Driver Attentiveness in Virtual Reality (Experimental Research Project)

Aim:

The aim of the project is to investigate how different scenarios can positively or negatively effect a driver's reaction time whilst driving a car. On average 5 people die on the road per day in Great Britain, see [1], this project aims to provide research that can help to reduce that number.

This data can potentially be used in two ways:

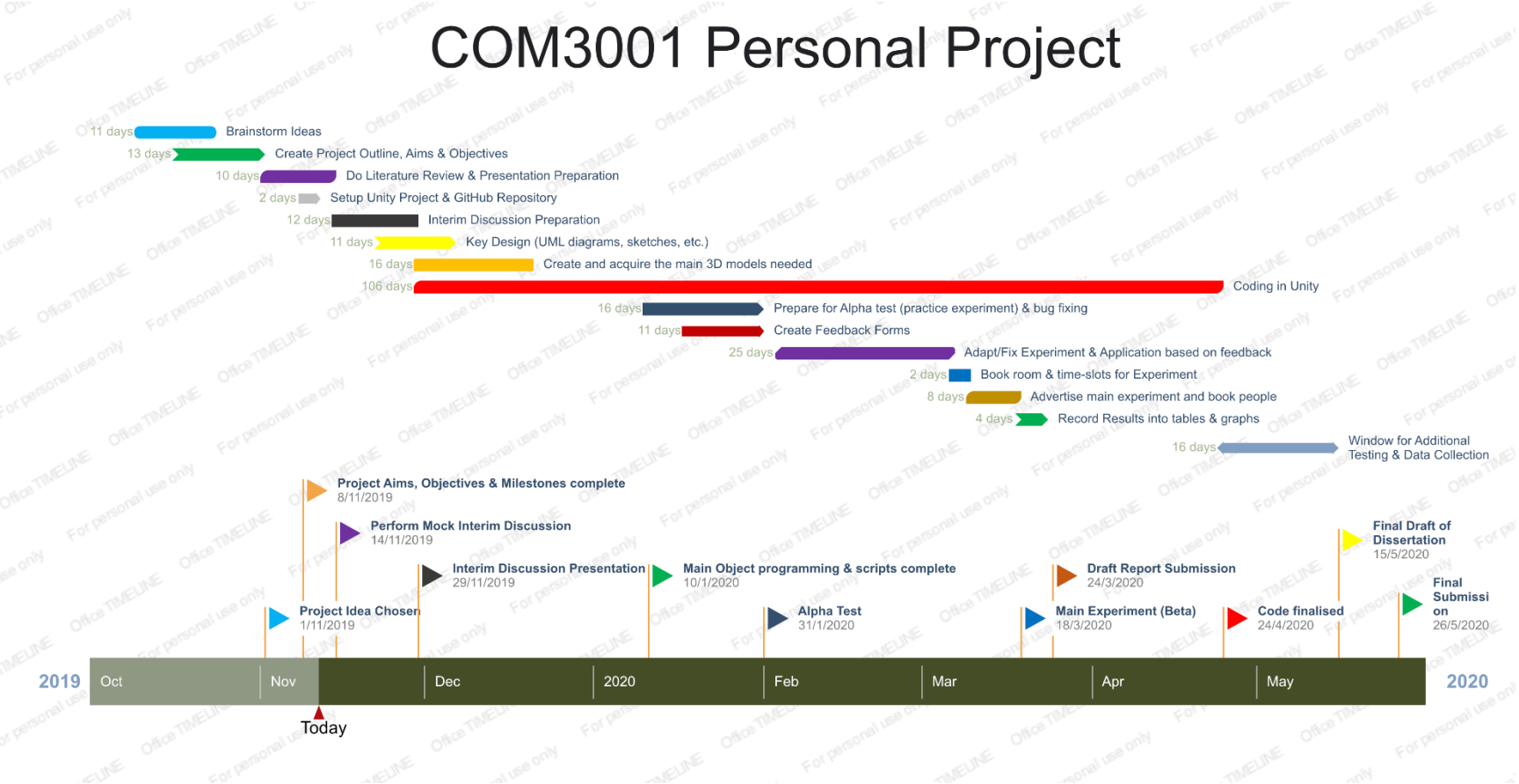
1. To fuel government regulations (For example: banning the use of devices – such as handsfree phones)
2. To encourage new software or hardware for cars to be invented. If developers see data that suggests a technique works (For example: a red light appearing whenever a car in front slows down) then companies will be more likely to fund a project to create that technology.

Objectives:

1. **Create** a 3D environment within Unity, using a combination of premade 3D assets and 3D objects created by myself within 3D design software (Maya).
2. **Design** and choose an art style for the 3D environment. Could be simple block shapes (more cartoony but easier to program & build) or be realistic (more difficult but may improve results).
3. **Review** literature pertaining to different studies in the same field [2], [3], as well as the data on the various causes of crashes [4] so that the test can be relevant.
4. **Decide** what the main features are that need to be implemented in the test. These can be to potentially distract the driver, to try and improve the drivers focus, or to impair the driver in some way (For example: handsfree phones, noisy passengers, relaxing music, loud music, visual indicators, visual impairment, etc.)
5. **Research** how to build different scenes within Unity (for creating different simulations) and connect each scene together into a full application that can be used for testing purposes with Virtual Reality hardware.
6. **Program** a functioning application that can be used for experiments to gather quantitative results (For example: reaction times, crash rate, questionnaire values, etc.)
7. **Test** the program, and fix any major bugs.
8. **Organise** and **perform** live experiments using the software with various participating people. I will need to advertise the test properly and carry it out in an organised way where it is done efficiently and fairly.
9. **Analyse** the testing data and figure out what conclusions can be taken, whether the results are as expected, as well as any critiques/errors that could be done better in the future.

Milestones:

Type	Title	Start date	End date	Duration (in days)
Task	Brainstorm Ideas	09/10/2019	23/10/2019	11
Task	Create Project Outline, Aims & Objectives	16/10/2019	01/11/2019	13
Milestone	Project Idea Chosen	01/11/2019	01/11/2019	-
Task	Do Literature Review & Presentation Preparation	01/11/2019	14/11/2019	10
Milestone	Project Aims, Objectives & Milestones complete	08/11/2019	08/11/2019	-
Task	Setup Unity Project & GitHub Repository	08/11/2019	11/11/2019	2
Milestone	Perform Mock Interim Discussion	14/11/2019	14/11/2019	-
Task	Interim Discussion Preparation	14/11/2019	29/11/2019	12
Task	Key Design (UML diagrams, sketches, etc.)	22/11/2019	06/12/2019	11
Milestone	Interim Discussion Presentation	29/11/2019	29/11/2019	-
Task	Create and acquire the main 3D models needed	29/11/2019	20/12/2019	16
Task	Coding in Unity	29/11/2019	24/04/2020	106
Milestone	Main Object programming & scripts complete	10/01/2020	10/01/2020	-
Task	Prepare for Alpha test (practice experiment) & bug fixing	10/01/2020	31/01/2020	16
Task	Create Feedback Forms	17/01/2020	31/01/2020	11
Milestone	Alpha Test	31/01/2020	31/01/2020	-
Task	Adapt/Fix Experiment & Application based on feedback	03/02/2020	06/03/2020	25
Task	Book room & time-slots for Experiment	06/03/2020	09/03/2020	2
Task	Advertise main experiment and book people	09/03/2020	18/03/2020	8
Milestone	Main Experiment (Beta)	18/03/2020	18/03/2020	-
Task	Record Results into tables & graphs	18/03/2020	23/03/2020	4
Milestone	Draft Report Submission	24/03/2020	24/03/2020	-
Milestone	Code finalised	24/04/2020	24/04/2020	-
Task	Window for Additional Testing & Data Collection	24/04/2020	15/05/2020	16
Milestone	Final Draft of Dissertation	15/05/2020	15/05/2020	-
Milestone	Final Submission	26/05/2020	26/05/2020	-



References:

[1] https://www.brake.org.uk/facts-resources/1653-uk-road-casualties - 2017 report on road casualties.

[2] https://trimis.ec.europa.eu/sites/default/files/project/documents/DRIVEIN2.pdf - 2016 report on driver cognitive distraction (tested with VR)

[3] https://trl.co.uk/driving-simulator - DigiSim overview of their driving simulations.

[4] https://www.aceable.com/safe-driving/car-accident-statistics/ - US driving fatality data (2007 – 2012)