) =0.83s

Notification 2: 17.86 + 5s = 22.86s

RT 2: 23.83s -22.86s =0.97s

UNIVERSITI TEKNIKAL MALAYSIA MELAKA Notification 3: 25.88s + 10s = 35.88s

RT 3: 36.88s - 35.88s = 1s

Participant 3

	С	AC	AM	AN	AO		
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake		
2	0.057425	0.000862	0	0	0		
1687	14.99804	116.9675	0	0	0		
1688	15.00617	117.0811	0	0	0		
1800	16.02567	131.4822	0	0	0		
1801	16.03373	131.5959	0.035191	0.035191	0.035191		
1802	16.04199	131.7123	0.035191	0.035191	0.035191		
2041	18.05799	143.751	1	1	1		
2042	18.09501	0.000698	0	0	1		
2608	23.08067	16.44262	0	0	0		
2609	23.09159	16.532	0	0	0		
2693	23.86758	23.52607	0	0	0		
2694	23.87726	23.62082	0.01173	0.01173	0.01173		
2934	25.97099	30.14359	1	1	1		
2935	26.00486	0.000577	0	0	1		
4024	35.99643	65.77321	0	0	0		
4025	36.00492	65.88358	0	0	0		
4134	<b>37</b> .03724	79.6964	0	0	0		
4135	37.04776	79.83965	0.041056	0.041056	0.041056		
4494	40.44157	92.01529	0	0	0		
RT 1: 16.03-15.00s (Notification 1) =1.03s							
Notification 2: $18.09 + 5s = 23.09s$							
اونيوم.سيني تيڪنيڪل مليہser 2: 23.88-23.09=0.79s							
Notification 3: 26.00 + 10s = 36.0s							
RT 3: 37.04-36.00= 1.04s							
	С	AC	AM	AN	AO		
------	-----------	-----------	----------	-----------	----------		
1	scenarioT	distanceT	brake	appliedBr	rawBrake		
2	0.062652	0.00096	0	0	0		
1615	14.99663	141.576	0	0	0		
1616	15.01207	141.8128	0	0	0		
1746	16.17027	159.3203	0	0	0		
1747	16.17906	159.4508	0.000978	0.000978	0.000978		
1748	16.18967	159.6081	0.016618	0.016618	0.016618		
1984	18.23348	184.9688	0.26002	0.26002	0.26002		
1985	18.2733	0.000852	0.227761	0	0.227761		
2538	23.26177	11.63224	0	0	0		
2539	23.27102	11.6621	0	0	0		
2712	24.83356	17.13006	0	0	0		
2713	24.84234	17.16222	0.006843	0.006843	0.006843		
2942	26.90514	20.52152	0.394917	0.394917	0.394917		
2943	26.93895	0.000577	0.398827	0	0.398827		
4028	36.92599	41.40652	0	0	0		
4029	36.93525	41.5176	20	0	0		
4182	38.37996	59.88157	0	0	-0		
4183	38.38784	59.98358	0.002933	0.002933	0.002933		
4865	44.75629	92.51369	0.31085	0.31085	0.31085		

RT 1: 16.18-15.01s (Notification 1) =1.17s Notification 2: 18.27+ 5s = 23.27s

RT 2: 24.84-23.27=1.57s

Notification 3: 26.93+ 10s = 36.93s

RT 3: 38.39-36.93= 1.46s

	C	AC	AM	AN	AO
1	scenarioTi	distanceTr	brake	appliedBr	rawBrake
2	0.052512	0.000617	0	0	0
1614	14.99104	115.6025	0	0	0
1615	15.00061	115.7342	0	0	0
1698	15.80483	126.9018	0	0	0
1699	15.8158	127.0544	0.002933	0.002933	0.002933
1923	17.8519	142.6208	0.794721	0.794721	0.794721
1924	17.88808	0.000683	0.656892	0	0.656892
2463	22.88369	17.29	0	0	0
2464	22.89303	17.35806	0	0	0
2555	23.79804	24.78026	0	0	0
2556	23.80855	24.87632	0.037146	0.037146	0.037146
2769	25.83859	30.41058	0	0	0
2770	25.87461	0.00066	0	0	0
3799	35.86345	76.70152	0	0	0
3800	<b>3</b> 5.87 <b>1</b> 94	76.83001	0	0	0
3858	36.43734	85.52258	0	0	0
3859	<mark>3</mark> 6.44721	85.67606	0.022483	0.022483	0.022483
4159	39.35723	101.6038	0	0	0
	10 million (1997)				

RT 1: 15.82-15.00s (Notification 1) =0.82s

Notification 2: 17.89+ 5s = 22.89s

RT 2: 23.80-23.89=0.91siti teknikal malaysia melaka

Notification 3: 25.87+ 10s = 35.87s

RT 3: 36.44-35.87= 0.57s

C AC AM AN AO	
1 scenarioTidistanceTibrake appliedBr rawBra	ke
2 0.063268 0.001139 0 0	0
1608 14.99382 167.6068 0 0	0
1609 15.00152 167.7271 0 0	0
1672 15.54478 176.1331 0 0	0
1673 15.55438 176.2802 0.025415 0.025415 0.0254	15
1901 17.58829 193.2561 0.428153 0.428153 0.4281	53
1902         17.62465         0.000682         0.252199         0         0.2521	99
2440 22.61512 17.10323 0 0	0
2441 22.62396 17.17348 0 0	0
2521 23.37544 23.94486 0 0	0
2522 23.38565 24.04571 0.072336 0.072336 0.0723	36
2748 25.39141 29.85568 1 1	1
2749 25.42537 0.000564 1 0	1
3801 35.41425 55.84739 0 0	0
3802 35.42351 55.98154 0 0	0
3873 36.10319 66.28071 0 0	0
3874 36.11292 66.43283 0.01173 0.01173 0.011	73
4207	

RT 1: 15.55-15.00s (Notification 1) =0.55s

Notification 2: 17.62+ 5s = 22.62s

RT 2: 23.39-22.62=0.77siti teknikal malaysia melaka

Notification 3: 25.42+ 10s = 35.42s

RT 3: 36.12-35.42= 0.7s

	С	AC	AM	AN	AO
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake
2	0.066852	0.001216	0	0	0
1610	14.99303	133.8497	0	0	0
1611	15.00122	133.9897	0	0	0
1760	16.34309	157.3566	0	0	0
1761	16.35292	157.5304	0.006843	0.006843	0.006843
1982	18.37072	176.3166	0.683284	0.683284	0.683284
1983	18.40928	0.00076	0.206256	0	0.206256
2524	23.40771	18.31945	0	0	0
2525	23.41679	18.39685	0	0	0
2647	24.62759	30.72796	0	0	0
2648	24.6377	30.84783	0.022483	0.022483	0.022483
2862	26.65019	39.56804	0	0	0
2863	26.6867	0.000671	0	0	0
3884	36.67626	61.09346	SIA 0	0	0
3885	<b>36.</b> 68444	61.19086	0	0	0
3963	37.45842	70.75161	0	0	0
3964	37.46956	70.89317	0.086999	0.086999	0.086999
4248	40,29103	81.61528	0	0	0
	2				

RT 1: 16.35-15.00 (Notification 1) =1.35s

Notification 2: 18.40+5=23.41s

RT 2: 24.64-23.41=1.23s UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Notification 3: 26.68+10=36.68s

RT 3: 37.47-36.68=0.79s

	С	AC	AM	AN	СР	0
1	scenarioTi	distanceTi	brake	appliedBra	ake	
2	0.080108	0.001776	0	0		
3	0.093827	0.002778	0	0		
1645	15.00814	117.2137	0	0		
1727	15.77748	127.1641	0	0		
1728	15.78751	127.2935	0.063539	0.063539		
1949	17.7911	150.8352	0	0		
1950	17.84135	0.001411	0	0		
2504	22.83678	15.78994	0	0		
2505	22.84582	15.84438	0	0		
2614	23.8718	23.35986	0	0		
2615	23.88095	23.43633	0.013685	0.013685		
2827	25.90177	35.34071	0	0		
2828	25.95082	0.00143	0	0		
3879	35.94927	66.27289	SIA 0	0		
3880	35.95794	66.38653	0	0		
3944	36.61779	75.22182	0	0		
3945	36.627 <u>4</u> 9	75.35437	0.047898	0. <mark>047898</mark>		6
4251	39.60637	88.78112	0.293255	0.293255		
_	1	<u> </u>				

RT 1: 15.79-15.00 (Notification 1) =0.79s Notification 2: 17.84+5=22.84s RT 2: 23.88-22.84=1.04s

Notification 3: 25.95+10=35.95s

RT 3: 36.63-35.95=0.68s

	С	AC	AM	AN	AO	СР	1
1	scenarioTi	distanceT	brake	appliedBr	rawBrake		
2	0.11294	0.00445	0	0	0		
1634	14.99864	248.0704	0	0	0		
1635	15.00665	248.2986	0	0	0		
1762	16.21527	283.15	0	0	0		
1763	16.22368	283.3943	0.009775	0.009775	0.009775		
1982	18.25261	326.7768	1	1	1		
1983	18.30585	0.001606	1	0	1		
2538	23.30122	17.22454	0	0	0		
2539	23.31007	17.31897	0	0	0		
2615	24.00538	25.68515	0	0	0		
2616	24.01407	25.80148	0.024438	0.024438	0.024438		
2837	26.03209	39.3656	1	1	1		
2838	26.08106	0.001411	0	0	1		
3892	36.07849	145.6461	0	0	0		
3893	<b>36</b> .08856	145.9116	10 0	0	0		
3932	36.4774	156.286	20	0	0		
3933	36.48678	156.539	0.080156	0.08 <mark>015</mark> 6	0.080156		
RT	1: 16.22-1	5.00(Notif	ication 1) =	=1.22s		J	VI
Not RT	ification 2: 2: 24.01-2	:18.31+5=2 3.31=0.7s	کل ملیہ	کینگ	بي نيد	سيچ	ونيونه
Not	ification 3:	26.08+10	=36.08s	NIKAL N	IALAYS	SIA M	ELAK/

RT 3: 36.49-36.08=0.41s

1	С	AC	AM	AN	AO	
1	scenarioTi	distanceT	brake	appliedBr	rawBrake	
2	0.084116	0.001018	0	0	0	
1642	14.99266	122.0496	0.88563	0.88563	0.88563	
1643	15.00072	122.0647	0.769306	0.769306	0.769306	
1644	15.00794	122.0778	0.769306	0.769306	0.769306	
1875	17.05799	132.0013	0	0	0	
1876	17.09656	0.000782	0	0	0	
2418	22.08831	41.18041	0	0	0	
2419	22.0977	41.31824	0	0	0	
2513	22.94674	54.40032	0	0	0	
2514	22.95609	54.55039	0.230694	0.230694	0.230694	
2736	24.95714	68.74297	1	1	1	
2737	24.99401	0.000714	0	0	1	
3816	34.98268	124.3849	0	0	0	
3817	<b>34</b> .99243	124.6271	4 0	0	0	
3908	35.82586	145.8857	0	0	0	
3909	35.83591	146.1491	0.206256	0.206256	0.206256	
_	U F	-				
RT 1-	15 01-15	00(Notifica	(1) = 0	01s		_

Notification 2:17.09+5=22.09s

RT 2: 22.96-22.09=0.87s

Notification 3: 24.99+10=34.99s KNIKAL MALAYSIA MELAKA

RT 3: 35.84-34.99=0.85s

	С	AC	AM	AN	AO	
1	scenarioTi	distanceT	brake	appliedBr	rawBrake	
2	0.077784	0.001583	0	0	0	
1597	15.00606	214.9016	0.249267	0.249267	0.249267	
1598	15.01431	215.0872	0.249267	0.249267	0.249267	
1813	17.03666	244.8235	0.591398	0.591398	0.591398	
1814	17.08734	0.001489	0.596285	0	0.596285	
2353	22.07455	24.85545	0	0	0	
2354	22.08367	24.97714	0	0	0	
2490	23.39332	45.10956	0	0	0	
2491	23.40335	45.27517	0.010753	0.010753	0.010753	
2700	25.434	64.48373	1	1	1	
2701	25.48392	0.001426	0.844575	0	0.844575	
3745	35.47282	136.0475	0	0	0	
3746	35.48192	136.2542	0	0	0	
3824	36.23362	153.1602	4 0	0	0	
3825	36.24384	153.3876	0.018573	0.018573	0.018573	
3826	36.25338	153.5998	0.018573	0.018573	0.018573	
4201	ш			_		-
RT 1	: 15.01-15.	00 (Notific	eation 1) =(	0.01s		7
Notif RT 2	fication 2:1 : 23.40-22.	7.09+5=22 08=1.32s	ڪل مليد	کنید	تي تيڭ	<u>.</u>
Notif RT 3	ication 3: 2 : 36.24-35.	25.48+10=3 48=0.76s	35.48s	IIKAL M	ALAYS	IA I

	С	AC	AM	AN	AO
1	scenarioTi	distanceT	brake	appliedBr	rawBrake
2	0.084541	0.00201	0	0	0
1577	14.99297	228.4645	0	0	0
1578	15.00139	228.6718	0	0	0
1677	15.96434	252.4892	0	0	0
1678	15.97398	252.7267	0.021505	0.021505	0.021505
1892	17.99068	287.9579	0.632454	0.632454	0.632454
1893	18.03808	0.001321	0	0	0.632454
2450	23.02562	16.34198	0	0	0
2451	23.03534	16.4145	0	0	0
2564	24.10595	25.74926	0	0	0
2565	24.11513	25.83987	0.052786	0.052786	0.052786
2790	26.12255	32.84686	0.392962	0.392962	0.392962
2791	26.17113	0.001388	0.142717	0	0.142717
3797	36.16978	93.00025	0	0	0
3798	36.17985	93.20744	0	0	0
3877	36.95773	109.6008	~ 0	0	0
3878	36.96964	109.8572	0.051808	0.051808	0.051808
	LIS				

RT 1: 15.97-15.00(Notification 1) =0.97s

Notification 2:18.04+5=23.04s

RT 2: 24.12-23.04=1.08s

UNIVERSITI TEKNIKAL MALAYSIA MELAKA Notification 3: 26.17+10=36.17s

RT 3: 36.97-36.17=0.8s

1	С	AC	AM	AN	AO	C
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	
2	0.087809	0.002181	0	0	0	
1616	15.00784	142.2717	0	0	0	
1758	16.33045	165.9425	0	0	0	
1759	16.33946	166.1041	0.01955	0.01955	0.01955	
1984	18.37368	190.7378	0.734115	0.734115	0.734115	
1985	18.42596	0.001618	0	0	0.734115	
2524	23.42251	22.21248	0	0	0	
2525	23.43123	22.32054	0	0	0	
2631	24.45044	36.85588	0	0	0	
2632	24.46002	37.00222	0.054741	0.054741	0.054741	
2846	26.46372	52.9461	0.667644	0.667644	0.667644	
2847	26.51502	0.001556	0.208211	0	0.208211	
3869	36.50215	141.4079	0	0	0	
3870	36.51209	141.6669	1 0	0	0	
3871	36.52252	141.939	0	0	0	
3927	37.08844	156.97	0	0	0	
3928	37.09915	157.2575	0.043011	0.043011	0.043011	
	E	_				-
RT 1:	16.34-15.0	)1(Notificat	tion 1) =1.3	3s		
النور، سبخ، تنكنيك مليسية ماراد						
RT 2:	24.46-23.4	43=1.03s		1.		
Notif	ication 3: 2	6.51+10=30	6.51s	KAL MA	LAYSIA	ME

RT 3: 37.10-36.51=0.59s

	С	AC	AM	AN	AO
1	scenarioTi	distanceT	brake	appliedBr	rawBrake
2	0.083516	0.001924	0	0	0
1590	14.99617	201.9369	0	0	0
1591	15.0048	202.1843	0	0	0
1736	16.31807	239.974	0	0	0
1737	16.32749	240.2437	0.021505	0.021505	0.021505
1957	18.34294	280.7036	1	1	1
1958	18.39269	0.00141	0	0	1
2492	23.38408	31.45138	0	0	0
2493	23.39352	31.5951	0	0	0
2657	24.94951	58.34562	0	0	0
2658	24.95956	58.52917	0.036168	0.036168	0.036168
2868	26.97106	78.32355	1	1	1
2869	27.02127	0.00143	0	0	1
3925	37.01434	129.1427	0	0	0
3926	37.02381	129.3784	0	0	0
4075	38.49274	167.5573	0	0	0
4076	38.5017	167.7955	0.018573	0.018573	0.018573
DT 1	16.00.15				

RT 1: 16.33-15.00(Notification 1) =1.33s

Notification 2:18.39 +5=23.39s

RT 2: 24.96-23.39=1.57s

UNIVERSITI TEKNIKAL MALAYSIA MELAKA Notification 3: 27.02+10=37.02s

RT 3: 38.50-37.02=1.48s

1	С	AC	AM	AN	AO
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake
2	0.078448	0.00175	0	0	0
1603	14.99647	162.522	0	0	0
1604	15.00619	162.7246	0	0	0
1615	15.11055	164.8983	0	0	0
1616	15.12161	165.1283	0.006843	0.006843	0.006843
1852	17.31722	205.3924	0.710655	0.710655	0.710655
1853	17.36534	0.001283	0	0	0.710655
2398	22.36588	26.81033	0	0	0
2399	22.37577	26.94926	0	0	0
2553	23.83867	50.41517	0.00782	0.00782	0.00782
2767	25.86411	74.46572	0.665689	0.665689	0.665689
2768	25.90962	0.001179	0.665689	0	0.665689
3827	35.90667	133.5644	0	0	0
3828	<b>35</b> .91571	133.7963	0	0	0
3875	36.34383	144.9128	0	0	0
3876	36.35265	145.1448	0.048876	0.048876	0.048876
4283	i i	•	P		
RT 1:	: 15.12-15.(	)0(Notificat	ion 1) =0.1	2s	IG
Notif	ication 2:17	7.37+5=22.3	کل مد	کنید	ىيتى تيە
Notif	ication 3: 2	5.91+10=35	5.91s	KAL MA	LAYSIA
RT 3:	: 36.35-35.9	91=0.44s			

### Participant Tuesday & Wednesday

### Participant 16

1	С	AC	AM	AN	AO	l
1	scenarioTime	distanceTravelled	brake	appliedBrake	rawBrake 🔫	- Data
1577	14.9941472	172.4893494	0	0	0	
1578	15.0032757	172.6664276	0	0	04	<ul> <li>Notification</li> </ul>
1692	16.0293794	192.2603302	0	0	0	
1693	16.0387836	192.4370575	0.0400782	0.0400782	0.0400782	Brake
1921	18.0575895	211.3539886	1	1	1	
1922	18.1051556	0.001251115	0	0	14	Start 2
2445	23.1027328	22.63087654	0	0	0	
2446	23.1123655	22.75675964	0	0	0∢	- Notification
2569	24.3115056	40.27642059	0	0	0	
2570	24.3204363	40.41029358	0.003910068	0.003910068	0.0039101	Brake
2790	26.3915947	54.7776947	0.247311831	0.247311831	0.2473118	
2791	26.4364456		0	0	0∢	Start 3
3815	36.4312523	87.42532349	0	0	0	
3816	36.4409986	87.57875824	0	0	04	Notofication
3873	37.017915	96.79140472	> 0	0	0	
3874	37.0287893	96.96603394	0.030303031	0.030303031	0.030303	Brake
3875	37.0383368	97.1193161	0.030303031	0.030303031	0.030303	
3876	37.0484194	97.28112793	0.110459432	0.110459432	0.1104594	
3877	37.0589083	97.44933319	0.246334314	0.246334314	0.2463343	
2070	27.0600160	07 61122121	0.202205400	0.202205400	0.2022054	
	-)	- cum	- u	ي س	- 19.	2

# RT 1: 16.04s -15.00s (Notification 1) =1.04s

Notification 2: 18.11 + 5s = 23.11s

RT 2: 24.32s -23.11s =1.21s

Notification 3: 26.44s + 10s = 36.44s

RT 3: 37.03s - 36.44s = 0.59s

Participant 17

	С	AC	AM	AN	AO
1	scenarioTime	distanceTravelled	brake	appliedBrake	rawBrake
1522	14.9988394	146.0918884	0	0	0
1523	15.0075279	146.2340851	0	0	0
1688	16.5638654	171.9454498	0	0	0
1689	16.5734071	172.1011353	0.0088	0.008797654	0.0087977
1909	18.6005025	188.6074371	0	0	0
1910	18.6506626	0.001509762	0	0	0
2422	23.6439736	26.19819832	0	0	0
2423	23.6531259	26.32095909	0	0	0
2521	24.6156155	40.69074249	0	0	0
2522	24.6254429	40.84366608	0.044	0.043988269	0.0439883
2727	26.6455003	60.78707504	0	0	0
2728	26.6935142	0.001316583	0	0	0
3726	36.6832667	120.842041	0	0	0
3727	36.6923962	ALAY 121.0632324	0	0	0
3812	37.5645074	142.0093536	0	0	0
3813	37.5753212	142.2663879	0.044	0.043988269	0.0439883
3814	37.5867808	142.5386658	0.1378	0.137829915	0.1378299
3815	37.5972388	142.786972	0.2278	0.227761492	0.2277615

RT 1: 16.57s -15.00s (Notification 1) =1.57s

Notification 2: 18.65s + 5s = 23.65s

RT 2: 24.63s - 23.65s = 0.98s TEKNIKAL MALAYSIA MELAKA

Notification 3: 26.69s + 10s = 36.69s

RT 3: 37.58s - 36.69s = 0.89s

	С	AC	AM	AN	AO
1	scenarioTime	distanceTravelled	brake	appliedBrake	rawBrake
2	0.0811222	0.0019438	0	0	0
1556	15.0054152	221.3501434	0	0	0
1710	16.4065999	251.6514435	0	0	0
1711	16.4167195	251.8641205	0.02737	0.027370479	0.02737
1924	18.4425009	281.6512756	0.798631	0.798631489	0.798631
1925	18.4922962	0.001440554	0.820137	0	0.820137
2477	23.4869986	28.34165764	0	0	0
2478	23.4964732	28.48028755	0	0	0
2602	24.6749247	47.63703156	0	0	0
2603	24.6868501	47.84584427	0.107527	0.107526883	0.107527
2817	26.6949363	68.98548126	0.665689	0.66568917	0.665689
2818	26.7444102	0.001422658	0.665689	0	0.665689
3872	36.7312864	149.8636932	0	0	0
3873	36.7400849	150.0977325	0	0	0
3995	37.8491219	180.5251617	0	0	0
3996	37.3585184	180.788147	0.067449	0.067448683	0.067449
3997	37.8705948	181.1259918	0.136852	0.136852399	0.136852
3998	37.8801241	181.3924103	0.208211	0.208211139	0.208211

RT 1: 16.42s -15.00s (Notification 1) =1.42s

Notification 2: 18.49s + 5s = 23.49s KAL MALAYSIA MELAKA

igu g

RT 2: 24.85s - 23.49s = 1.36s

Notification 3: 26.69s + 10s = 36.74s

RT 3: 37.58s - 36.69s = 1.12s

1	С	AC	AM	AN	AO
1	scenarioTime	distanceTravell	brake	appliedBrake	rawBrake
2	0.0759046	0.001534371	0	0	0
1611	15.0057595	156.5390472	0	0	0
1612	15.0145171	156.6913757	0	0	0
1765	16.381429	180.8240509	0.00196	0.001955034	0.001955
1766	16.3903256	180.982254	0.00196	0.001955034	0.001955
1989	18.4644312	0.001551384	0.42913	0	0.42913
1990	18.4768635	0.002427316	0.42913	0.002728212	0.42913
2526	23.4647218	24.67209816	0	0	0
2527	23.4743643	24.78431129	0	0	0
2656	24.7216052	41.74066544	0.01857	0.018572826	0.018573
2657	24.7321297	41.89905167	0.16911	0.169110462	0.16911
2869	26.7951391	0.00171063	0	0	0.521994
2870	26.8074427	0.002614717	0	0	0.521994
3898	36.8043554	128.8672028	0	0	0
3899	36.8145621	129.1087952	0	0	0
4016	38-0095172	158.3289337	0 <mark>.096</mark> 77	0.096774191	0.096774
4017	38.0208598	158.6124573	0.14663	0.14662756	0.146628
4018	38.0310861	158.8678284	0.20137	0.201368526	0.201369

RT 1: 16.38s -15.00s (Notification 1) =1.38s

Notification 2: 18.46s + 5s = 23.46s NIKAL MALAYSIA MELAKA

ودرة

RT 2: 24.72s - 23.46s = 1.26s

Notification 3: 26.80s + 10s = 36.80s

RT 3: 38.01s - 36.80s = 1.21s

1.1	С	AC	AM	AN	AO
1	scenarioTime	distanceTravelled	brake	appliedBrake	rawBrake
2	0.083523	0.002023854	0	0	0
1632	15.0085358	279.1716309	0	0	0
1735	15.9078042	304.9546204	0	0	0
1736	15.9173779	305.2286987	0.034213	0.0342131	0.034213
1737	15.9272604	305.5115356	0.034213	0.0342131	0.034213
1958	17.9957191	0.001856673	0.969697	0	0.969697
1959	18.0094738	0.002890977	0.969697	0.007607332	0.969697
2505	22.9975629	24.55497169	0	0	0
2506	23.0072591	24.67612076	0	0	0
2630	24.1771557	41.48703003	0.02346	0.023460411	0.02346
2631	24.1882099	41.65748596	0.11437	0.114369504	0.11437
2849	26.2456999	0.001427708	0.840665	0	0.840665
2850	26.2595823	0.002368721	0.840665	0.005074239	0.840665
3901	36.25453	ALAY136.8956451	0	0	0
3902	36.2641358	137.1292877	0	0	0
4027	37.4542069	167.0020447	0.059629	0.059628543	0.059629
4028	37.4633876	167.2370758	0.059629	0.059628543	0.059629
4029	37.4726968	167.475296	0.110459	0.110459432	0.110459

RT 1: 15.91s -15.00s (Notification 1) =0.91 s

Notification 2: 17.99s + 5s = 22.99s

RT 2: 24.17s - 22.99s = 1.18 STEKNIKAL MALAYSIA MELAKA

Notification 3: 26.25s + 10s = 36.25s

RT 3: 37.45s - 36.25s = 1.2s

1	С	AC	AM	AN	AO
1	scenarioTime	distanceTravelled	brake	appliedBrake	rawBrake
2	0.0805789	0.001853128	0	0	0
1547	15.0060659	137.284317	0	0	0
1548	15.0144015	137.411087	0	0	0
1656	16.0337943	153.0341949	0.009775	0.009775171	0.009775
1657	16.0427069	153.1706543	0.009775	0.009775171	0.009775
1871	18.1128739	0.001656208	0	0	0
1872	18.1263055	0.002639638	0	0	0
2407	23.1062608	38.2677536	0	0	0
2408	23.1161686	38.42475128	0	0	0
2511	24.1000377	55.23940277	0.01564	0.015640274	0.01564
2512	24.1096814	55.41365433	0.01564	0.015640274	0.01564
2722	26.1735586	0.001674826	0.801564	0	0.801564
3748	36.1634728	70.4196701	0	0	0
3749	36.173363	AALAY70.56230164	0	0	0
3750	36.1823819	70.69249725	0	0	0
3801	36.6953475	78.32102203	0.006843	0.00684262	0.006843
3802	36.7053637	78.47606659	0.102639	0.102639295	0.102639
3803	36 7150742	78 62649536	0 102639	0 102639295	0 102639

RT 1: 16.03s -15.00s (Notification 1) =1.03 s

Notification 2: 18.11s + 5s = 23.11s

RT 2: 24.1s – 23.11s = 0.99 s UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Notification 3: 26.17s + 10s = 36.17s

RT 3: 36.7s - 36.17s = 0.53s

	С	AC	AM	AN	AO
1	scenarioTime	distanceTravel	brake	appliedBrake	rawBrake
2	0.0792091	0.001752778	0	0	0
1620	15.0034703	245.4239044	0	0	0
1621	15.012221	245.6774139	0	0	0
1761	16.2982703	283.0076599	0.0186	0.018572826	0.0185728
1762	16.3070917	283.26297	0.0186	0.018572826	0.0185728
1981	18.368185	0.00145949	1	0	1
1982	18.3821205	0.002386223	1	0.006434703	1
2512	23.3672165	18.03085899	0	0	0
2513	23.3768496	18.13739014	0	0	0
2643	24.6797503	35.70793915	0.0186	0.018572826	0.0185728
2644	24.6894711	35.85438919	0.13	0.13000977	0.1300098
2857	26.7418045	0.001594682	0	0	0
2858	26.7562192	0.002630865	0	0	0
3879	36.7434647	110.3251724	0	0	0
3880	36.7529265	110.453537	0	0	0
3987	37.8276234	126.6235352	0.0821	0.082111441	0.0821114
3988	37.8375771	126.7916336	0.1867	0.186705768	0.1867058
3989	37.8469096	126.9401245	0.1867	0.186705768	0.1867058

RT 1: 16.3s -15.00s (Notification 1) =1.3 s

Notification 2: 18.37s + 5s = 23.37s

RT 2: 24.68s - 23.37s = 1.31 s EKNIKAL MALAYSIA MELAKA

Notification 3: 26.74s + 10s = 36.74s

RT 3: 37.82s - 36.74s = 1.08s

1.1	С	AC	AM	AN	AO
1	scenarioTime	distanceTravelled	brake	appliedBrake	rawBrake
2	0.0847976	0.00178761	0	0	0
1523	15.0077863	281.2181396	0	0	0
1524	15.0172185	281.4919739	0	0	0
1650	16.2147468	316.2857971	0.068426	0.068426199	0.068426
1651	16.2254813	316.5977173	0.135875	0.135874882	0.135875
1849	18.2656623	0.001391417	0	0	1
1850	18.2781358	0.002218044	0	0	1
2362	23.2690951	28.02682114	0	0	0
2363	23.2783712	28.16586113	0	0	0
2448	24.0822128	40.95091248	0.055718	0.055718474	0.055718
2449	24.0914573	41.10444641	0.055718	0.055718474	0.055718
2666	26.1374878	0.001278166	1	0	1
2667	26.1491832	0.002005977	1	0.005551217	1
3675	<b>3</b> 6.1302844	ALAY 137.431488	0	0	0
3676	36.1400564	137.6822968	0	0	0
3800	37.4421637	172.3942719	0.028348	0.028347997	0.028348
3801	37.4541888	172.7232056	0.135875	0.135874882	0.135875
3802	37.4664769	173.0590973	0.214076	0.214076251	0.214076

RT 1: 16.21s -15.00s (Notification 1) =1.21 s

Notification 2: 18.27s + 5s = 23.27s

RT 2: 24.08s – 23.37s = 0.71 s UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Notification 3: 26.13s + 10s = 36.13s

RT 3: 37.44s - 36.13s = 1.31s

	С	AC	AM	AN	AO
1	scenarioTime	distanceTravelled	brake	appliedBr	rawBrake
2	0.0821771	0.00184548	0	0	0
1482	15.0018084	226.6599884	0.186706	0.186706	0.186706
1483	15.0127702	226.920639	0.15738	0.15738	0.15738
1485	15.0306468	227.3450165	0.13783	0.13783	0.13783
1691	17.0837947	0.001618953	0	0	0
1692	17.0971046	0.00255738	0	0	0
2178	22.0800455	19.99194145	0	0	0
2179	22.089859	20.07701683	0	0	0
2293	23.1955015	31.03915024	0.013685	0.013685	0.013685
2294	23.2045223	31.1364727	0.044966	0.044966	0.044966
2496	25.2803308	0.001522387	0	0	0
2497	25.2928079	0.002385698	0	0	0
3489	35.288323	88.33634949	0	0	0
3490	35.297844	88.5227356	0	0	0
3541	35.8774682	100.0381522	0.039101	0.039101	0.039101
3542	35.8874328	100.2994537	0.160313	0.160313	0.160313
3543	35.8989303	100.5315552	0.216031	0.216031	0.216031

RT 1: 15.01s -15.00s (Notification 1) =0.01 s

Notification 2: 17.08s + 5s = 22.08s

RT 2: 23.2s - 22.08s = 1.12 s

Notification 3: 25.28s + 10s = 35.28s

RT 3: 35.88s - 35.28s = 0.6s

1	С	AC	AM	AN	AO
1	scenarioTime	distanceTravelled	brake	appliedBrake	rawBrake
2	0.1720537	0.003365235	0	0	0
1540	15.0030769	164.9494934	0	0	0
1541	15.0120373	165.0978241	0	0	0
1553	15.1445025	167.2854919	0.004	0.003910068	0.00391
1554	15.1527614	167.4215698	0.004	0.003910068	0.00391
1770	17.2822079	0.000748951	0.687	0	0.687195
1771	17.2970278	0.001494399	0.687	0.002423839	0.687195
2284	22.2886521	25.93696976	0	0	0
2285	22.2986395	26.06398392	0	0	0
2362	23.0761704	37.10757828	0.068	0.068426199	0.068426
2363	23.0859097	37.25753403	0.124	0.124144673	0.124145
2564	25.1125142	0.000628225	0	0	0
2565	25.1256245	0.001228316	0	0	0
3554	35.1084855	ALAY115.2658157	0	0	0
3555	35.1204437	115.4948502	0	0	0
3586	35.4463339	121.7790222	0.053	0.052785926	0.052786
3587	35.4569716	121.9855347	0.198	0.198435977	0.198436
3588	35.4672496	122.1851654	0.363	0.362658858	0.362659

RT 1: 15.14s -15.00s (Notification 1) =0.14 s

Notification 2: 17.28s + 5s = 22.28s

RT 2: 23.08s - 22.28s = 0.8s TEKNIKAL MALAYSIA MELAKA

Notification 3: 25.11s + 10s = 35.11s

RT 3: 35.45s - 35.11s = 0.34s

	С	AC	AM	AN	AO
1	scenarioTime	distanceTravelled	brake	appliedBrake	rawBrake
2	0.0501514	0.00055711	0	0	0
1857	15.0074676	291.6038818	0	0	0
1858	15.0153405	291.8330078	0	0	0
1988	16.0557167	322.0161743	0.031281	0.031280547	0.031281
1989	16.0633884	322.2366638	0.031281	0.031280547	0.031281
2241	18.1041626	0.000457956	1	0	1
2242	18.118486	0.001031749	1	0.00234696	1
2875	23.1045615	33.77933502	0	0	0
2876	23.1125252	33.89957809	0	0	0
2986	24.0033259	48.44971848	0.140762	0.140762463	0.140762
2987	24.011538	48.5929184	0.140762	0.140762463	0.140762
3240	26.032972	0.000356391	0	0	0
3241	26.0445452	0.000740497	0	0	0
4443	36.0306697	ALAYS 151.5767975	0	0	0
4444	36.0383813	151.7773743	0	0	0
4556	36.9491447	176.0305634	0.109482	0.109481916	0.109482
4557	36.9572338	176.2507324	0.109482	0.109481916	0.109482
4558	36.9650343	176.4629517	0.345064	0.345063537	0.345064
4550	26 0721700	176 6044036	0.245064	0.245052527	0.245064

RT 1: 16.06 s -15.00s (Notification 1) =1.06s

Notification 2: 18.10s + 5s = 23.10s

RT 2: 24.00s - 23.10s = 0.9s TEKNIKAL MALAYSIA MELAKA

Notification 3: 26.03s + 10s = 36.03s

RT 3: 36.95s - 36.03s = 0.92s

Participant 27

	С	AC	AM	AN	AO
1	scenarioTime	distanceTravelled	brake	appliedBr	rawBrake
2	0.1543736	0.001815715	0	0	0
1525	15.00152	171.9413452	0	0	0
1526	15.011013	172.1808167	0	0	0
1661	16.2893956	205.5969238	0.040078	0.040078	0.040078
1662	16.2995043	205.8694305	0.191593	0.191593	0.191593
1876	18.3409744	0.000831314	1	0	1
1877	18.3559309	0.001615693	1	0.003887	1
2384	23.3444352	31.24886894	0	0	0
2385	23.3552197	31.41394424	0	0	0
2486	24.3691055	48.33529282	0.033236	0.033236	0.033236
2487	24.3797821	48.52883148	0.355816	0.355816	0.355816
2692	26.4165871	0.000695938	1	0	1
2693	26.4313583	0.001416715	1	0.003301	1
3645	36.4110101	ALAY 152.6647339	0	0	0
3646	36.4217379	152.9503326	0	0	0
3713	37.1072162	171.5541382	0.1652	0.1652	0.1652
3714	37.1177441	171.8455353	0.333333	0.333333	0.333333

RT 1: 16.29 s -15.00s (Notification 1) =1.29 s

Notification 2: 18.34s + 5s = 23.34s

RT 2: 24.37s - 23.34s = 1.03s

Notification 3: 26.42s + 10s = 36.42s

RT 3: 37.11s - 36.42s = 0.69s

	С	AC	AM	AN	AO
1	scenarioTime	distanceTravelled	brake	appliedBr	rawBrake
2	0.1583378	0.002124478	0	0	0
1604	15.0014376	249.9368896	0	0	0
1605	15.0095635	250.1672211	0	0	0
1728	16.1004229	281.5414429	0.043011	0.043011	0.043011
1729	16.1103544	281.8302917	0.043011	0.043011	0.043011
1948	18.1598696	0.000853061	1	0	1
1949	18.1729097	0.001546465	1	0.00383	1
2472	23.1546922	31.94561386	0	0	0
2473	23.1648428	32.09813309	0	0	0
2636	24.7300202	59.07136536	0.01564	0.01564	0.01564
2637	24.7407969	59.27525711	0.143695	0.143695	0.143695
2847	26.7792814	0.000681155	0	0	1
2848	26.7923045	0.001301052	0	0	1
3881	<b>3</b> 6.7707538	ALAY123.4588547	0	0	0
3882	36.7807249	123.7083435	0	0	0
3944	37.3981222	139.4910736	0.01955	0.01955	0.01955
3945	37.407615	139.7391357	0.01955	0.01955	0.01955

RT 1: 16.1 s -15.00s (Notification 1) =1.1 s Notification 2: 18.16s + 5s = 23.16s

RT 2: 24.73s - 23.15s = 1.58s

Notification 3: 26.78s + 10s = 36.78s

RT 3: 37.4s - 36.78s = 0.62s

1	С	AC	AM	AN	AO
1	scenarioTime	distanceTravelled	brake	appliedBrake	rawBrake
2	0.1450167	0.001178066	0	0	0
1524	15.009719	163.6467743	0	0	0
1525	15.0202093	163.9224701	0	0	0
1614	15.8753281	186.9894257	0.025415	0.025415445	0.025415
1615	15.8847158	187.2479248	0.025415	0.025415445	0.025415
1826	17.9382636	0.00075873	1	0	1
1827	17.9521869	0.001453364	1	0.003570343	1
2330	22.9304432	11.19231701	0	0	0
2331	22.9384309	11.22707748	0	0	0
2535	24.837787	21.56347466	0.020528	0.02052786	0.020528
2536	24.8478165	21.63432121	0.020528	0.02052786	0.020528
2759	26.898431	0.000929337	0	0	0
2760	26.9114367	0.001651498	0	0	0
3799	<b>3</b> 6.8963046	ALAY 112.770874	0	0	0
3800	36.9048173	112.9667206	0	0	0
3934	38.2331809	144.9923248	0.009775	0.0097751 <b>71</b>	0.009775
3935	38.2436887	145.2545471	0.065494	0.065493643	0.065494

RT 1: 15.87s -15.00s (Notification 1) = 0.87 s

Notification 2: 17.93s + 5s = 22.93s

RT 2: 24.84s – 22.93s = 1.91s

UNIVERSITI TEKNIKAL MALAYSIA MELAKA Notification 3: 26.90s + 10s = 36.9s

RT 3: 38.23s - 36.9s = 1.33s

14	С	AC	AM	AN	AO
1	scenarioTime	distanceTravelled	brake	appliedBrake	rawBrake
2	0.1535513	0.001754232	0	0	0
1148	15.0039577	203.2898254	0	0	0
1149	15.016062	203.638031	0	0	0
1259	16.3111218	240.6847839	0.034213	0.0342131	0.034213
1260	16.3232317	241.0279236	0.074291	0.074291304	0.074291
1433	18.3639852	0.000661749	0.082111	0	0.082111
1434	18.379973	0.001435103	0.081134	0.000258444	0.081134
1821	23.3580062	14.08409119	0	0	0
1822	23.3706387	14.16936493	0	0	0
1955	25.1099467	31.14817619	0.013685	0.013685239	0.013685
1956	25.124459	31.32497215	0.074291	0.074291304	0.074291
2109	27.1687272	0.000573217	0	0	0.904203
2110	27.1847204	0.001291907	0	0	0.904203
2864	37.1691255	ALAY \$ 85.71953583	0	0	0
2865	37.1834407	86.02523041	0	0	0
2964	38.5217567	116.1443558	0.01564	0.015640274	0.01564
2965	38.5349009	116.4533539	0.089932	0.089931577	0.089932
2966	38.548828	116.780571	0.123167	0.123167157	0.123167

RT 1: 16.31s -15.00s (Notification 1) = 1.31 s

RT 2: 25.11s – 23.36s = 1.75s UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Notification 3: 27.17s + 10s = 37.17s

RT 3: 38.52s - 37.17s = 1.35s

NO	PARTICIPANT	BIC	YCLE	MOTOF	RCYCL	LO	RRY	PEDES	ΓRIAN
		SCEN	VARIO	E	, /	SCEN	JARIO	SCEN	ARIO
				SCEN	ARIO				
		R. T	B. $T(s)$	R. T(s)	В.	R. T(s)	B. T(s)	R. T(s)	B. $T(s)$
		(s)			T(S)				
1	AIMAN	0.92	0.01	1.31	0.23	0.46	0.04	0.57	0.78
2	IZZUDDIN	0.39	0.51	0.79	0.02	0.54	0.42	0.39	0.57
3	AMIRUL	0.71	0.89	1.16	1.77	1.41	0.01	0.9	0.78
4	SYAFIQ	0.67	0.44	1.13	1.38	1	0.57	1.12	0.55
5	KAMIL	0.76	2.55	1.05	2.87	0.59	NULL	0.8	NULL
6	ZAHIN	1.36	0.75	0.95	2.05	0.91	0.13	0.63	2.32
7	AMIR	0.81	0.24	0.91	2.28	1.27	1.24	0.68	1.66
8.	HILMI	0.48	2.63	0.47	0.02	0.55	4.84	0.8	NULL
9.	ZAYAN	4.63	NULL	1.3	3.34	1.12	1.51	1.31	1.17
10.	AERON	0.43	0.66	0.63	0.02	1.0	0.03	0.49	NULL
11.	AMAR	0.71	1.16	0.96	3.41	1.76	1.95	1.04	1.91
12.	IZZAT	0.87	NULL	0.58	1.67	0.56	0.39	0.66	NULL
13.	AZRI	0.63	NULL	0.56	0.01	0.7	0.02	0.52	2.38
14.	HAKIM	1.34	NULL	0.62	0.02	1.22	0.01	1.18	NULL
15.	HAFIZ	0.59	3	0.76	2.21	0.61	0.02	0.36	NULL
16.	FILZA	0.51	1.12	0.49	2.47	0.4	0.01	0.34	NULL
17.	SHIKIN	0.6	2.24	1.02	0.01	1.2	NULL	0.66	NULL
18.	AFIQ	3.71	0.01	1.2	2.29	1.13	2.9	2.08	NULL
19.	MURSYID	1.09	0.46	0.79	0.01	0.94	NULL	0.39	NULL
20.	ABYAD	0.45	NULL	0.68	0.01	0.64	0.01	0.73	1
21.	HALIF	0.85	1.37	0.65	0.44	0.65	NULL	0.61	NULL
22.	ADAM	0.84	1.72	0.5	0.01	0.91	0.01	0.52	NULL
23.	DAUS N	0.53	2.07	0.95	0.01	0.84	NULL	0.55	NULL
24.	DAUS M	0.55	0.91	1.07	3.36	1.28	3.42	0.73	1.9
25.	ZAI	0.35	1.94	0.78	1.02	0.83	1.48	0.93	NULL
26.	AKALIL	0.43	NULL	3.85	NULL	0.43	NULL	6.64	NULL
27.	QAYYUM	0.51	1.84	1.13	2.7	1.02	2.15	0.67	1.9
28.	NABIIL	0.67	1.9	6.25	0	0.67	2.19	2.27	0.9
29.	AZIM	2.35	0.73	4.02	0.58	5.27	NULL	2.84	0.45
30.	ZUL	4.62	0	1.65	3.81	2.21	2.53	4.62	NULL

## APPENDIX E Table of reaction and breaking time for driving scenario

Calculation of reaction and breaking time for driving scenario

#### Participant 1 Motorcycle

	С	AC	AM	AN	AO	AR	со	СР	CQ	
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2			
2	0.1	0.00069	0	0	0	Manual	FALSE			
3	0.236669	0.011431	0	0	0	Manual	FALSE			
1545	13.1044	149.8321	0	0	0	ForceAuto	FALSE			
1546	13.11298	149.973	0	0	0	ForceAuto	FALSE			
1547	13.12157	150.1142	0	0	0	ForceAutc	FALSE			
1548	13.12937	150.2422	0	0	0	ForceAuto	FALSE			
1699	14.42106	170.4443	0.136719	0.136719	0	ForceAuto	TRUE			
1700	14.42976	170.5688	0	0.136719	0	Manual	TRUE			
1726	14.65315	173.7071	0	0.120444	0	Manual	FALSE			
1727	14.66225	173.8328	0.001955	0.119587	0.001955	Manual	FALSE			

RT (RECOGNITION TIME) = 14.43-13.12=1.31s BT (BRAKE TIME) = 14.66-14.43=0.23s

Bicycle

· ·	24	A	100					
	C	AC	AM P	AN	AO	AR	со	СР
1	scenarioT	distanceTit	orake a	ap <mark>pl</mark> ie <mark>dBr</mark>	rawBrake	drivingMc	button2	
2	0.1	0.000862	0	0	0	Manual	FALSE	
594	13.10799	149.9253	0	0	0	ForceAuto	FALSE	
595	13.11589	150.0551	0	0	. 9	ForceAutc	FALSE	
705	14.02885	165.0753	ulo, of	0	0.071359	ForceAuto	TRUE	
706	<b>14.0</b> 3711	165.2112	. 0	<sup>""</sup> 0	0.073314	Manual	TRUE	
707	14.04505	165.3419	TITEO	NIKAP	0.073314	Manual	FALSE	
708	14.05435	165.4951	0.078201	5.06E-05	0.078201	Manual	FALSE	

RT (RECOGNITION TIME) =14.04-13.12=0.92s BT (BRAKE TIME) = 14.05-14.04=0.01s

### Lorry

	С	AC	AM	AN	AO	со	CP
1	scenarioTi	distanceT	brake	appliedBr	rawBrake	button2	
2	0.018241	0.000161	0	0	0	FALSE	
470	12.96727	149.9168	0	0	0	FALSE	
471	12.97604	150.0628	0	0	0	FALSE	
472	12.98368	150.1901	0	0	0	FALSE	
523	13.42851	157.6034	0	0	0	FALSE	
524	13.43734	157.7504	0	0	0	TRUE	
528	13.46976	158.2903	0	0	0	TRUE	
529	13.47905	158.4448	0.074337	0.074337	0	TRUE	

RT (RECOGNITION TIME) =13.44-12.98=0.46s

BT (BRAKE TIME) = 13.48-13.44=0.04s

### Umbrella Man

	С	AGLAY	AM	AN	AO	AR	CO	СР
1	scenarioTi	distanceTi bi	rake 🚫 ap	op <mark>liedBr</mark>	rawBrake	drivingMc	button2	
2	0.1	0.002909	0	0	0	Manual	FALSE	
346	13.11044	149.9271	0⊵	0	0	ForceAuto	FALSE	
347	13.1198	150.0808	0	0	0	ForceAutc	FALSE	
407	13.67306	159.1711	0	0	0	ForceAuto	TRUE	
408	<b>13.6</b> 8261	159.3281	0	0	0	Manual	TRUE	
486	14.44759	171.8833	0	0	0	Manual	FALSE	
487	14.45709	172.0385 0	0.002933	0.00258	0.002933	Manual	FALSE	
_			. 0	12		. 0.	12.1	

RT (RECOGNITION TIME) =13.68-13.11=0.57s LAYSIA MELAKA

BT (BRAKE TIME) = 14.46-13.68=0.78s

### Bicycle

	С	AC	AM	AN	AO	AR	СО	СР	CQ	
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2			
2	0.034868	0.001679	0	0	0	Manual	TRUE			
1321	12.73679	149.9273	0	0	0	ForceAuto	FALSE			
1322	12.74628	150.0855	0	0	0	ForceAutc	FALSE			
1363	13.13286	156.5277	0	0	0	ForceAuto	TRUE			
1364	13.14146	156.671	0	0	0	Manual	TRUE			
1413	13.63489	164.875	0	0	0	Manual	FALSE			
1414	13.64564	165.0532	0.008798	0.004427	0.008798	Manual	FALSE			

RT (RECOGNITION TIME) =13.14-12.75=0.39s

7

BT (BRAKE TIME) = 13.65-13.14=0.51s

Motorcycle 🖋

	R R		_	7					
	C .	AC	AM	AN	AO	AR	со	СР	C
1	scenarioT	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2		
2	0.1	0.003674	0	0	0	Manual	FALSE		
142	12.75654	149.942	0	0	0	ForceAuto	FALSE		
143	12.76649	150.1055	our o	0	i Co	ForceAutc	FALSE	100	
218	13.54716	162.7202	0.14375	0.14375	•* 0	ForceAuto	TRUE		
1219	13.55677	162,8685	CITI T	0.14375	LI BAA9	Manual	TRUE	LZ A	
1220	13.56755	163.0347	0	0.143717		Manual	FALSE	INA	
1221	13.57956	163.2196	0.002933	0.143606	0.002933	Manual	FALSE		

RT (RECOGNITION TIME) =13.56-12.77=0.79s

BT (BRAKE TIME) = 13.58-13.56=0.02s

Lorry

	С	AC	AM	AN	AO	AR	CO	СР	CQ
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2		
2	0.037005	0.002519	0	0	0	Manual	TRUE		
1265	12.4151	149.9369	0	0	0	ForceAuto	FALSE		
1266	12.42437	150.0892	0	0	0	ForceAutc	FALSE		
1322	12.95244	158.7301	0.141406	0.141406	0	ForceAuto	TRUE		
1323	12.96239	158.8892	0	0.141406	0	Manual	TRUE		
1363	13.37072	165.2264	0	0.090694	0	Manual	FALSE		
1364	13.38174	165.3923	0.004888	0.090479	0.004888	Manual	FALSE		

RT (RECOGNITION TIME) =12.96-12.42=0.54s

BT (BRAKE TIME) = 13.38-12.96=0.42s

Umbrella Man

	С	AC	AM	AN	AO	AR	CO	CP	CQ
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2		
2	0.035938	0.003218	0	0	0	Manual	TRUE		
1150	12.63561	149.8668	0	0	0	ForceAutc	FALSE		
1151	12.64561	150.0335	0	0	0	ForceAutc	FALSE		
1187	13.02893	156.4215	0	0	0	ForceAutc	TRUE		
1188	13.03968	156.6005	0	0	0	Manual	TRUE		
1238	13.59583	165.8714	0	0	0	Manual	FALSE		
1239	13.60748	166.0655	0.001955	0.001181	0.001955	Manual	FALSE		

RT (RECOGNITION TIME) =13.04-12.65=0.39s

BT (BRAKE TIME) = 13.61-13.04=0.57s MALAYSIA MELAKA

### Bicycle

	С	AC	AM	AN	AO	AR	со	СР
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2	
2	0.02804	0.000917	0	0	0	Manual	TRUE	
1568	13.01886	149.8721	0	0	0	ForceAuto	FALSE	
1569	13.02747	150.0137	0	0	0	ForceAutc	FALSE	
1653	13.73524	161.4845	0.155469	0.155469	0	ForceAuto	TRUE	
1654	13.74339	161.611	0	0.155469	0	Manual	TRUE	
1751	14.62313	174.413	0	0.005629	0	Manual	FALSE	
1752	14.63314	174.5514	0.002933	0.007614	0.002933	Manual	FALSE	

RT (RECOGNITION TIME) =13.74-13.03=0.71s

# BT (BRAKE TIME) = 14.63-13.74=0.89s

Motorcycle

	·		6				_				_		
		C F	-11	AC	AM	- 1	AN	AO	AR	со	(	C <b>P</b>	CC
1	scen	ario	Ţ.	distanceT	brake	app	liedBr	rawBrake	drivingMo	button2			
1453	13.0	0034	4	149.9323	0		0	0	ForceAut	FALSE			
1454	13.0	0124	9	150.081	0		0	0	ForceAut	FALSE			
1583	14.	1600	9	168.2076	0.139062	0.1	39062	0	ForceAut	TRUE			
1584	14.	1685	6	168.3315	oundo	0.1	39062	·0	Manual	TRUE	190		
1779	15.9	9207	3	191.6108	0		0	0	Manual	FALSE			
1780	15.	9306	7.	191,7362	0.00391	R	00391	0.00391	Manual	FALSE	K A		

RT (RECOGNITION TIME) =14.17-13.01=1.16s

BT (BRAKE TIME) = 15.94-14.17=1.77s

Lorry

	С	AC	AM	AN	AO	AR	CO	CF
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2	
2	0.018315	0.00021	0	0	0	Manual	FALSE	
1332	12.37431	149.8618	0.1	0.1	0	ForceAuto	FALSE	
1333	12.38491	150.0151	0.05	0.05	0	ForceAutc	FALSE	
1486	13.78344	168.3713	0	0	0.762463	ForceAuto	TRUE	
1487	13.79232	168.4765	0	0	0.773216	Manual	TRUE	
1488	13.8029	168.602	0.789834	0.000154	0.789834	Manual	FALSE	

RT (RECOGNITION TIME) =13.79-12.38=1.41s

BT (BRAKE TIME) = 13.80-13.79=0.01s

Umbrella Man

	С	AC	AM	AN	AO	AR	CO	CP
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2	
2	0.023264	0.000605	0	0	0	Manual	TRUE	
1302	12.83077	149.8303	0	0	0	ForceAuto	FALSE	
1303	12.84223	150.0191	2 0	0	0	ForceAuto	FALSE	
1394	13.7284	164.2677	0.136719	0.136719	0	ForceAuto	TRUE	
1395	13.73811	164.4155	0	0.136719	0	Manual	TRUE	
1473	14.508	175.4777	0	0.017003	0	Manual	FALSE	
1474	<b>14</b> .51725	175.6042	0.001955	0.017472	0.001955	Manual	FALSE	

2

او دو.

RT (RECOGNITION TIME) =13.74-12.84=0.9s

5: BT (BRAKE TIME) = 14.52-13.74=0.78s UNIVERSITI TEKNIKAL MALAYSIA MELAKA

### Bicycle

	С	AC	AM	AN	AO	AR	CO	СР
1	scenario Ti	distanceT	brake	appliedBr	rawBrake	drivingMc	button2	
2	0.1	0.001583	0	0	0	Manual	FALSE	
3	0.252498	0.014606	0	0	0	Manual	FALSE	
575	13.10695	149.916	0	0	0	ForceAuto	FALSE	
576	13.11486	150.0458	0	0	0	ForceAuto	FALSE	
658	13.77142	160.826	0	0	0	ForceAuto	TRUE	
659	13.78076	160.9795	0	0	0	Manual	TRUE	
709	14.20963	168.0258	0	0	0	Manual	FALSE	
710	14.21934	168.1853	0.00782	0.003156	0.00782	Manual	FALSE	

RT (RECOGNITION TIME) =13.78-13.11=0.67s

BT (BRAKE TIME) = 14.22-13.78=0.44s

Motorcycle

Mot	orcycle	7 •	ELAKA					
	C I	AC	AM	AN	AO	AR	со	
1	scenarioT	distanceTi	brake	appliedBr	rawBrake	drivingMc	butto <mark>n2</mark>	
2	0.1	0.003989	0	0	0	Manual	FALSE	
3	0.280511	0.021029	0	0		Manual	FALSE	
489	13.10831	149.875	uls 0	0	20,0	ForceAutc	FALSE	
490	13.11816	150.0368	0	0		ForceAutc	FALSE	
617	14.24552	167.8776	0.139062	0.139062	ALAYS9	ForceAutc	TRUE	
618	14.25488	168.015	0	0.139062	0	Manual	TRUE	
769	15.61688	186.4044	0	0	0	Manual	FALSE	
770	15.6254	186.5139	0.002933	0.002933	0.002933	Manual	FALSE	

RT (RECOGNITION TIME) =14.25-13.12=1.13s

BT (BRAKE TIME) = 15.63-14.25=1.38s

Lorry

	С	AC	AM	AN	AO	AR	CO	СР
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2	
2	0.018077	0.000269	0	0	0	Manual	FALSE	
1404	13.00402	149.9928	0	0	0	ForceAuto	FALSE	
1405	13.01315	150.1429	0	0	0	ForceAuto	FALSE	
1516	14.00494	165.9619	0.135937	0.135937	0	ForceAuto	TRUE	
1517	14.01415	166.0998	0	0.135937	0	Manual	TRUE	
1579	14.57711	174.1758	0	0.05438	0	Manual	FALSE	
1580	14.58486	174.2826	0.01955	0.064662	0.01955	Manual	FALSE	

RT (RECOGNITION TIME) =14.01-13.01=1s

BT (BRAKE TIME) = 14.58-14.01=0.57s



RT (RECOGNITION TIME) =14.24-13.12=1.12s

BT (BRAKE TIME) = 14.79-14.24=0.55s
#### Bicycle

	С	AC	AM	AN	AO	AR	со	СР	CC
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2		
2	0.1	0.001636	0	0	0	Manual	FALSE		
3	0.253274	0.01477	0	0	0	Manual	FALSE		
1414	13.1028	149.8806	0	0	0	ForceAuto	FALSE		
1415	13.11309	150.0497	0	0	0	ForceAutc	FALSE		
1491	13.86169	162.3639	0	0	0	ForceAuto	TRUE		
1492	13.87164	162.5277	0	0	0	Manual	TRUE		
1741	16.4131	203.36	0	0	0	Manual	FALSE		
1742	16.42389	203.5264	0.047898	0.047898	0.047898	Manual	FALSE		

RT (RECOGNITION TIME) =13.87-13.11=0.76s

BT (BRAKE TIME) = 16.42-13.87=2.55s

#### Motorcycle

		MALAYS	IA .					
Moto	rcycle	ř	and a second					
	Ş		3	_				
	C 🚆	AC	AM	AN	AO	AR	CO	
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2	
2	0.1	0.001454	0	0	0	Manual	FALSE	
3	0.250539	0.014194	0	0	0	Manual	FALSE	
1480	13.10868	149.9983	0	0	0	ForceAuto	FALSE	
1481	13.11836	150.1574	0	0	-0	ForceAuto	FALSE	
1598	14.15813	166.696	0.1625	0.1625	0	ForceAuto	TRUE	
1599	14.16678	166.8246	0	0.1625	0	Manual	TRUE	
1919	17.02772	203.974		MIKAI <sup>0</sup>	MALA9	Manual	FALSE	
1920	17.03711	204.0877	0.01173	0.01173	0.01173	Manual	FALSE	

RT (RECOGNITION TIME) =14.17-13.12=1.05s

BT (BRAKE TIME) = 17.04-14.17=2.87s

	C	AC	۵M	AN	40	ΔR	0)	CP
	e e e e e e e e e e e e e e e e e e e	distanceT	hanka		- Deales	deixie et te	hutten 2	Cr
	scenario	distance i	ргаке	appliedBr	гамвгаке	arivingivic	button2	
2	0.023349	0.000608	0	0	0	Manual	TRUE	
3	0.113057	0.004886	0	0	0	Manual	FALSE	
1409	12.94609	149.8888	0	0	0	ForceAuto	FALSE	
1410	12.956	150.0517	0	0	0	ForceAutc	FALSE	
1471	13.53871	159.6375	0	0	0	ForceAuto	TRUE	
1472	13.5481	159.7921	0	0	0	Manual	TRUE	

RT (RECOGNITION TIME) =13.55-12.96=0.59s

BT (BRAKE TIME) = NULL

Umbrella Man

		State of the local division in which the local division in the loc	WARD IN COLUMN					
	С	AC	AM.	AN	AO	AR	CO	СР
1	scenarioT	distanceT	brake 😽	appliedBr	rawBrake	drivingMc	button2	
2	0.1	0.001615	0	0	0	Manual	FALSE	
3	0.252965	0.014704	0	0	0	Manual	FALSE	
1304	13.10646	149.9578	0	0	0	ForceAutc	FALSE	
13055	13.11518	150.101	0	0	0	ForceAutc	FALSE	
1388	13.90893	163.1437	0	0	0	ForceAuto	TRUE	
13899	<b>13.</b> 91814	163.2951	0	0	0	Manual	TRUE	
1390	13.92875	163.4695	0	0	0	Manual	FALSE	
1391	13.93842	163.6284	0	0	0	Manual	FALSE	
2331	23.23591	312.1727		0	0	Manual	FALSE	

RT (RECOGNITION TIME) =13.92-13.12=0.8s

BT (BRAKE TIME) = NULL

#### Bicycle

1	С	AC	AM	AN	AO	AR	CO	СР	CQ
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2		
2	0.1	0.001492	0	0	0	Manual	FALSE		
3	0.251123	0.014316	0	0	0	Manual	FALSE		
1493	13.10935	149.9023	0	0	0	ForceAuto	FALSE		
1494	13.11817	150.0474	0	0	0	ForceAutc	FALSE		
1651	14.47061	172.3137	0	0	0	ForceAuto	TRUE		
1652	14.47912	172.454	0	0	0	Manual	TRUE		
1734	15.222	184.6862	0	0	0	Manual	FALSE		
1735	15.23144	184.841	0.002933	0.002508	0.002933	Manual	FALSE		

RT (RECOGNITION TIME) =14.48-13.12=1.36s

BT (BRAKE TIME) =15.23-14.48=0.75s

WALAYS/4

#### Motorcycle

	Ş		E.				
	<u> </u>						
	C	AC	AM	AN	-OA	AR	CO
1	scenarioT	distanceTi	brake	appliedBr	rawBrake	drivingMc l	button2
2	0.1	3.72E-07	0	0	0	Manual	FALSE
3	0.202	0.006768	0	0	0	Manual	FALSE
1385	13.0324	149.8134	0	0	0	ForceAutc	FALSE
1386	13.04479	150.0172	lo, So	Riso	Ru, ie	ForceAutc	FALSE
1468	13.98892	165.1351	0.132812	0.132812		ForceAutc	TRUE
1469	13.99864	165.2818	0	0.132812		Manual	TRUE
1664	16.02945	192.9614	I IEKN <mark>0</mark>	KAL MO	LAYSIA	Manual	FALSE
1665	16.04031	193.1017	0.00782	0.00782	0.00782	Manual	FALSE

RT (RECOGNITION TIME) =13.99-13.04=0.95s

BT (BRAKE TIME) =16.04-13.99=2.05s

	С	AC	AM	AN	AO	AR	CO	СР	
1	scenario Ti	distanceT	brake	appliedBr	rawBrake	drivingMc	button2		
2	0.024097	0.000205	0	0	0	Manual	FALSE		
3	0.082888	0.001874	0	0	0	Manual	FALSE		
1418	12.94519	149.8653	0	0	0	ForceAuto	FALSE		
1419	12.95368	150.0048	0	0	0	ForceAutc	FALSE		
1518	13.85118	164.3984	0.13125	0.13125	0	ForceAuto	TRUE		
1519	13.85905	164.5178	0	0.13125	0	Manual	TRUE		
1533	13.98104	166.3513	0	0.126569	0	Manual	FALSE		
1534	13.99079	166.4965	0.01564	0.126506	0.01564	Manual	FALSE		

RT (RECOGNITION TIME) =13.86-12.95=0.91s

MALAYSIA 4

BT (BRAKE TIME) =13.99-13.86=0.13s

#### Umbrella

UMD	rena	1	Ě						
	C H	AC	AM	AN	AO	AR	со	С	P (
1	scenarioT	distanceT	brake	appliedBr	rawBrake	drivingMc	button2		
2	0.1	0.001616	0	0	0	Manual	FALSE		
3	0.252982	0.014708	0	0	0	Manual	FALSE		
1355	13.10408	149.8943	0	0	. 0	ForceAuto	FALSE	1	
1356	13.11416	150.0598	oahn	0	0	ForceAuto	FALSE	191	
1423	13.73623	160.2899	0	0	0	ForceAuto	TRUE		
1424	13.74601	160.451	SITI TE	KNIKA	LMAP	Manual	MTRUEL	KA	
1661	16.06443	197.8669	0	0	0	Manual	FALSE		
1662	16.07468	198.0272	0.031281	0.031281	0.031281	Manual	FALSE		

RT (RECOGNITION TIME) =13.75-13.11=0.64s

BT (BRAKE TIME) =16.07-13.75=2.32s

#### Bicycle

	C	AC	۵M	AN	40	٨R	00	CP	0
_	C	AC	AW	AIN	AO	AIX	00	Cr	cq
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2		
2	0.1	0.003323	0	0	0	Manual	FALSE		
3	0.273838	0.019406	0	0	0	Manual	FALSE		
1550	13.10868	149.9518	0	0	0	ForceAuto	FALSE		
1551	13.1169	150.087	0	0	0	ForceAutc	FALSE		
1646	13.9101	163.1332	0	0	0	ForceAuto	TRUE		
1647	13.91913	163.2818	0	0	0	Manual	TRUE		
1673	14.14624	167.0202	0	0	0	Manual	FALSE		
1674	14.15541	167.1712	0.034213	0.004495	0.034213	Manual	FALSE		

### RT (RECOGNITION TIME) =13.92-13.12=0.8s BT (BRAKE TIME) =14.16-13.92=0.24s

#### Motorcycle

	3		Z					
	C I	AC	AM	AN	AO	AR	со	CP
1	scenarioT	distanceTi	brake	ap <mark>pli</mark> ed <mark>Br</mark>	rawBrake	drivingMc	button2	
2	0.1	0.001397	0	0	0	Manual	FALSE	
3	0.249654	0.01401	0	0	0	Manual	FALSE	
1465	13.10129	149.7933	0	0	0	ForceAuto	FALSE	
1466	13.11058	149.9459	و مليس	0	0	ForceAuto	FALSE	
1467	<b>1</b> 3.119	150.084	0	0	0	ForceAuto	FALSE	
1567	14.02603	164.63	0.152344	0.152344	MALO	ForceAuto	ETRUE	
1568	14.0341	164.7524	0	0.152344	0	Manual	TRUE	
1812	16.29595	195.4055	0	0	0	Manual	FALSE	
1813	16.30554	195.528	0.000978	0.000978	0.000978	Manual	FALSE	

RT (RECOGNITION TIME) =14.03-13.12=0.91s

BT (BRAKE TIME) =16.31-14.03=2.28s

	С	AC	AM	AN	AO	AR	CO	СР
1	scenarioTi	distanceT	brake	appliedBr	rawBrake	drivingMc	button2	
2	0.018437	0.000183	0	0	0	Manual	FALSE	
3	0.075821	0.001697	0	0	0	Manual	FALSE	
1346	12.96327	149.8493	0	0	0	ForceAuto	FALSE	
1347	12.97239	150.0013	0	0	0	ForceAuto	FALSE	
1481	14.22114	170.598	8.20E-09	8.20E-09	0	ForceAuto	TRUE	
1482	14.2392	170.8841	0	8.20E-09	0	Manual	TRUE	
1616	15.46552	189.9452	0	0	0	Manual	FALSE	
1617	15.47659	190.1138	0.013685	0.013685	0.013685	Manual	FALSE	

RT (RECOGNITION TIME) = 14.24-12.97=1.27s

BT (BRAKE TIME) =15.48-14.24=1.24s

#### <u>Umbrella Man</u>

	С	ACAYS	AM	AN	AO	AR	CO	CP
1	scenario T	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2	
2	0.1	0.003789	20	0	0	Manual	FALSE	
3	0.278572	0.020551	> 0	0	0	Manual	FALSE	
1368	13.10841	149.9469	0	0	0	ForceAutc	FALSE	
1369	13.11832	150.11	0	0	0	ForceAutc	FALSE	
1442	13.79279	161.2296	0	0	0	ForceAuto	TRUE	
1443	13.80227	161.3861	0	- 0	0	Manual	TRUE	
1613	15.45349	188.3896	0	0	0	Manual	FALSE	
1614	15.46278	188.5381	0.025415	0.025415	0.025415	Manual	FALSE	
2492		1	. 0-	-	. (	5. V -	7.2	
2402								

RT (RECOGNITION TIME) = 13.80-13.12=0.68s AYSIA MELAKA

BT (BRAKE TIME) =15.46-13.80=1.66s

#### Bicycle

	C	AC	AM	AN	40	AR	0	CP	0
1	scenarioTi	distanceT	brake	appliedBr	rawBrake	drivingMc	hutton2	C.	cq
	Secharion	anstancen	DIGKC	applicable	Tawbrake	unungine	buttonz		
2	0.1	0.001426	0	0	0	Manual	FALSE		
3	0.25011	0.014105	0	0	0	Manual	FALSE		
1551	13.11255	149.9525	0	0	0	ForceAuto	FALSE		
1552	13.12152	150.0997	0	0	0	ForceAutc	FALSE		
1609	13.59523	157.8882	0	0	0	ForceAuto	TRUE		
1610	13.60396	158.032	0	0	0	Manual	TRUE		
1913	16.2183	199.9502	0	0	0	Manual	FALSE		
1914	16.22661	200.0778	0.005865	0.005865	0.005865	Manual	FALSE		

### RT (RECOGNITION TIME) = 13.60 - 13.12=0.48s

7

### BT (BRAKE TIME) =16.23-13.60=2.63s

Motorcycle

-1000			9		-		
	C	AC	AM	AN	AO	AR	со
1	scenarioTi	distanceT	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.001584	0	0	0	Manual	FALSE
3	0.252505	0.014607	0	0	0	Manual	FALSE
1456	13.11221	149.959	0	0	0	ForceAuto	FALSE
1457	13.1223	150.1248	1/0	. / 0	O	ForceAuto	FALSE
1505	13.5773	157.5902	0.146875	0.146875	w, no	ForceAuto	TRUE
1506	<b>1</b> 3.58695	157.746	· •	0.146875		Manual	TRUE
1507	13.59682	157.9053	0	0.146841	0	Manual	FALSE
1508	13.60673	VEIS8065	TEKNIK	A 146737	.AYSIAd	Mah GaKA	FALSE

RT (RECOGNITION TIME) = 13.59-13.12=0.47s

BT (BRAKE TIME) =13.61-13.59=0.02s

	С	AC	AM	AN	AO	AR	CO
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.028048	0.000596	0	0	0	Manual	FALSE
3	0.108943	0.003718	0	0	0	Manual	FALSE
1367	12.9569	149.8898	0	0	0	ForceAuto	FALSE
1368	12.96694	150.057	0	0	0	ForceAuto	FALSE
1429	13.51485	159.1881	0	0	0	ForceAuto	TRUE
1430	13.52487	159.3551	0	0	0	Manual	TRUE
1955	18.35468	239.284	0	0	0	Manual	FALSE
1956	18.36482	239.4465	0.025415	0.025415	0.025415	Manual	FALSE

RT (RECOGNITION TIME) = 13.52-12.97=0.55s

BT (BRAKE TIME) =18.36-13.52=4.84s

#### Umbrella Man

	С	ALAC'SIA	AM	AN	AO	AR	CO
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.001847	Z 0	0	0	Manual	FALSE
3	0.256268	0.015412	> 0	0	0	Manual	FALSE
1358	13.10304	149.893	0	0	0	ForceAuto	FALSE
1359	13.11326	150.061	0	0	0	ForceAuto	FALSE
1445	13.905	163.1017	0	0	0	ForceAuto	TRUE
1446	13.9148	163.2633	0	0	0	Manual	TRUE
1447	13.92434	163.4205	6	b.: <	0	Manual	FALSE
1448	13.93336	163.5694	0	at 0	. 5.0	Manual	FALSE

RT (RECOGNITION TIME) = 13.91-13.11=0.8s LAYSIA MELAKA

BT (BRAKE TIME) =NULL

#### Bicycle

	С	AC	AM	AN	AO	AR	со	
1	scenarioTi	distanceT	brake	appliedBr	rawBrake	drivingMc	button2	
2	0.1	0.003099	0	0	0	Manual	FALSE	
3	0.271452	0.018841	0	0	0	Manual	FALSE	
1217	12.36012	149.9448	0	0	0	ForceAuto	FALSE	
1218	12.37028	150.1116	0	0	0	ForceAutc	FALSE	
1684	16.99365	226.2928	0	0	1	ForceAuto	FALSE	
1685	17.00283	226.4448	0	0	1	ForceAuto	FALSE	
1686	17.00283	147.2469	0	0	1	Manual	FALSE	
2163	17.00283	224.0093	0	0	1	Manual	FALSE	

#### RT (RECOGNITION TIME) = 17.00-12.37=4.63

### BT (BRAKE TIME) =NULL AT MALAYSIA

#### Motorcycle

Moto	orcycle	and the second s	40				
	C 🗿	AC	AM	AN	AO	AR	со
1	scenarioTi	distanceTi	brake	appliedB	r rawBrake	drivingMc b	utton2
2	0.1	0.001538	0		0 0	Manual	FALSE
3	0.25182	0.014462	0		0 0	Manual	FALSE
1473	<b>13</b> .04607	150.0101	0		0 0	ForceAutc	FALSE
1618	14.33952	170.2678	0.145312	0.14531	2 0	ForceAuto	TRUE
1619	14.34834	170.3941	1.10	0.14531	2 ** 0	Manual	TRUE
1977	17.67951	220.3112	0		0 ~ ( 50	Manual	FALSE
1978	17.68962	220.4961	0.004888	0.00488	8 0.004888	Manual	FALSE
1979	17.69905	220.6687	0.063539	0.06353	9 0.063539	Manual KA	FALSE

RT (RECOGNITION TIME) = 14.35-13.05=1.3s

BT (BRAKE TIME) =17.69-14.35=3.34s

	С	AC	AM	AN	AO	AR	CO
1	scenarioTi	distanceT	brake	appliedBr	rawBrake	drivingMc	button2
2	0.025679	0.00059	0	0	0	Manual	FALSE
1304	12.22866	149.9545	0	0	0	ForceAuto	FALSE
1305	12.23733	150.0971	0	0	0	ForceAutc	FALSE
1429	13.35215	167.7542	0.132031	0.132031	0	ForceAuto	TRUE
1430	13.36037	167.8749	0	0.132031	0	Manual	TRUE
1597	14.8641	188.6408	0	0	0	Manual	FALSE
1598	14.87347	188.7779	0.00782	0.00782	0.00782	Manual	FALSE
1599	14.88259	188.9116	0.037146	0.037146	0.037146	Manual	FALSE

RT (RECOGNITION TIME) = 13.36-12.24=1.12s

BT (BRAKE TIME) =14.87-13.36=1.51s

#### Umbrella Man

	С	MPACYS/	AM	AN	AO	AR	со
1	scenarioT	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.001614	<b>o</b>	0	0	Manual	FALSE
3	0.252956	0.014702	2 0	0	0	Manual	FALSE
1148	12.10842	149.9775	0	0	0	ForceAutc	FALSE
1149	12.1175	150.1268	0	0	-0	ForceAutc	FALSE
1283	13.41904	171.5733	0	0	0	ForceAutc	TRUE
1284	13.42901	171.7377	0	0	0	Manual	TRUE
1398	14.58818	190.9355	0	0	0	Manual	FALSE
1399	14.59852	191.1082	0.005865	0.005865	0.005865	Manual	FALSE
1400	14.60787	191.2645	0.009775	0.009775	0.009775	Manual	FALSE
1771	311		A 6			and the second of	

V

1.1

RT (RECOGNITION TIME) = 13.43-12.12=1.31s

BT (BRAKE TIME) =14.60-13.43=1.17s

#### Bicycle

	С	AC	AM	AN	AO	AR	CO
1	scenarioTi	distanceT	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.001544	0	0	0	Manual	FALSE
3	0.251913	0.014482	0	0	0	Manual	FALSE
1551	13.10967	149.9544	0	0	0	ForceAuto	FALSE
1552	13.11765	150.0856	0	0	0	ForceAuto	FALSE
1602	13.53848	157.0085	0	0	0	ForceAuto	TRUE
1603	13.54704	157.1495	0	0	0	Manual	TRUE
1672	14.19836	167.8706	0	0	0	Manual	FALSE
1673	14.20748	168.0206	0.002933	0.002172	0.002933	Manual	FALSE
1674	14.2162	168.1638	0.124145	0.093503	0.124145	Manual	FALSE

RT (RECOGNITION TIME) = 13.55-13.12=0.43s

#### BT (BRAKE TIME) =14.21-13.55=0.66s

AALAYSIA

#### Motorcycle

2	Y N	(	20				
	C	AC	AM	AN	AO	AR	CO
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	-0.1	3.72E-07	0	0	0	Manual	FALSE
3	0.202	0.006768	0	0	0	Manual	FALSE
1464	13.04144	149.9292	0	0	0	ForceAutc	FALSE
1465	13.04994	150.0689	o	0	- 0	ForceAutc	FALSE
1532	13.66788	160.135	0.146094	0.146094	0	ForceAuto	TRUE
1533	13.67778	160.2915	0	0.146094	· 0	Manual	TRUE
1534	13.68708	160.438	··· 0	0.146058	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Manual	FALSE
1535	13. <u>6965</u>	160.5865	0	0.145961	0	Manual	FALSE

RT (RECOGNITION TIME) = 13.68-13.05=0.63s

BT (BRAKE TIME) =13.70-13.68=0.02s

	С	AC	AM	AN	AO	AR	CO
1	scenarioTi	distanceT	brake	appliedBr	rawBrake	drivingMc	button2
2	0.020972	0.000242	0	0	0	Manual	FALSE
1404	12.97486	149.8582	0	0	0	ForceAuto	FALSE
1405	12.98456	150.0176	0	0	0	ForceAuto	FALSE
1512	13.96731	165.7137	0.136719	0.136719	0	ForceAuto	TRUE
1513	13.97758	165.8677	0	0.136719	0	Manual	TRUE
1514	13.98708	166.01	0	0.136683	0	Manual	FALSE
1515	13.99627	166.1473	0	0.136587	0	Manual	FALSE
1516	14.00654	166.3007	0	0.136436	0	Manual	FALSE

RT (RECOGNITION TIME) = 13.98-12.98=1.0s

BT (BRAKE TIME) =14.01-13.98=0.03s

Umbrella Man

	С	AC	AM	AN	AO	AR	СО
1	<mark>sc</mark> enarioTi	distanceT	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.001632	M. 0	0	0	Manual	FALSE
3	0.253208	0.014756	0	0	0	Manual	FALSE
1378	13.10801	149.8806	0	0	0	ForceAuto	FALSE
1379	13.11769	150.0395	0	0	0	ForceAutc	FALSE
1431	13.60141	157.9808	0	0	0	ForceAuto	TRUE
1432	13.61017	158.1247	0	0	0	Manual	TRUE
1433	13.62044	158.2933	0	0	0	Manual	FALSE

او دو.

RT (RECOGNITION TIME) = 13.61-13.12=0.49s

BT (BRAKE TIME) =NULL UNIVERSITI TEKNIKAL MALAYSIA MELAKA

#### Bicycle

	С	AC	AM	AN	AO	AR	CO
1	scenarioTi	distanceT	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.004563	0	0	0	Manual	FALSE
3	0.285823	0.022364	0	0	0	Manual	FALSE
1316	12.82596	149.8981	0	0	0	ForceAuto	FALSE
1317	12.83566	150.0574	0	0	0	ForceAutc	FALSE
1396	13.54043	161.6521	0	0	0	ForceAuto	TRUE
1397	13.54884	161.7907	0	0	0	Manual	TRUE
1520	14.70532	180.7494	0	0	0	Manual	FALSE
1521	14.71469	180.9009	0.010753	0.010753	0.010753	Manual	FALSE
2388	22.73242	305.7705	0	0	0	Manual	FALSE

RT (RECOGNITION TIME) = 13.55-12.84=0.71s

BT (BRAKE TIME) =14.71-13.55=1.16s

MALAYSIA 4

#### Motorcycle

VIULUI	cycle		8				
	C	AC	AM	AN	AO	AR	CO
1	scenarioT	distanceTi	brake	appliedBr	rawBrake	drivingMc b	outton2
2	0.1	0.001482	0	0	0	Manual	FALSE
3	0.250974	0.014285	0	0	0	Manual	FALSE
1475	13.11074	149.9626	0	0	0	ForceAutc	FALSE
1476	13.11969	150.1094	O	0	0	ForceAutc	FALSE
1584	14.08241	165.4823	0.140625	0.140625	0	ForceAuto	TRUE
1585	14.09132	165.6162	lo 6	0.140625		Manual	ATRUE
1953	17.4829	210.9866	. 0 0	. 0		Manual	FALSE
1954	17.49326	211.1204	0.016618	0.016618	0.016618	Manual	FALSE
3128	27.76746	312.4634	I TEKNO	KAL NO	ALAYS9	Manual	FALSE

RT (RECOGNITION TIME) = 14.09-13.12=0.96s

BT (BRAKE TIME) =17.50-14.09=3.41s

	С	AC	AM	AN	AO	AR	CO
1	scenario Ti	distanceT	brake	appliedBr	rawBrake	drivingMc	button2
2	0.024765	0.000749	0	0	0	Manual	FALSE
1378	12.95061	149.937	0	0	0	ForceAuto	FALSE
1379	12.95898	150.0745	0	0	0	ForceAutc	FALSE
1577	14.73503	176.9493	0.138281	0.138281	0	ForceAuto	TRUE
1578	14.74327	177.0583	0	0.138281	0	Manual	TRUE
1790	16.67678	199.8129	0	0	0	Manual	FALSE
1791	16.68602	199.9149	0.009775	0.009775	0.009775	Manual	FALSE
2890	26.85486	296.5087	0	0	0	Manual	FALSE

RT (RECOGNITION TIME) = 14.74-12.96=1.76s

BT (BRAKE TIME) =16.69-14.74=1.95s

Umbrella Man

	С	AC	AM		AN	AO	AR	со	
1	<mark>sce</mark> narioTi	distanceT	brake		appliedBr	rawBrake	drivingMc	butto <mark>n2</mark>	
2	0.1	0.001839		0	0	0	Manual	FALSE	
3	0.256156	0.015388	Pr.	0	0	0	Manual	FALSE	
1298	12.90103	149.9638	×	0	0	0	ForceAuto	FALSE	
1299	12.91209	150.1452		0	0	0	ForceAutc	FALSE	
1405	13.93953	167.0219		0	0	0	ForceAuto	TRUE	
1406	13.94882	167.1745		0	0	0	Manual	TRUE	
1599	15.84826	198.3311		0	0	0	Manual	FALSE	
1600	15.85862	198.4989	0.0195	55	0.01955	0.01955	Manual	FALSE	
RT (	RT (RECOGNITION TIME) = 13.95-12.91=1.04s								

RT (RECOGNITION TIME) = 13.95-12.91=1.04s

BT (BRAKE TIME) =15.86-13.95=1.91s MALAYSIA MELAKA

#### Bicycle

	С	AC	AM	AN	AO	AR	CO
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.001593	0	0	0	Manual	FALSE
3	0.252637	0.014635	0	0	0	Manual	FALSE
1515	13.11659	149.9861	0	0	0	ForceAuto	FALSE
1516	13.12487	150.1221	0	0	0	ForceAuto	FALSE
1618	13.98178	164.2135	0	0	0	ForceAuto	TRUE
1619	13.98983	164.3458	0	0	0	Manual	TRUE
2566	22.497	326.2877	0	0	0	Manual	FALSE

RT (RECOGNITION TIME) = 13.99-13.12=0.87s

BT (BRAKE TIME) = NULL

Moto	rcycle	WALAYS/4	14				
	C 🗧	AC	AM	AN	AO	AR	CO
1	scenarioTi	distanceT	brake	appliedBr	rawBrake	drivingMc b	utton2
2	0.1	0.001736	0	0	0	Manual	FALSE
3	0.254722	0.015079	0	0	0	Manual	FALSE
1450	13.11107	149.9301	0	0	0	ForceAutc	FALSE
1451	13.11959	150.0701	o	0	0	ForceAutc	FALSE
1515	13.69347	159.4371	0.163281	0.163281	. 0	ForceAuto	TRUE
1516	13.70283	159.5858	1.10	0.163281	·* 0	Manual	TRUE
1696	15.35888	183.4826	0	0		Manual	FALSE
1697	15.3 <u>6875</u>	183.618	0.010753	0.010753	0.010753	Manual	FALSE
2761	24.92607	252.2664	TEKN	CAL MA	LAYSIA	Manual	FALSE

RT (RECOGNITION TIME) = 13.70-13.12=0.58s

BT (BRAKE TIME) = 15.37-13.70=1.67s

	С	AC	AM	AN	AO	AR	со
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.02421	0.00049	0	0	0	Manual	FALSE
3	0.101868	0.003316	0	0	0	Manual	FALSE
414	13.05656	149.8765	0	0	0	ForceAuto	FALSE
415	13.06534	150.021	0	0	0	ForceAuto	FALSE
476	13.62019	159.099	0.157813	0.157813	0	ForceAuto	TRUE
477	13.6299	159.2538	0	0.157813	0	Manual	TRUE
517	14.01332	165.1934	0	0.107496	0	Manual	FALSE
518	14.02284	165.3365	0.037146	0.117358	0.037146	Manual	FALSE

RT (RECOGNITION TIME) = 13.63-13.07=0.56s

BT (BRAKE TIME) = 14.02-13.63=0.39s

Umbi	rella Man	MALAYSI	MEL		_			
	С	AC	AM	AN	and the	AO	AR	со
1	scenarioTi	distanceTi	brake	applied	Br rav	vBrake	drivingMc b	utton2
2	0.1	0.001588	0		0	0	Manual	FALSE
3	0.252563	0.014619	0		0	0	Manual	FALSE
1451	12.14845	149.9837	0		0	0	ForceAutc	FALSE
1452	12.1561	150.1096	0		0	0	ForceAutc	FALSE
1526	12.77145	160.2694	0		0	0	ForceAutc	TRUE
1527	12.77946	160.4019	10 60	-: 4	0	. 0	Manual	TRUE
1528	12.78748	160.5345	. 0 0		0	. (So	Manual	FALSE
2566	<b>21</b> .93842	360.6895	0		0	• 0	Manual	FALSE
_	UNI	VERSIT	TEKNI	KAL N	IAL/	YSIA	MELAK/	1

RT (RECOGNITION TIME) = 13.77-13.11=0.66s

BT (BRAKE TIME) = NULL

#### Bicycle

1	С	AC	AM	AN	AO	AR	со
1	scenarioTi	distanceT	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.001719	0	0	0	Manual	FALSE
3	0.254464	0.015024	0	0	0	Manual	FALSE
1248	13.10362	149.8326	0	0	0	ForceAuto	FALSE
1249	13.1141	150.0048	0	0	0	ForceAuto	FALSE
1312	13.7593	160.6165	0	0	0	ForceAuto	TRUE
1313	13.76915	160.7787	0	0	0	Manual	TRUE
1314	13.77866	160.9353	0	0	0	Manual	FALSE
2139	22.22351	319.1908	0	0	0	Manual	FALSE

RT (RECOGNITION TIME) = 12.78-12.15=0.63s

BT (BRAKE TIME) = NULL

Motorcycle

NIOTO	rcycle		N.				
	C	AC	AM	AN	AO	AR	со
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.00144	0	0	0	Manual	FALSE
3	0.250328	0.014151	0	0	0	Manual	FALSE
1393	12.73459	149.9248	0	0	0	ForceAuto	FALSE
1394	12.74339	150.0694	0	0	0	ForceAuto	FALSE
1455	13.29043	159.0098	0.141406	0.141406	**• O	ForceAuto	TRUE
1456	13.29965	159.1568	0	0.141406	-w, 50	Manual	9 TRUE
1457	13.30917	159.3085	· · · o	0.141377	0	Manual	FALSE
2478	23.03077	366.6631	TEKA	KAL M9	LAVE!	Manual	FALSE

RT (RECOGNITION TIME) = 13.30-12.74=0.56s

BT (BRAKE TIME) = 13.31-13.30=0.01s

1	С	AC	AM	AN	AO	AR	CO
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.02544	0.000421	0	0	0	Manual	FALSE
3	0.104074	0.003433	0	0	0	Manual	FALSE
1419	12.85925	149.8893	0	0	0	ForceAuto	FALSE
1420	12.86703	150.0173	0	0	0	ForceAutc	FALSE
1495	13.56405	161.3374	0.165625	0.165625	0	ForceAuto	TRUE
1496	13.57325	161.4814	0	0.165625	0	Manual	TRUE
1497	13.58196	161.6173	0	0.16559	0	Manual	FALSE
1498	13.5925	161.7816	0	0.165494	0	Manual	FALSE
1499	13.60128	161.9184	0	0.165295	0	Manual	FALSE
2507	23.09783	359.1853	0	0	0	Manual	FALSE

RT (RECOGNITION TIME) = 13.57-12.87=0.7s

BT (BRAKE TIME) = 13.59-13.57=0.02s

#### **Umbrella Man** AC AM AN AO AR co scenarioTi distanceTi brake appliedBr rawBrake drivingMc button2 0 2 0.1 0.001899 FALSE 0 0 Manual з 0.256975 0.015565 0 0 0 Manual FALSE 12.16936 149.9577 0 0 0 ForceAutc FALSE 147 148 12.17918 150.1193 0 0 **0** ForceAutc FALSE 149 12.18915 150.2835 0 0 0 ForceAutc FALSE 158 5258 12,68929 0 0 0 ForceAutc TRUE 201 202 0 0 Manual 12.69862 158.6796 0 TRUE 203 12.70804 158.8351 0 0 0 Manual FALSE 0 Manual FALSE 438 15.07226 199.6541 0 0 439 440 15.09344 200.0434 0.063539 0.063539 0.063539 Manual FALSE 23.79947 373 275.8795 0 0 0 Manual FALSE

RT (RECOGNITION TIME) = 12.70-12.18=0.52s

BT (BRAKE TIME) = 15.08-12.70=2.38s

#### Bicycle

	С	AC	AM	AN	AO	AR	CO	СР
1	scenarioTi	distanceT	brake	appliedBr	rawBrake	drivingMc	button2	
2	0.1	0.001867	0	0	0	Manual	FALSE	
1419	13.11322	149.9463	0	0	0	ForceAuto	FALSE	
1420	13.12165	150.0848	0	0	0	ForceAutc	FALSE	
1574	14.44961	171.94	0	0	0	ForceAuto	TRUE	
1575	14.45761	172.0716	0	0	0	Manual	TRUE	
2482								

RT (RECOGNITION TIME) = 14.46-13.12=1.34s

BT (BRAKE TIME) = NULL

Mote	orcycle	AL MALAY	SIA NE					
	С	AC	AM 🕺	AN	AO	AR	со	CP
1	scenarioTi	distanceTi	brake 🦉	appliedBr	rawBrake	drivingMc	button2	
2	0.1	0.00157	0	0	C	Manual	FALSE	
3	0.252302	0.014565	0	0	C	) Manual	FALSE	
298	12.14643	149.9253	0	0	0	) ForceAutc	FALSE	
299	<b>12</b> .1559	150.0808	0	0	- 0	) ForceAutc	FALSE	
367	12.76695	160.0427	0.148438	0.148438	C	) ForceAutc	TRUE	
368	12.77631	160.1907	0	0,148438	/ 0	Manual	TRUE	
369	12.78553	160.3365	0	0.148405	C	Manual	FALSE	
370	12.79502	160.4862	. 0	0.148311	5	Manual (	EALSE	
267						1.0		

RT (RECOGNITION TIME) = 12.78-12.16=0.62s AYSIA MELAKA

BT (BRAKE TIME) = 12.80-12.78=0.02s

	С	AC	AM	AN	AO	AR	CO	
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2	
2	0.023467	0.000715	0	0	0	Manual	FALSE	
3	0.108919	0.004369	0	0	0	Manual	FALSE	
1311	12.47758	149.8918	0	0	0	ForceAuto	FALSE	
1312	12.48639	150.0367	0	0	0	ForceAuto	FALSE	
1442	13.69767	169.0901	0.132031	0.132031	0	ForceAuto	TRUE	
1443	13.70581	169.2079	0	0.132031	0	Manual	TRUE	
1444	13.71453	169.334	0	0.13201	0	Manual	FALSE	
1445	13.7241	169.4721	0	0.131939	0	Manual	FALSE	
2343	22.27586	337.5089	0	0	0	Manual	FALSE	
2344								

RT (RECOGNITION TIME) = 13.71-12.49=1.22s

BT (BRAKE TIME) = 13.72-13.71=0.01s

Umbrella Man

	С	AC	AM	AN	AO	AR	со
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.004201	0	0	0	Manual	FALSE
3	0.282516	0.021528	o 🧳 🔰	0	0	Manual	FALSE
1213	12.02354	149.8846	× 0	0	0	ForceAutc	FALSE
1214	12.03244	150.031	0	0	0	ForceAutc	FALSE
1337	13.19916	169.2266	0	0	0	ForceAutc	TRUE
1338	13.20864	169.3826	0	0	0	Manual	TRUE
1339	13.21783	169.5338	0	0	0	Manual	FALSE
2200	21.73661	342.348	0	0	0	Manual	FALSE
2201							
_	لأك	lo lum	کا , مل	Rife	ىتى ئىچ	و دره مر س	

سيتي

190

RT (RECOGNITION TIME) = 13.21-12.03=1.18s

BT (BRAKE TIME) = NULL

#### Bicycle

	С	AC	AM	AN	AO	AR	со
1	scenarioTi	distanceT	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.001368	0	0	0	Manual	FALSE
3	0.249191	0.013914	0	0	0	Manual	FALSE
1574	13.11232	149.9977	0	0	0	ForceAuto	FALSE
1575	13.1205	150.1321	0	0	0	ForceAutc	FALSE
1645	13.70274	159.706	0	0	0	ForceAuto	TRUE
1646	13.71124	159.8459	0	0	0	Manual	TRUE
1995	16.70388	208.0331	0	0	0	Manual	FALSE
1996	16.71229	208.1644	0.044966	0.044966	0.044966	Manual	FALSE
2969	24.84525	290.6638	0	0	0	Manual	FALSE

RT (RECOGNITION TIME) = 13.71-13.12=0.59s

WALAYSIA 40

BT (BRAKE TIME) = 16.71-13.71=3s

Motorcycle

	i si		2				
1	C	AC	AM	AN	AO	AR	со
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	outton2
2	0.1	0.001644	0	0	0	Manual	FALSE
3	0.253392	0.014796	0	0	0	Manual	FALSE
1493	13.10926	149.9543	0	0	0	ForceAutc	FALSE
1494	13.11873	150.1098	0	0	0	ForceAutc	FALSE
1579	13.87278	162.3011	0.141406	0.141406	- 0	ForceAutc	TRUE
1580	13.88159	162.4376	0	0.141406	150	Manual	TRUE
1824	16.08466	193.2201	0	0	0	Manual	FALSE
1825	16.09383	193.3413	0.02737	0.02737	0.92737	Manual L	FALSE
1826	16.10382	193.4734	0.02737	0.02737	0.02737	Manual	FALSE
2837	25.36619	261.5523	0	0	0	Manual	FALSE

RT (RECOGNITION TIME) = 13.88-13.12=0.76s

BT (BRAKE TIME) = 16.09-13.88=2.21s

	С	AC	AM	AN	AO	AR	со	
1	scenarioTi	distanceT	brake	appliedBr	rawBrake	drivingMc	button2	
2	0.021824	0.000562	0	0	0	Manual	FALSE	
3	0.102452	0.003719	0	0	0	Manual	FALSE	
1395	13.01272	149.9651	0	0	0	ForceAuto	FALSE	
1396	13.02315	150.1364	0	0	0	ForceAutc	FALSE	
1463	13.61906	159.856	0.139844	0.139844	0	ForceAuto	TRUE	
1464	13.62704	159.9825	0	0.139844	0	Manual	TRUE	
1465	13.6361	160.1259	0	0.139822	0	Manual	FALSE	
1466	13.64602	160.2827	0	0.139744	0	Manual	FALSE	
2329	21.74142	302.8899	0	0	0	Manual	FALSE	

RT (RECOGNITION TIME) = 13.63-13.02=0.61s

BT (BRAKE TIME) = 13.65-13.63=0.02s

# Umbrella Man

	2	<u>/</u>	10				
	С	AC	ĀM	AN	AO	AR	со
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.001667	0	0	0	Manual	FALSE
3	0.253729	0.014866	0	0	0	Manual	FALSE
325	13.11086	149.945	0	0	0	ForceAutc	FALSE
326	13.12048	150.103	O	0	0	ForceAuto	FALSE
363	13.46957	155.8379	0	0	0	ForceAuto	TRUE
364	<b>13</b> .47946	156.0004	0	0	0	Manual	TRUE
257	22.4889	353.8709	0	. 0	0	Manual	FALSE
250		no wand			the and	للودومه	_

RT (RECOGNITION TIME) = 13.48-13.12=0.36s AYSIA MELAKA

BT (BRAKE TIME) = NULL

#### PARTICIPANT 16

#### Bicycle

	С	AC	AD	AM	AN	AO	AR	CO
1	scenarioTi	distanceTi	steering	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.001412	0	0	0	0	Manual	FALSE
1570	13.11189	150.0401	-1.73E-05	0	0	0	ForceAuto	FALSE
1571	13.12163	150.2001	-1.82E-05	0	0	0	ForceAuto	FALSE
1631	13.61708	158.3421	-2.42E-05	0	0	0	Manual	TRUE
1632	13.62647	158.4964	-2.42E-05	0	0	0	Manual	FALSE
1756	14.73904	176.7022	0.003006	0.00782	0.00782	0.00782	Manual	FALSE
1757	14.74787	176.8449	0.003006	0.01955	0.01955	0.01955	Manual	FALSE
1758	14.75727	176.9968	0.003006	0.01955	0.01955	0.01955	Manual	FALSE
1759	14 76517	177 1243	0.003037	0.029326	0.029326	0.029326	Manual	FALSE

RECOGNITION TIME: 13.62S – 13.11S = **0.51S** 

#### BREAKING TIME: 14.74S- 13.62S = 1.12S WALAYSIA

#### Lorry

Lorry	y III	LAKA.					
1.1	C	AC	MA	AN	AO	AR	CO
1	scenarioTime	distanceTravelled	brake	appliedBr	rawBrake	drivingMc	button2
2	0.0221398	0.000477529		0 0	0	Manual	TRUE
1371	13.0335845	150.0690613	-	0 0	0	ForceAuto	FALSE
1372	13.0418901	150.2055206	2	0 0	, no	ForceAuto	FALSE
1415	13.4368921	156.6927948	**	0 0.1625	0 0	Manual	TRUE
1416	13.4462601	/EDC156.8451233	MIK AT	0 0.162467	Vela M	Manyal A	FALSE
1417	13.4557518	156.9992371	NIRAL	0.162364	0	Manual	FALSE
1418	13.4650324	157.149704		0.162188	0	Manual	FALSE
1/10	12 4724977	157 2266052		0 161946	0	Manual	EALSE

RECOGNITION TIME: 13.43S – 13.03S = **0.4S** 

BREAKING TIME: 13.45S- 13.44S = 0.01S (ERROR)

### Motorcycle

	С	AC	AM	AN	AO	AR	CO
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.001621	0	0	0	Manual	FALSE
1487	13.1151	150.0634	0	0	0	ForceAuto	FALSE
1488	13.12432	150.2149	0	0	0	ForceAuto	FALSE
1542	13.60687	158.1176	0	0.116406	0	Manual	TRUE
1543	13.61513	158.2504	0	0.116383	0	Manual	FALSE
1812	16.08332	194.4354	0.009775	0.009775	0.009775	Manual	FALSE
1813	16.0929	194.5685	0.009775	0.009775	0.009775	Manual	FALSE
1814	16.10214	194.6967	0.022483	0.022483	0.022483	Manual	FALSE

RECOGNITION TIME: 13.61S – 13.12S = **0.49S** 

BREAKING TIME: 16.08S - 13.61S = 2.47S

## Umbrella Man, MALAYS/4

	S.		E.					
	C	AC	MA	A	N	AO	AR	CO
1	scenarioTi	distanceTi	brake	appli	iedBr	rawBrake	drivingMc	button2
2	0.1	0.001486			0	0	Manual	FALSE
1379	13.12059	150.0952	(	)	0	- 0	ForceAutc	FALSE
1380	13.12932	150.2386	0	)	0	0	ForceAutc	FALSE
1416	13.45846	155.6505	1/0		0	. · · · · · · · · · · · · · · · · · · ·	Manual	TRUE
1417	13.46884	155,8212		) in	0	~ S.O	Manual	FALSE
1418	13.47811	155.9738	0	)	0	•* 0	Manual	FALSE
1419	13.48838	156.1426	TEKN	KAL	MA0	.AYSIAo	Manual	FALSE
1420	13/197/19	156 2925			0	0	Manual	EALSE

RECOGNITION TIME: 13.46S – 13.12S = **0.34S** 

#### PARTICIPANT 17

#### Bicycle

	С	AC	AM	AN	AO	AR	СО
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.001729	0	0	0	Manual	FALSE
1565	13.11087	150.019	0	0	0	ForceAuto	FALSE
1566	13.1194	150.159	0	0	0	ForceAuto	FALSE
1639	13.71173	159.9009	0	0	0	Manual	TRUE
1640	13.72051	160.0454	0	0	0	Manual	FALSE
1896	15.95335	198.1785	0.043988	0.043988	0.043988	Manual	FALSE
1897	15.96162	198.3266	0.043988	0.043988	0.043988	Manual	FALSE
1000	15.07100	109 4062	0.072214	0.072214	0.072214	Manual	FALSE

RECOGNITION TIME: 13.71S – 13.11S = **0.6S** 

#### BREAKING TIME: 15.95- 13.71S = 2.24S

		MALAYSIA	14				
Lorry	Kuller		CLAKA				
	C⊢	AC	MA	AN	AO	AR	CO
1	scenario Ti	distanceTi	brake	applied	Br rawBrake	drivingMc k	ou <mark>tton2</mark>
2	0.025723	0.00064	0		0 0	Manual	FALSE
1414	12.98806	150.0625	0		0 0	ForceAutc	FALSE
1415	12.99661	150.203	0	L . C	0 0	ForceAutc	FALSE
1546	14.18827	169.8107	000		0 0	Manual	TRUE
1547	14.19916	169.99	0		0 0	Manual	FALSE
1548	14.20971	170.1638	TEKNÖ	KAL M/	/oLAYSIA	ManualKA	FALSE

RECOGNITION TIME: 14.19S – 12.99S = 1.2S

### Motorcycle

	С	AC	AM	AN	AO	AR	СО
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.001717	0	0	0	Manual	FALSE
1489	13.11098	150.0052	0	0	0	ForceAutc	FALSE
1490	13.11952	150.1456	0	0	0	ForceAuto	FALSE
1603	14.12859	166.2163	0	0.1625	0	Manual	TRUE
1604	14.13808	166.3578	0	0.16247	0	Manual	FALSE
1605	14.14768	166.5008	0	0.162368	0	Manual	FALSE
1606	14.1572	166.6422	0	0.162192	0	Manual	FALSE
1607	14.16573	166.7688	0	0.161944	0	Manual	FALSE

RECOGNITION TIME: 14.13S – 13.11S = **1.02S** 

BREAKING TIME: 14.14S – 14.13 = 0.01S (ERROR)

Umbrella Man

	S		No.					
	CX	AC	AM	AN		AO	AR	CO
1	scenarioTi	distanceTi	brake	applied	Br	rawBrake	drivingMc k	outton2
2	0.1	0.001726	0		0	0	Manual	FALSE
1302	13.11021	150.0216	0		0	0	ForceAutc	FALSE
1303	13.11861	150.1597	0		0	0	ForceAutc	FALSE
1371	13.76771	160.8598	0	2	0	0	Manual	TRUE
1372	13.78367	161.1233	0 0		0	~ S.O	Manual	FALSE
1373	13.7944	161.3005	0		0	·* 0	Manual	FALSE
1374	13.80432	161.4643	TEKNÓ	KAL M	0	AYSIA	Manual KA	FALSE

RECOGNITION TIME: 13.77S - 13.11S = 0.66S

#### PARTICIPANT 18

#### Bicycle

1.1	С	AC	AM	AN	AO	AR	CO
1	scenarioTi	distanceTravelle	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.001574307	0	0	0	Manual	FALSE
1460	13.11436	150.0011902	0	0	0	ForceAuto	FALSE
1461	13.1228	150.1400299	0	0	0	ForceAuto	FALSE
1889	16.81965	211.3149567	0	0	0.865103	Manual	TRUE
1890	16.8289	211.4685669	0.870968	0.000132	0.870968	Manual	FALSE
1891	16.83782	211.6167908	0.870968	0.000627	0.870968	Manual	FALSE
1892	16.84694	211.76828	0.87781	0.001464	0.87781	Manual	FALSE

RECOGNITION TIME: 16.82S – 13.11S = **3.71S** 

#### BREAKING TIME: 16.83S - 16.82 = 0.01S

		MALAYSIA							
Lor	ry	1							
	C	AC	AM		AN		AO	AR	СО
1	scenarioTime	distanceTravelled	brake		appliedBra	ke	rawBrake	drivingMode	button2
2	0.0244282	0.000626814		0		0	0	Manual	FALSE
1427	12.9558615	150.1232758		0		0	0	ForceAutoma	FALSE
1428	12.9650362	150.2740784		0		0	0	ForceAutoma	FALSE
1553	14.0883809	168.0230713	12	0	0.1296875	03	0	Manual	TRUE
1554	14.0969038	168.1478577	)	0	0.1296557	78	(S. 0	Manual	FALSE
1877	16.9906533	205.5655823	0.0009	978	0.0009775	17	0.000978	Manual	FALSE
1878	16.9993528	205.6705933	0.0009	978	0.0009775	17	0.000978	Manual KA	FALSE
1879	17.0077816	205.7723083	0.0391	101	0.0391006	84	0.039101	Manual	FALSE

RECOGNITION TIME: 14.09S – 12.96S = 1.13S

BREAKING TIME: 16.99S – 14.09 = 2.9S

### Motorcycle

	С	AC	AM	AN	AO	AR	СО
1	scenario Ti	distanceT	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.001614	0	0	0	Manual	FALSE
1438	13.12546	150.1525	0	0	0	ForceAuto	FALSE
1439	13.13584	150.3231	0	0	0	ForceAuto	FALSE
1563	14.32727	169.0701	0	0.139844	0	Manual	TRUE
1564	14.33667	169.2064	0	0.139813	0	Manual	FALSE
1797	16.61981	198.8604	0.001955	0.001955	0.001955	Manual	FALSE
1798	16.62865	198.9687	0.012708	0.012708	0.012708	Manual	FALSE
1799	16.63861	199.0906	0.012708	0.012708	0.012708	Manual	FALSE

RECOGNITION TIME: 14.33S – 13.13S = **1.2S** 

BREAKING TIME: 16.62S – 14.33 = 2.29S

### Umbrella Man

	1							
	C	AC	MA	AN		AO	AR	со
1	scenarioTi	distanceTi	brake	applied	Br	rawBrake	drivingMc b	utton2
2	0.1	0.001792	0		0	0	Manual	FALSE
1340	13.12042	150.0966	o		0	0	ForceAutc	FALSE
1341	13.129	150.2375	0		0	0	ForceAutc	FALSE
1563	15.19999	184.2827	0	. /	- 0		Manual	TRUE
1564	15.20922	184.4345	10 J 0	Rank	0	20,00	Manual	FALSE
1565	15.21851	184.5873	0		0	0	Manual	FALSE
1566	15.22887	184.7577	TEKN	KALN	0	AYSI/	Manual KA	FALSE

RECOGNITION TIME: 15.2S – 13.12S = **2.08S** 

#### PARTICIPANT 19

#### Bicycle

	С	AC	AM	AN	AO	AR	CO
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.001577	0	0	0	Manual	FALSE
1464	13.11597	150.0285	0	0	0	ForceAuto	FALSE
1465	13.12416	150.163	0	0	0	ForceAuto	FALSE
1587	14.2149	168.1219	0	0	0	Manual	TRUE
1588	14.22454	168.2807	0	0	0	Manual	FALSE
1635	14.66887	175.6003	0.018573	0.007896	0.018573	Manual	FALSE
1636	14.67882	175.764	0.018573	0.008187	0.018573	Manual	FALSE
1637	14.69064	175.9585	0.040078	0.01829	0.040078	Manual	FALSE
6600	44 70050	475 4040	O OCASAS	0.000000	O OCASAS		EALOF.

RECOGNITION TIME: 14.21S – 13.12S = **1.09S** 

BREAKING TIME: 14.67S - 14.21S = 0.46S

#### Lorry

Lorry	TERUTE	-	CLAKA.				
	CE	AC	AM	AN	AO	AR	CO
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	but <mark>ton2</mark>
2	0.023437	0.000705	0	0	0	Manual	FALSE
1422	13.04832	150.0761	1.10	0	0	ForceAutc	FALSE
1423	13.05785	150.2328	o U o	0	W (50	ForceAutc	FALSE
1528	13.99312	165.6167	0	0	• 0	Manual	TRUE
1529	14.0029	165.7776	I TEKNØ	KAL MA	LAYSIA	Manual 🔨	FALSE
1530	14.01284	165.9413	0	0	0	Manual	FALSE
1531	14.02296	166.1078	0	0	0	Manual	FALSE

RECOGNITION TIME: 13.99S – 13.05S = **0.94S** 

### Motorcycle

	С	AC	AM	AN	AO	AR	CO
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.001663	0	0	0	Manual	FALSE
1388	13.11599	150.1009	0	0	0	ForceAuto	FALSE
1389	13.12435	150.2383	0	0	0	ForceAuto	FALSE
1473	13.901	162.7763	0.135156	0.135156	0	ForceAuto	TRUE
1474	13.91033	162.9202	0	0.135156	0	Manual	TRUE
1475	13.92057	163.078	0	0.135127	0	Manual	FALSE
1476	13.93007	163.2241	0	0.135028	0	Manual	FALSE
1477	12 92996	162 2744	0	0 124975	0	Manual	EALSE

RECOGNITION TIME: 13.91S – 13.12S = **0.79S** 

BREAKING TIME: 13.92S – 13.91S = 0.01S (ERROR)

# Umbrella Man

	C	AC	AM	Ī	AN		AO	AR	со
1	scenarioTi	distanceT	brake		a <mark>ppl</mark> ie	dBr	rawBrake	drivingMc	b <mark>utton2</mark>
2	0.1	0.00166		0		0	0	Manual	FALSE
1328	13.12058	150.0888		0		0		ForceAutc	FALSE
1329	13.1304	150.2502		0		0	0	ForceAuto	FALSE
1369	13.50866	156.4728		0		0	0	Manual	TRUE
1370	13.51835	156.6323	1.14	0	a: <	0	· · · 0	Manual	FALSE
1371	13.52782	156.7882	~	0		0	S.0	Manual	FALSE
1372	13.53787	156.9537		0		0	•* 0	Manual	FALSE
_		The second s		1.1	10.000	100	No. of Street,		

RECOGNITION TIME: 13.51S – 13.12S = **0.39S** 

#### PARTICIPANT 20

#### Bicycle

	С	AC	AM	AN	AO	AR	СО	
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2	
2	0.1	3.72E-07	0	0	0	Manual	FALSE	
1450	13.05109	150.0837	0	0	0	ForceAutc	FALSE	
1451	13.06007	150.2316	0	0	0	ForceAuto	FALSE	
1500	13.50426	157.556	0	0	0	Manual	TRUE	
1501	13.51297	157.6998	0	0	0	Manual	FALSE	
1502	13.52219	157.8519	0	0	0	Manual	FALSE	
1503	13.53185	158.0115	0	0	0	Manual	FALSE	
1504	13.54085	158.1601	0	0	0	Manual	FALSE	
1505	13.55005	158.3119	0	0	0	Manual	FALSE	

RECOGNITION TIME: 13.5S – 13.05S = **0.45S** 

#### BREAKING TIME: NULL

#### Lorry

Lorry	A TEKNING	<u> </u>	LAKA.		Γ	Μ	
	C	AC	AM	AN	AO	AR	co
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.023775	0.00064	0	0	0	Manual	FALSE
1399	13.05594	150.028	مک ما	Rico	2ú, ús	ForceAuto	FALSE
1400	13.06504	150.1777	0	·* 0	··· • • • • •	ForceAuto	FALSE
1472	13.70296	160.568	TEKM	0.14375	AVSIA	Manual	TRUE
1473	13.71242	160.7171	0	0.143713		Manual	FALSE
1474	13.72132	160.857	0	0.143612	0	Manual	FALSE
1475	13.73189	161.023	0	0.14346	0	Manual	FALSE
1476	12 74104	161 1664	0	0 142206	0	Manual	LAISE

RECOGNITION TIME: 13.7S – 13.06S = **0.64S** 

BREAKING TIME: 13.71S – 13.70S = 0.01S (ERROR)

### Motorcycle

	С	AC	AM	AN	AO	AR	CO
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.001512	0	0	0	Manual	FALSE
1423	13.11794	150.1304	0	0	0	ForceAutc	FALSE
1424	13.1269	150.2776	0	0	0	ForceAuto	FALSE
1494	13.79691	161.1638	0	0.145313	0	Manual	TRUE
1495	13.80721	161.3251	0	0.145284	0	Manual	FALSE
1496	13.81825	161.4978	0	0.14518	0	Manual	FALSE
1497	13.8284	161.6564	0	0.144984	0	Manual	FALSE

RECOGNITION TIME: 13.8S – 13.12S = **0.68S** 

BREAKING TIME: 13.81S – 13.8S = 0.01S (ERROR)

### Umbrella Man

	and the second se							
	C	AC	AM		AN	AO	AR	СО
1	scenarioTim	distanceTi	brake	app	liedBr	rawBrake	drivingMc k	outton2
2	- 0.1	0.001789	(	0	0	0	Manual	FALSE
1181	13.1266238	150.1618	(	D	0	0	ForceAutc	FALSE
1182	13.1380093	150.3488		)	0	0	ForceAutc	FALSE
1247	<b>13</b> .8562514	1162.152		)	0	0	Manual	TRUE
1248	13.8681474	162.3476	1/1	0	/ 0	. 0	Manual	FALSE
1334	14.8603182	178.5983	0.00195	5 0.0	01955	0.001955	Mangal 9	FALSE
1335	14.8723211	178.7928	0.014663	3 0.0	14663	0.014663	Manual	FALSE
1336	14.8882182	179.0503	0.0195	5 Δ Ο.	.01955	0.01955	Manual	FALSE

RECOGNITION TIME: 13.86S – 13.13S = **0.73S** 

BREAKING TIME: 14.86S – 13.86S = 1S

#### PARTICIPANT 21

#### Bicycle

	С	AC	AM	AN	AO	AR	со
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.003881	0	0	0	Manual	FALSE
1298	13.12176	150.1681	0	0	0	ForceAutc	FALSE
1299	13.13217	150.3394	0	0	0	ForceAuto	FALSE
1381	13.96664	164.0855	0	0	0	Manual	TRUE
1382	13.97732	164.2618	0	0	0	Manual	FALSE
1508	15.34211	186.8207	0.00782	0.00782	0.00782	Manual	FALSE
1509	15.35196	186.9827	0.030303	0.030303	0.030303	Manual	FALSE
1510	15.36272	187.1595	0.055718	0.055718	0.055718	Manual	FALSE

RECOGNITION TIME: 13.97S – 13.12S = **0.85S** 

#### BREAKING TIME: 15.34S – 13.97S = 1.37S

Lorry

Lorry	TEKUIR	-	ELAKA		To	N A	
	CE	AC	AM	AN	AQ	AR	СО
1	scenarioT	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.025776	0.000493	0	0	0	Manual	FALSE
1365	12.7553	150.1042	0	0	0	ForceAutc	FALSE
1366	12.7642	150.2526	~ _ 0	0	5.0	ForceAuto	FALSE
1438	13.40688	160.9629	0	0	• • 0	Manual	TRUE
1439	13.41501	161.0985	TEKNO	KAL MA	LAYSIA	Manual	FALSE
1440	13.42345	161.239	0	0	0	Manual	FALSE
1441	13.43238	161.3877	0	0	0	Manual	FALSE

RECOGNITION TIME: 13.41S – 12.76S = 0.65S

### Motorcycle

	С	AC	AM	AN	AO	AR	CO
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.001728	0	0	0	Manual	FALSE
1464	13.09912	150.0194	0	0	0	ForceAuto	FALSE
1465	13.10756	150.1581	0	0	0	ForceAuto	FALSE
1537	13.75076	160.628	0	0.139063	0	Manual	TRUE
1538	13.7601	160.7749	0	0.13903	0	Manual	FALSE
1584	14.18946	167.333	0.017595	0.08998	0.017595	Manual	FALSE
1585	14.20025	167.4929	0.036168	0.095923	0.036168	Manual	FALSE
1586	14.20963	167.6316	0.036168	0.094197	0.036168	Manual	FALSE

RECOGNITION TIME: 13.75S – 13.1S = **0.65S** 

BREAKING TIME: 14.19S - 13.75S = **0.44S** 

### Umbrella Man

	S.		No.						
	C	AC	MA		AN		AO	AR	СО
1	scenarioTi	distanceTi	brake	ap	oplied	Br	rawBrake	drivingMc k	ou <mark>tton2</mark>
2	0.1	0.001657	0			0	0	Manual	FALSE
1287	13.11604	150.0038	0			0	0	ForceAutc	FALSE
1288	13.12472	150.1466	0			0	0	ForceAutc	FALSE
1352	13.72781	160.0703	0		<	0	· · 0	Manual	TRUE
1353	13.73779	160.2346	~ 0 0		1	0	~ S.O	Manual	FALSE
1354	13.74759	160.3959	0			0	•* 0	Manual	FALSE
		VEDCITI	TEIZNI	10 1		A 1	AVGIA		

RECOGNITION TIME: 13.73S - 13.12 = **0.61S** 

#### PARTICIPANT 22

#### Bicycle

	С	AC	AM	AN	AO	AR	со
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	5.13E-07	0	0	0	Manual	FALSE
1576	13.07425	150.0849	0	0	0	ForceAutc	FALSE
1577	13.08167	150.2067	0	0	0	ForceAuto	FALSE
1677	13.90511	163.7412	0	0	0	Manual	TRUE
1678	13.91317	163.8737	0	0	0	Manual	FALSE
1886	15.62916	192.1649	0.029326	0.029326	0.029326	Manual	FALSE
1887	15.63863	192.3193	0.088954	0.088954	0.088954	Manual	FALSE
1888	15.64599	192.4395	0.088954	0.088954	0.088954	Manual	FALSE
1889	15.65482	192.5834	0.1261	0.1261	0.1261	Manual	FALSE
1000	15 6626	103 7363	0 100700	0.106706	0.106706	A damage al	FALCE

RECOGNITION TIME: 13.91S – 13.07S = **0.84S** 

BREAKING TIME: 15.63S – 13.91S = 1.72S

#### Lorry

	C	AC.	AM	AN	40	AR	00
	C				AC		
1	scenario	distanceli	brake	appliedBr	rawBrake	drivingMc	button2
2	0.023785	0.000613	lo, So	2	w, in	Manual 🧃	FALSE
1335	13.00957	150.0099	0	** <b>0</b>	· · · · 0	ForceAutc	FALSE
1336	13.01743	150.1391	TEKN		AVSIA	ForceAutc	FALSE
1374	13.35179	155.6346	0.1	0.1	0	ForceAutc	FALSE
1375	13.36322	155.8222	0.2	0.2	0	ForceAutc	FALSE
1435	13.92344	164.6574	0	0.1125	0	Manual	TRUE
1436	13.93267	164.7972	0	0.11247	0	Manual	FALSE
1437	13.94128	164.9275	0	0.112393	0	Manual	FALSE
1438	13.95079	165.0712	0	0.112279	0	Manual	FALSE

RECOGNITION TIME: 13.92S – 13.01S = **0.91S** 

BREAKING TIME: 13.93S - 13.92S = 0.01S

### Motorcycle

	С	AC	AM	AN	AO	AR	CO
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.003915	0	0	0	Manual	FALSE
1469	13.11667	150.0657	0	0	0	ForceAuto	FALSE
1470	13.12515	150.2051	0	0	0	ForceAuto	FALSE
1507	13.44998	155.5501	0.1	0.1	0	ForceAuto	TRUE
1508	13.4581	155.6835	0.2	0.2	0	ForceAuto	TRUE
1526	13.61738	158.2711	0	0.128906	0	Manual	TRUE
1527	13.6262	158.4128	0	0.12888	0	Manual	FALSE
1528	13.63523	158.5577	0	0.128803	0	Manual	FALSE
1529	13.64531	158.7192	0	0.128674	0	Manual	FALSE

RECOGNITION TIME: 13.62S – 13.12S = **0.5S** 

BREAKING TIME: 13.63S - 13.62S = 0.01S

MALAYSIA

Umbrella Man

	and the second sec		PA					
	C	AC	MA	A	N	AO	AR	со
1	scenario Ti	distanceTi	brake	appl	iedBr	rawBrake	drivingMc	button2
2	0.1	3.72E-07	0		0	0	Manual	FALSE
970	13.10633	150.0057	0		0	0	ForceAutc	FALSE
971	13.11838	150.2038	0		/ 0	<b>0</b>	ForceAuto	FALSE
1011	13.63355	158.6797	• س	-lin	0	20,50	Manual	TRUE
1012	13.6471	158.9028	0		0	0	Manual	FALSE
1013	13.66021	159.1187	TEKNO	KAL	<b>V</b> /0	LAYSIA0	Manual	FALSE

RECOGNITION TIME: 13.63S – 13.11S = **0.52S**
### Bicycle

	С	AC	AM	AN	AO	AR	СО
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	3.72E-07	0	0	0	Manual	FALSE
1655	13.05059	150.1077	0	0	0	ForceAutc	FALSE
1656	13.05828	150.2343	0	0	0	ForceAuto	FALSE
1706	13.45672	156.8038	0	0	0	Manual	TRUE
1707	13.4649	156.9389	0	0	0	Manual	FALSE
1950	15.53331	191.7094	0.00391	0.00391	0.00391	Manual	FALSE
1951	15.54236	191.8613	0.00391	0.00391	0.00391	Manual	FALSE
1952	15.55014	191.992	0.054741	0.054741	0.054741	Manual	FALSE
1052	15 55929	192 1472	0 121212	0 121212	0 121212	Manual	EALSE

RECOGNITION TIME: 13.46S – 13.05S = **0.52S** 

BREAKING TIME: 15.53S - 13.46S = 2.07

# Lorry

Lorry	TEKNIR	-	LAKA			M	
	C S	AC	AM	AN	AO	AR	со
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.025396	0.000474	0	0	0	Manual	FALSE
1334	13.03362	150.0076	lo, So	zis	en, us	ForceAuto	FALSE
1335	13.04259	150.1571	0	·* 0		ForceAuto	FALSE
1424	13.86683	163,8926	TEKM	CAL MAN	AVELA	Manual	TRUE
1425	13.876	164.0453	0	0	0	Manual	FALSE
1426	13.88534	164.201	0	0	0	Manual	FALSE
1427	13.89461	164.3555	0	0	0	Manual	FALSE

RECOGNITION TIME: 13.87S – 13.03S = **0.84S** 

	C	AC	AM	AN	AO	AR	СО
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
1343	13.11788	150.0641	0	0	0	ForceAutc	FALSE
1344	13.12684	150.2116	0	0	0	ForceAuto	FALSE
1377	13.4431	155.4209	0.1	0.1	0	ForceAuto	FALSE
1378	13.45229	155.5721	0.2	0.2	0	ForceAuto	FALSE
1443	14.06533	165.2351	0	0.141406	0	Manual	TRUE
1444	14.07543	165.3874	0	0.141366	0	Manual	FALSE
1445	14.08533	165.5364	0	0.141254	0	Manual	FALSE
1446	14.09614	165.6988	0	0.141075	0	Manual	FALSE
		4.55.0440		0.440000			EALOF.

RECOGNITION TIME: 14.07S – 13.12S = **0.95S** 

A.

BREAKING TIME: 14.08S - 14.07S = **0.01S** 

Umbrella Man

	and the second s		E.					
	C	AC	MA	AN		AO	AR	со
1	scenarioT	distanceTi	brake	applie	dBr r	rawBrake	drivingMc l	outton2
2	0.1	3.72E-07	0		0	0	Manual	FALSE
991	13.11238	150.0406	0		0	0	ForceAutc	FALSE
992	13.12447	150.2393	0		0	0	ForceAuto	FALSE
1034	13.65526	158.9707	6	ais	0		Manual	TRUE
1035	13.66793	159.1793	0 0	- 10	0		Manual	FALSE
1036	13.68079	159.391	0		0	0	Manual	FALSE
1037	13.69517	159.6276	TEKN	AL N	0	AY SIA	Manual	FALSE
1038	13.7079	159.8372	0		0	0	Manual	TRUE

RECOGNITION TIME: 13.66S – 13.11S = **0.55S** 

### Bicycle

	С	AC	AM	AN	AO	AR	СО
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	3.72E-07	0	0	0	Manual	FALSE
1585	13.04767	150.0475	0	0	0	ForceAuto	FALSE
1586	13.0559	150.1829	0	0	0	ForceAuto	FALSE
1656	13.6011	159.1522	0	0	0	Manual	TRUE
1657	13.61016	159.3013	0	0	0	Manual	FALSE
1764	14.51429	174.1527	0.001955	0.001918	0.001955	Manual	FALSE
1765	14.52191	174.2768	0.001955	0.001925	0.001955	Manual	FALSE
1766	14.53039	174.4152	0.033236	0.032822	0.033236	Manual	FALSE
1767	14 52950	174 5497	0.022226	0.022015	0.022226	Manual	FALSE

RECOGNITION TIME: 13.60S - 13.05S = 0.55S

BREAKING TIME: 14.51S - 13.60 = 0.91S

### Lorry

Lorry	TEKIIR	-	LAKA			M	
	C 5	AC	MA	AN	AO	AR	СО
1	<mark>sce</mark> narioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	bu <mark>tton2</mark>
2	0.026616	0.000706	0	0	0	Manual	FALSE
1315	12.89928	150.0562	6 6	a: Co	ai il	ForceAutc	FALSE
1316	12.90791	150.2	0 0	·* 0	. 6.0	ForceAuto	FALSE
1451	14.18085	170.9878		0.16789	AVCIA	Manual	TRUE
1452	14.19036	171.1316	TEKNO	0.167856	LATSIA	Manual	FALSE
1813	17.59573	214.8218	0.00391	0.00391	0.00391	Manual	FALSE
1814	17.60445	214.9239	0.00391	0.00391	0.00391	Manual	FALSE
1815	17.61477	215.0446	0.022483	0.022483	0.022483	Manual	FALSE

RECOGNITION TIME: 14.18S – 12.9S = 1.28S

BREAKING TIME: 17.6S – 14.18 = 3.42S

	С	AC	AM	AN	AO	AR	CO
1	scenarioTi	distanceT	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.001532	0	0	0	Manual	FALSE
1409	13.12112	150.0602	0	0	0	ForceAuto	FALSE
1410	13.12934	150.1952	0	0	0	ForceAuto	FALSE
1528	14.18975	167.0282	0	0.139844	0	Manual	TRUE
1529	14.19853	167.158	0	0.139814	0	Manual	FALSE
1900	17.55492	210.9445	0.00782	0.00782	0.00782	Manual	FALSE
1901	17.56386	211.0544	0.00782	0.00782	0.00782	Manual	FALSE
1902	17.57379	211.1763	0.02346	0.02346	0.02346	Manual	FALSE

RECOGNITION TIME: 14.19S – 13.12S = 1.07S

BREAKING TIME: 17.55S -14.19S = **3.36S** 

Umbr	ella Man	MALAYS/4	Renawa				
	C	AC	AM	AN	AO	AR	со
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	3.72E-07	0	0	0	Manual	FALSE
978	<b>1</b> 3.12393	150.1573	0	0	0	ForceAutc	FALSE
979	13.13582	150.3527	0	. / 0	0	ForceAuto	FALSE
1036	13.85355	162.16	o	0	20 50	Manual	TRUE
1037	13.86841	162.4046	0	0	** 0	Manual	FALSE
1178	15.75282	192,9621	0.006843	0.006843	0.005843	MEnualK/	FALSE
1179	15.76547	193.1613	0.024438	0.024438	0.024438	Manual	FALSE
1180	15.77952	193.3824	0.037146	0.037146	0.037146	Manual	FALSE
1101	45 70055	100 500	0.050760	0.050760	0.050760		SALOS

RECOGNITION TIME: 13.85S – 13.12S = **0.73S** 

BREAKING TIME: 15.75S – 13.85S = **1.9S** 

### Bicycle

	С	AC	AM	AN	AO	AR	СО
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.000763	0	0	0	Manual	FALSE
1249	13.11864	150.1171	0	0	0	ForceAuto	FALSE
1250	13.12864	150.2815	0	0	0	ForceAuto	FALSE
1284	13.47228	155.9321	0	0	0	Manual	TRUE
1285	13.48317	156.1113	0	0	0	Manual	FALSE
1464	15.4094	187.9593	0.057674	0.057674	0.057674	Manual	FALSE
1465	15.42034	188.1399	0.171065	0.171065	0.171065	Manual	FALSE
1466	15.43127	188.3201	0.280547	0.280547	0.280547	Manual	FALSE

RECOGNITION TIME: 13.47S – 13.12S = **0.35S** 

# BREAKING TIME: 15.41S – 13.47S = **1.94S**

### LORRY

LUKI	XI S		R.				
	C	AC	AM	AN	AO	AR	СО
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.018179	0.000292	0	0	0	Manual	TRUE
1323	12.53546	150.0459	0	0	0	ForceAuto	FALSE
1324	12.54557	150.212	0	0		ForceAuto	FALSE
1418	13.37342	163.5433	Lo bo	0.144531	20,000	Manual 9	TRUE
1419	13.38212	163.6766	0	0.144506	0 ~ ~	Manual	FALSE
1578	14.85269	184.7231	T0:00782	A0.00782	AQ:00782	Manyak	FALSE
1579	14.86353	184.8806	0.051808	0.051808	0.051808	Manual	FALSE
1580	14.873	185.0181	0.051808	0.051808	0.051808	Manual	FALSE

RECOGNITION TIME: 13.37S – 12.54S = **0.83S** 

BREAKING TIME: 14.85S - 13.37S = 1.48S

	С	AC	AM	AN	AO	AR	CO
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.000315	0	0	0	Manual	FALSE
1481	13.07595	150.0947	0	0	0	ForceAuto	FALSE
1482	13.08345	150.2179	0	0	0	ForceAuto	FALSE
1571	13.86412	162.8256	0	0.142969	0	Manual	TRUE
1572	13.87212	162.949	0	0.142941	0	Manual	FALSE
1683	14.87816	177.4694	0.013685	0.013685	0.013685	Manual	FALSE
1684	14.887	177.5911	0.013685	0.013685	0.013685	Manual	FALSE
1685	14.89485	177.6992	0.033236	0.033236	0.033236	Manual	FALSE

RECOGNITION TIME: 13.86S – 13.08S = 0.78S

BREAKING TIME: 14.88S - 13.86S = 1.02S

# Umbrella Man MALAYSIA

	4	Ý	N.		_					
	C	AC	AD		AM		AN	AO	AR	со
1	scenarioT	distanceTi	steering	bra	ke	ар	pliedBr	rawBrake	e drivingMc	button2
2	0.1	0.000858	0		(	D	0		0 Manual	FALSE
1330	13.12107	150.1494	-0.00289		(		0	-	0 ForceAutc	FALSE
1331	<b>13.</b> 13059	150.3059	-0.00286		(	)	0	(	0 ForceAutc	FALSE
1427	14.04615	165.3731	-0.00246	1	(	), _	0	·	0 Manual	TRUE
1428	14.057	165.5518	0.008255		(	)	0	(S.	0 Manual	FALSE
1429	14.06676	165.7125	0.008255		(	)	0	10	0 Manual	FALSE
1420	14.07715	165 0027	0.00956	'MI	KA		IAL A	VSIA N	ال كامشطقة ال	FALSE

RECOGNITION TIME: 14.05S – 13.12S = **0.93S** 

### Bicycle

	С	AC	AM	AN	AO	AR	CO
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	3.72E-07	0	0	0	Manual	FALSE
1210	11.91937	150.0556	0	0	0	ForceAuto	FALSE
1211	11.93223	150.2672	0	0	0	ForceAuto	FALSE
1255	12.34792	157.1088	0	0	0	Manual	TRUE
1256	12.35736	157.2642	0	0	0	Manual	FALSE
1257	12.36885	157.4534	0	0	0	Manual	FALSE

RECOGNITION TIME: 12.35S – 11.92S = **0.43S** 

### BREAKING TIME: NULL

Lorry	, S	MALAYS/4	ALC.					
	C	AC	MA	AN		AO	AR	со
1	scenarioTi	distanceTi	brake	applie	dBr	rawB <b>rak</b> e	drivingMc k	outton2
2	0.1	0.001259	0		0	0	Manual	FALSE
951	11.96996	150.2057	0		0	0	ForceAutc	FALSE
952	11.9821	150.4056	0		0	0	ForceAutc	FALSE
988	12.3978	157.2509	0	(	0	O	Manual	TRUE
989	12.40899	157.4354	~ 0	-cu-	0	~ S:0	Manual	FALSE
990	12.42114	157.6356	0		0	•* 0	Manual	FALSE
991	12.43289	157.8292	TEKNÖ	KAL N	/o	.AYSIAo	Manual	FALSE

RECOGNITION TIME: 12.4S – 11.97S = **0.43S** 

	С	AC	AM	AN	AO	AR	СО
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.024599	0.000522	0	0	0	Manual	FALSE
1494	13.05405	150.0211	0	0	0	ForceAuto	FALSE
1495	13.06231	150.157	0	0	0	ForceAuto	FALSE
1943	16.89788	201.2466	0	0	0	Manual	FALSE
1944	16.90719	201.362	0	0	0	Manual	FALSE
1945	16.91671	201.4802	0	0	0	Manual	FALSE
1010	45.00554	0.04 50					EALOF.

RECOGNITION TIME: 16.9S - 13.05S = **3.85S** 

BREAKING TIME: NULL

### Umbrella Man

		and the local states of the						
	C	AC	AM	AN		AO	AR	со
1	scenarioTi	distanceT	brake	applied	dBr ra	wB <mark>rake</mark>	drivingMc l	outton2
2	0.1	0.001302	(P)	D	0	0	Manual	FALSE
1289	12.54047	150.0444	(	D	0	0	ForceAutc	FALSE
1290	12.55031	150.2061		D	0	0	ForceAutc	FALSE
1993	19.18115	147.3447		0	0	0	Manual	FALSE
1994	<b>19.</b> 18115	147.9464	(	D	0	0	Manual	FALSE
1995	19.18115	148.0812	1.14	0	0	0	Manual	FALSE
1005	10 10115	140 226			0		Manund 2	FALSE

RECOGNITION TIME: 19.18S – 12.54S = 6.64S

### Bicycle

	С	AC	MA	AN	AO	AR	CO
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.021059	3.72E-07	0	0	0	Manual	FALSE
1470	13.0833	150.0487	0	0	0	ForceAuto	FALSE
1471	13.09139	150.1816	0	0	0	ForceAuto	FALSE
1526	13.58699	158.3247	0	0	0	Manual	TRUE
1527	13.59573	158.4683	0	0	0	Manual	FALSE
1735	15.43506	188.2702	0.004888	0.004888	0.004888	Manual	FALSE
1736	15.44309	188.3967	0.004888	0.004888	0.004888	Manual	FALSE
1737	15,45058	188.5147	0.008798	0.008798	0.008798	Manual	FALSE

RECOGNITION TIME: 13.59S – 13.08S = **0.51S** 

BREAKING TIME: 15.43S - 13.59S = 1.84S

### Lorry

Lorry	EKUINE		ELAKA				
	С	AC	AM	AN	AO	AR	со
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.021453	0.000275	0	0	0	Manual	TRUE
1440	12.95729	150.0104	0	0	0	ForceAuto	FALSE
1441	12.96687	150.1678	Lo Go	⇒i≤0	2 0	ForceAuto	FALSE
1554	<b>13</b> .97915	166.2833	0 0	0:129687	·· ( o	Manual	TRUE
1555	13.98725	166.4041	TELZNO	0.129669	AVCIA	Manual	FALSE
1795	16.1345	195.2473	0.00391	0.00391	0.00391	Manual	FALSE
1796	16.14544	195.3862	0.022483	0.022483	0.022483	Manual	FALSE
1797	16.15531	195.5115	0.039101	0.039101	0.039101	Manual	FALSE

RECOGNITION TIME: 13.98S – 12.96S = 1.02S

BREAKING TIME: 16.13S – 13.98S = 2.15S

	С	AC	AM	AN	AO	AR	СО
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.000408	0	0	0	Manual	FALSE
1392	13.12419	150.1558	0	0	0	ForceAutc	FALSE
1393	13.13335	150.3063	0	0	0	ForceAuto	FALSE
1512	14.25217	167.9892	0	0.139844	0	Manual	TRUE
1513	14.26245	168.1397	0	0.139806	0	Manual	FALSE
1795	16.95449	203.1544	0.036168	0.036168	0.036168	Manual	FALSE
1796	16.96507	203.2834	0.084066	0.084066	0.084066	Manual	FALSE
1797	16.97489	203.403	0.104594	0.104594	0.104594	Manual	FALSE

RECOGNITION TIME: 14.25S – 13.12S = 1.13S

BREAKING TIME: 16.95S -14.25S = **2.7S** 

# Umbrella Man

	and a second sec		Y.				_	
	C	AC	MA	AN		AO	AR	СО
1	scenarioTi	distanceTi	brake	applied	Br	rawBrake	drivingMc	bu <mark>tton2</mark>
2	0.1	0.000427	0		0	0	Manual	TRUE
1340	13.11463	150.0103	0		0	- 0	ForceAutc	FALSE
1341	13.12389	150.1625	0		0	0	ForceAutc	FALSE
1408	13.77865	160.9348	0	2.6	0	- · · · 0	Manual	TRUE
1409	13.78772	161.0842	0 0		0	S.O	Manual	FALSE
1602	15.68238	191.8337	0.021505	0.0215	05	0.021505	Manual	- FALSE
1603	15.69254	191.9939	0.050831	0.0508	31	0.050831	Manual	FALSE
1604	15.70236	192.1487	0.050831	0.0508	31	0.050831	Manual	FALSE

RECOGNITION TIME: 13.78S – 13.11S = 0.67S

BREAKING TIME: 15.68S -13.78S = **1.9S** 

### Bicycle

	С	AC	AM	AN	AO	AR	CO
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	3.72E-07	0	0	0	Manual	FALSE
1494	13.05309	150.1052	0	0	0	ForceAuto	FALSE
1495	13.06243	150.2588	0	0	0	ForceAuto	FALSE
1831	15.91431	197.2573	0	0	0.42131	Manual	TRUE
1832	15.92264	197.3948	0	0	0.42131	Manual	FALSE
1833	15.93149	197.5409	0.435973	0.000333	0.435973	Manual	FALSE
1834	15.94157	197.7072	0.438905	0.000757	0.438905	Manual	FALSE
1835	15.95206	197.8803	0.447703	0.001473	0.447703	Manual	FALSE

RECOGNITION TIME: 15.91S – 13.05S = **0.67S** 

### BREAKING TIME: 15.93S -15.91S = **1.9S**

Lorry

Lorry	TEKUL	-	CLAKA				
	CE	AC	MA	AN	AO	AR	со
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.017953	0.000293	0	0	0	Manual	FALSE
1326	12.20688	150.0028	1/0	. / 0		ForceAuto	FALSE
1327	12.21526	150.1407	0 0	0	en coro	ForceAuto	FALSE
1522	13.9 <u>8446</u>	176.9316	0	0.167187	0	Manual	TRUE
1523	13.99187	177.0297	TEKNI	0.167156	AYSIA9	Manual	FALSE
1768	16.17438	203.3698	0.02346	0.02346	0.02346	Manual	FALSE
1769	16.18522	203.5043	0.051808	0.051808	0.051808	Manual	FALSE
1770	16.19571	203.6345	0.073314	0.073314	0.073314	Manual	FALSE

RECOGNITION TIME: 13.98S – 12.21S = 1.77S

BREAKING TIME: 16.17S -13.98S = 1.9S

	С	AC	AM	AN	AO	AR	со
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.000338	0	0	0	Manual	FALSE
1525	13.11081	150.0232	0	0	0	ForceAuto	FALSE
1526	13.11886	150.1554	0	0	0	ForceAuto	FALSE
2259	19.35721	147.2249	0	0	0	Manual	FALSE
2260	19.35721	147.7716	0	0	0	Manual	FALSE
2315	19.35721	155.6715	0.1	0.2	0	Manual	FALSE
2316	19.35721	155.8241	0.2	0.15	0	Manual	FALSE
2317	19.35721	155.9562	0.15	0.125	0	Manual	FALSE

RECOGNITION TIME: 19.36S – 13.11S = 6.25S

BREAKING TIME: 19.36S -19.36S = **0**S

Umbrella Man

	and the second se		N.				
	C	AC	MA	AN	AO	AR	со
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.000338	0	0	0	Manual	FALSE
1134	13.1221	150.1584	0	0	0	ForceAuto	FALSE
1135	13.1329	150.3359	0	0	0	ForceAuto	FALSE
1329	15.38726	187.4128	lo So	2.iSo	en, in	Manual	TRUE
1330	15.40085	187.6364	0	·* 0	• • •	Manual	FALSE
1405	<b>1</b> 6.28764	202,1894	-0-02246	0.02289	AQ.02346	Manual	FALSE
1406	16.29907	202.3755	0.077224	0.07573	0.077224	Manual	FALSE
1407	16.3106	202.563	0.13001	0.128097	0.13001	Manual	FALSE

RECOGNITION TIME: 15.39S – 13.12S = **2.27S** 

BREAKING TIME: 16.29S -15.39S = **0.9S** 

### Bicycle

	С	AC	AM	AN	AO	AR	CO
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.000341	0	0	0	Manual	FALSE
1812	13.12194	150.1102	0	0	0	ForceAuto	FALSE
1813	13.12844	150.2171	0	0	0	ForceAuto	FALSE
2144	15.4695	188.7794	0	0	0	Manual	TRUE
2145	15.47659	188.8963	0	0	0	Manual	FALSE
2248	16.1981	200.7854	0.055718	0.04625	0.055718	Manual	FALSE
2249	16.20612	200.9171	0.055718	0.04669	0.055718	Manual	FALSE
2250	16.21248	201.0215	0.132942	0.11262	0.132942	Manual	FALSE

RECOGNITION TIME: 15.47S - 13.12S = 2.35S

### BREAKING TIME: 16.2S -15.47S = 0.73S MALAYSIA

### Lorry

Lorr	y J		LAKA				
	C	AC	AM	AN	AO	AR	СО
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	but <mark>ton2</mark>
2	0.021484	0.00025	0	0	0	Manual	TRUE
1444	<b>13</b> .05182	150.0747	0	_0	0	ForceAutc	FALSE
1445	13.06132	150.2308	02 , ما	a.i_o	Ru io	ForceAuto	FALSE
2045	18.31854	220.8603	0	<sup>at</sup> 0	0 2 1	Manual	TRUE
2046	18.32779	220.9977	TEKN	KAL M8	LAVSIR	Manual	FALSE
2047	18.33821	221.1524	0	0	0	Manual	FALSE
2048	18.34636	221.2736	0	0	0	Manual	FALSE

RECOGNITION TIME: 18.32S – 13.05S = **5.27S** 

	С	AC	AM	AN	AO	AR	СО
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.000357	0	0	0	Manual	FALSE
1455	13.01	150.0784	0	0	0	ForceAuto	FALSE
1456	13.02013	150.2449	0	0	0	ForceAuto	FALSE
1917	17.02879	203.3121	0	0	0	Manual	TRUE
1918	17.0372	203.4182	0	0	0	Manual	FALSE
1983	17.61603	211.036	0.043011	0.02723	0.043011	Manual	FALSE
1984	17.62567	211.1673	0.043011	0.027825	0.043011	Manual	FALSE
1985	17.63564	211.3033	0.093842	0.06206	0.093842	Manual	FALSE

RECOGNITION TIME: 17.03S – 13.01S = **4.02S** 

BREAKING TIME: 17.61S -17.03S = **0.58S** 

Umbr	ella Man	MALAYSIA	ARLANA				1
	C	AC	MA	AN	AO	AR	со
1	scenarioT	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	0.000417	0	0	0	Manual	FALSE
1308	12.83153	150.0067	0	0	0	ForceAutc	FALSE
1309	12.84025	150.1502	0	0	et 0	ForceAuto	FALSE
1608	15.67175	196.9623	. vo	0	-w So	Manual	TRUE
1609	15.68133	197.1211	0	0	. 0	Manual	FALSE
1654	16.12345	1204.4399	0.029326	0.012895	0.029326	MaFilaAK	AFALSE
1655	16.13508	204.6425	0.065494	0.028833	0.065494	Manual	FALSE
1656	16.14414	204.7926	0.099707	0.045707	0.099707	Manual	FALSE

RECOGNITION TIME: 15.67S – 12.83S = **2.84S** 

BREAKING TIME: 16.12S -15.67S = **0.45S** 

### Bicycle

	С	AC	AM	AN	AO	AR	со
1	scenarioTi	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.1	3.72E-07	0	0	0	Manual	FALSE
1057	12.10777	150.1212	0	0	0	ForceAutc	FALSE
1058	12.11791	150.2879	0	0	0	ForceAuto	FALSE
1494	16.73353	147.3165	0	0	0.379277	Manual	FALSE
1495	16.73353	147.8293	0	0	0.379277	Manual	FALSE
1496	16.73353	148.014	0	0	0.379277	Manual	FALSE
1497	16.73353	148.2001	0	0	0.379277	Manual	FALSE
1498	16.73353	148.5409	0	0	0.379277	Manual	FALSE

RECOGNITION TIME: 16.73S – 12.11S = **4.62S** 

### BREAKING TIME: 16.73S -16.73S = **0**S

### Lorry

Lorry	AL TEKULA	Ξ	ELAKA		Τρ	Μ	
	с	AC	AM	AN	AO	AR	со
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	bu <mark>tton2</mark>
2	0.017594	0.000175	6		0	Manual	TRUE
957	12.7064	150.1676	0	at 0	. 5.0	ForceAutc	FALSE
958	12.71833	150.3663	0	0	0	ForceAutc	FALSE
1131	14.92009	182.7781	TEKNU	AL MA	LAYSIA	Manual	TRUE
1132	14.93288	182.9322	0	0.199928	0	Manual	FALSE
1319	17.44554	211.3655	0.031281	0.031281	0.031281	Manual	FALSE
1320	17.45948	211.5381	0.083089	0.083089	0.083089	Manual	FALSE
1321	17.47199	211.6926	0.15347	0.15347	0.15347	Manual	FALSE

RECOGNITION TIME: 14.92S - 12.71S = 2.21S

BREAKING TIME: 17.45S -14.92S = 2.53S

	С	AC	AM	AN	AO	AR	со
1	scenario Ti	distanceTi	brake	appliedBr	rawBrake	drivingMc	button2
2	0.099344	0.000342	0	0	0	Manual	FALSE
1101	13.1224	150.1607	0	0	0	ForceAutc	FALSE
1102	13.13421	150.3544	0	0	0	ForceAuto	FALSE
1250	14.76664	175.2726	0	0.151562	0	Manual	TRUE
1251	14.77731	175.417	0	0.151519	0	Manual	FALSE
1600	18.58381	219.578	0.000978	0.000978	0.000978	Manual	FALSE
1601	18.59439	219.691	0.008798	0.008798	0.008798	Manual	FALSE
1602	18.60477	219.8017	0.012708	0.012708	0.012708	Manual	FALSE
1603	18.61603	219.9219	0.014663	0.014663	0.014663	Manual	FALSE

RECOGNITION TIME: 14.77S – 13.12S = 1.65S

BREAKING TIME: 18.58S -14.77S = **3.81S** 

Umbrella Man

	K		KA				
	C F	AC	AM	AN	AO	AR	со
1	scenarioTi	distanceTi	brake	applied	Br rawBrake	drivingMc k	outton2
2	0.1	3.72E-07	0		0 0	Manual	FALSE
598	<b>12.</b> 09984	150.0978	0		0 0	ForceAutc	FALSE
599	12.11957	150.4224	0	-· ~	0 0	ForceAutc	FALSE
836	16.71669	147,792	. 00		0 . 0.0	Manual	FALSE
837	16.71669	148.7976	0		0 0	Manual	FALSE
838	16.71669	149.1064	I TEKN	KAL M	6LAYSIA	Manual (A	FALSE
839	16.71669	149.4264	0		0 0	Manual	FALSE

RECOGNITION TIME: 16.72S – 12.1S = **4.62S** 



 Universiti Teknikal Malaysia Melaka Hang Tuah Jaya, 76100 Durian Tunggal, Melaka, Malaysia. № +606 270 1000
☆ +606 270 1022
⊕ www.utem.edu.my

### FAKULTI TEKNOLOGI KEJURUTERAAN MEKANIKAL DAN PEMBUATAN

Tel : +606 270 1184 | Faks : +606 270 1064

Rujukan Kami (Our Ref): Rujukan Tuan (Your Ref): Tarikh (Date): 31 Januari 2021

Chief Information Officer Perpustakaan Laman Hikmah Universiti Teknikal Malaysia Melaka

Melalui

Dekan Fakulti Teknologi Kejuruteraan Mekanikal dan Pembuatan Universiti Teknikal Malaysia Melaka

Tuan

### PENGKELASAN TESIS SEBAGAI TERHAD BAGI TESIS PROJEK SARJANA MUDA

Dengan segala hormatnya merujuk kepada perkara di atas.

2. Dengan ini, dimaklumkan permohonan pengkelasan tesis yang dilampirkan sebagai TERHAD untuk tempoh **LIMA** tahun dari tarikh surat ini. Butiran lanjut laporan PSM tersebut adalah seperti berikut:

#### Nama pelajar: AHMAD ABDULLAH BIN MUHAMAD Tajuk Tesis: STUDY ON DRIVER BEHAVIOUR IN PRE-CRASH SCENARIO INVOLVING PEDESTRIAN AND MOTORCYCLE BY USING UC WIN ROAD SOFTWARE

3. Hal ini adalah kerana IANYA MERUPAKAN PROJEK YANG DITAJA OLEH SYARIKAT LUAR DAN HASIL KAJIANNYA ADALAH SULIT.

Sekian, terima kasih.

"BERKHIDMAT UNTUK NEGARA" "KOMPETENSI TERAS KEGEMILANGAN"

Saya yang menjalankan amanah,

#### DR. NUR HAZWANI BINTI MOKHTAR

Penyelia Utama/ Pensyarah Kanan Fakulti Teknologi Kejuruteraan Mekanikal dan Pembuatan Universiti Teknikal Malaysia Melaka



CERTIFIED TO ISO 9001:2015 CERT. NO. : QMS 01385