Project Proposal for COMP 2003

Project Plan

Project Title: Interactive Driving Training Simulation

University: University of Plymouth

Module Code: COMP2003

Academic Year: 2025–2026

Client: Tyler Cheng (Academic Client)

Team:
Amir Esfehani, Eiad Ayman El Gharbawy, Frank Pswarai, Javier Alvarez Sanzberro

Introduction

This document sets out the plan for building a VR Driving Simulator for beginner driver training. The project is part of the COMP2003 Computing Group Project module and uses an agile, team based approach. The plan explains what we aim to build, what is included in the project, how the team will work, and how we will manage time, resources, and risks. Its goal is to keep the project on track, meet client expectations, and satisfy the module's assessment requirements.

Please note: You may come across sections where we address the simulation as "a game". This is because the simulation was developed by Unity, commonly known as a game engine. In this document, the terms product, simulation, project or game, all refer to the Driving Simulator that we are developing.

Overview

The Driving simulator project targets people with little to no driving experience in the UK. It aims to teach the users how to operate a car safely in a controlled virtual environment. The application focuses on vehicle familiarisation, basic driving mechanics, basic driving rules and introductory road scenarios such as straight roads, roundabouts, junctions, and motorways.

The simulator is structured around progressive learning levels, similar to introductory driving lessons, and is intended to be accessible, educational, and beginner friendly, while the initial deliverable is a functional prototype.

Project scope

This project keeps a tight scope to ensure our team can deliver it within the academic year. The simulator will cover core driving actions such as steering, acceleration, braking, and using indicators, supported by guided learning content. Driving scenarios will focus on simple road layouts, including straight roads and basic junctions, to support early-stage driver training.

The project does not include advanced features such as multiplayer modes, competitive gameplay, nor does it provide any real-world driving certification. Additionally, VR support and complex traffic AI sit outside the core scope and may be explored later if time allows. This clear scope keeps the project achievable while providing real educational value.

Project Objectives

Our goals:

- Build a learning tool that introduces beginner drivers to essential driving concepts.
- Deliver a well documented prototype that shows good software engineering practice, effective teamwork, and clear awareness of Legal, Social, Ethical, and Professional responsibilities in line with the COMP2003 Learning outcomes.
- Provide valuable user evaluation results for our client to use in his postgraduate research.

Through the use of the project users should be able to:

- use basic vehicle controls,
- practise simple driving scenarios with confidence.

Stakeholders

Client: Tyler Cheng (Postgraduate Student at the University of Plymouth)

Tyler is the project owner throughout the development process from whom we draw the project requirements from. He is one of the beneficiaries from this project as it provides the necessary user-evaluation results that he wants for his postgraduate work.

The project supervisor: JJ Chin (Lecturer at the University of Plymouth)

Beyond assessing our progress and ensuring that we are adhering to proper Agile Development and Scrum Framework principles, he provides support and has some administrative privileges to help us get the tools that we need for making the project a success (e.g. Installing the necessary tools for delivering the project on the University PCs that require administrative access to install anything)

Other Stakeholders: The University of Plymouth

The University usually showcases student projects during Open Days to demonstrate the work their students do at the University. Our project, should it be successful, can be a potential candidate to be showcased at the Open Days, which could be a great way of attracting students to the University.

Project Team

It is worth noting that everyone on the team will have some contribution to the development process of the product. That means that each member has the technical skills to implement something in the product using Unity. However, due to the phases of the project, some users will only be able to implement something in the later sprints of the project.

- Amir Esfehani
    - Research Lead
    - Project plan Designer
- Eiad Ayman El Gharbawy
    - In-simulation environment designer and developer (roads, traffic lights, etc.)
    - Complexity level designer (Shared with Javier)
- Frank Pswarai
    - Handles communication between team and client
    - Implementing realistic traffic in the simulation

- Javier Alvarez Sanzberro
    - Handles vehicle implementation
    - Complexity level designer (shared with Eiad)

Timeline

The project runs over two academic semesters and uses an agile, sprint-based approach that follows the COMP2003 module structure. In Semester 1, our team focuses on project setup, research, planning, and early development. By January, our team delivers a working prototype that acts as a minimum viable product. This prototype demonstrates core simulator features, including basic vehicle controls and at least one learning scenario, and forms the January interim submission.

In Semester 2, we will focus on further development, testing, and refinement. Then we will add features, improve scenarios, and make usability changes based on feedback from the client, teaching staff, and user testing. The project ends with user acceptance testing, client sign-off, and the delivery of a fully working product in May, alongside the final report and showcase presentation.

We track progress through sprint reviews and client meetings. A Gantt chart shows the full project schedule, including the January prototype milestone and the final delivery date.

Research

There are already some existing tools / driving simulations on the market. These include:

- City Car Driving
- Virtual Driving School
- Euro Truck Simulator 2

These are very popular driving simulations that already exist on the market and are very notable for the real-life driving experience that they provide. They all provide common learning outcomes:

- Vehicle Control Fundamentals (From steering wheel operation to pedal controls)
- Understanding road rules and traffic behaviour
- Instilling situational awareness & hazard perception
- Confidence building in zero-risk environment
- Repetition and consistency

The UK is currently facing a driving test backlog (provide reference from BBC page here). This has led to learner drivers having to potentially wait up to 6 months before they can take on their driving test. Driving a car, like anything else, needs some consistency in order to maintain the skills. To tackle the issue, our product could also be used to keep the learner driver's skills fresh while they wait for the day of their driving test.

But for the sake of making the product usable for everyone, especially new drivers, we must maintain the objective of keeping it as user friendly as possible and easy-to-use. Research into educational simulation and interactive learning projects suggests that gradual skill progression, clear feedback, and low-pressure environments are particularly effective for novice learners. This directly informed the decision to structure the simulator around simple, progressive levels that mirror early driving lessons. By limiting initial scenarios to straightforward road layouts and focusing on core vehicle controls, the project prioritises learning effectiveness over realism, which aligns with the defined project scope and objectives.

Existing driving simulations include:

- City Car Driving,
- Virtual Driving School,
- and Euro Truck Simulator 2

These are popular and notable for the realistic driving experience they offer. They provide common learning outcomes crucial for new drivers, including:

- vehicle control fundamentals
- understanding road rules and traffic behaviour,
- instilling situational awareness and hazard perception,
- confidence building in a zero-risk environment,
- and promoting repetition and consistency.

Our product aims to build upon these foundational elements while also addressing a timely issue: the current UK driving test backlog (Austin and Moreau, 2026). This backlog can result in learner drivers waiting up to six months for their test. Driving skill, like any skill, requires consistency to maintain proficiency. Our simulation offers a vital tool to help learner drivers keep their skills fresh and practice consistently while they await their test date, serving as an essential maintenance tool.

Crucially, research into educational simulation and interactive learning projects has informed our product's design to ensure it is user-friendly and accessible to everyone, especially novice drivers. This research suggests that gradual skill progression, clear feedback, and low-pressure environments are highly effective for new learners. Consequently, the simulator is structured around simple, progressive levels that mirror early driving lessons. By limiting initial scenarios to straightforward road layouts and focusing on core vehicle controls, the project prioritises learning effectiveness and ease-of-use over hyper-realism. This design choice ensures the product is suitable for new drivers, while its ability to facilitate consistent practice also makes it a valuable resource for current drivers looking to maintain their skills and hazard perception.

Proposed Solution

The proposed solution is an interactive driving simulator that supports beginner driver training through structured, step by step learning. The application teaches core driving skills such as vehicle familiarisation, basic control use, and safe road behaviour in a simulated environment. This will create a low pressure space to practise and make mistakes without any risk.

The simulator includes only the features defined in the project scope. It includes core vehicle controls such as steering, acceleration, braking, and indicators, along with a small number of beginner friendly scenarios like straight roads and basic junctions. The project deliberately excludes advanced features, complex traffic systems.

Development follows the project timeline. The team will deliver a working prototype by January as part of the interim submission. This prototype will show the core simulator features, including a controllable vehicle and at least one guided driving scenario. In Semester 2, we will refine and expand the system based on feedback to produce a polished final version.

Work Breakdown Structure

Car

We will need to come up with or find a car model and controller similar to UK cars.

If we are unable to find a cost-free car model for the car, we’ll have to model a quick one using a free, open-source 3D modelling software such as Blender.

Whether we look for one online or have to create our own from scratch, we will need to keep in mind that the most suitable car is one that has been manufactured for UK road use as UK residents will be the ones testing the simulator and trying to learn from it, so giving them a different car could confuse them or even create bad habits when learning to drive which they could recreate when driving a real car, causing a real accident.

We also need to keep in mind that the model itself, although it might not be very obvious from a Computer Science point of view, it must have the necessary visual components that allow a person to drive a car such as the side and central mirrors, a cockpit with all its controls such as the pedals, the steering wheel, the handbrake, etc.

For the controller of the car, we need to implement various, mandatory, controls: basic ones like moving forwards, backwards, braking steering the wheels (i.e. turning) as well as extra, yet required, driving-specific, controls such as the indicators (left, right and both at the same time). Changing gears could potentially be implemented in the future, but we'll start with automatic gears, as it is simpler to do.

Level selection

Some sort of scenario selection will be implemented to allow the user to pick which "lesson" they want to try. There will be different scenarios/lessons that the user will be able to pick from. Starting from a simple straight road to things like junctions, highways and crossroads.

We will also have to come up with a way to allow the user to be able to stop a level halfway through completion and select a different one if they feel like they are ready to continue with their learning or they want to go back and revisit a different scenario if they feel like they need to solidify any knowledge. Each level will need a pause menu with a few different options such as "Resume", "Level selection" or "Quit", to give the user different options to choose from, even halfway through a level.

Road/level/scenario design

Looking for assets would be the best way to start tackling this side of the project. By locating the perfect asset it would help us start planning the rest of the needed requirements to make a full road system. We will start planning the design of the road to try and connect the roads that we will make with the design. I will aim for a smooth but scenic style for the roads. With the roads, we will be able to create the different scenarios, similar to how beginner driving lessons go.

Relationship between tasks

Once there is a car model and controller together, we will put it in the roads that have been designed and finally, each scenario will be put up for selection (in order) in the level selector.

Resource Plan

The successful delivery of this project relies on the effective use of human, technical, and software resources. The primary human resource is the project development team, consisting of four members who collaboratively contribute to research, planning, implementation, testing, and documentation. Responsibilities are sheared across the team, with tasks allocated based on individual strengths while maintaining collective ownership of the final deliverables. This collaborative approach supports continuous progress and aligns with the team-based development model encouraged in the module.

From a technical perspective, development is carried out using University-provided computing equipment. Where required, available driving simulation hardware such as steering wheels and pedals is used to support testing and evaluation of driving mechanics. These resources allow us to validate that the simulator behaves in a manner consistent with real-world driving inputs, particularly during the prototyping and testing stages.

Throughout the project, we adopt an agile approach to development, structured around short, iterative sprints. To support this process, Trello is used as the primary project management tool, allowing us to organise tasks into clearly defined sprint boards that reflect the project timeline. Each sprint contains specific tasks related to research, development, documentation, and testing, which are assigned to individual team members and updated as work progresses.

By using Unity alongside free software tools and web-based platforms, the project minimises financial costs while maintaining a professional and structured development process. This resource strategy ensures that the project remains sustainable, efficient, and achievable within the constraints of the academic year.

Risk Management

Risk management is an important part of this project and is approached with consideration for Legal, Social, Ethical and Professional (LSEP) factors (mentioned in a separate section), in line with the COMP2003 Module requirements.

Without going into too much detail in the LSEP section, from a legal and ethical standpoint, risks related to data handling and user testing are considered. If any user feedback or testing data is collected, it will be done voluntarily and without storing personally identifiable information.

Social risks include accessibility and user comfort, particularly for inexperienced users who may feel overwhelmed or uncomfortable in a simulated driving environment. This risk is addressed by designing the simulator as a low-pressure learning space, with clear instructions, simple scenarios, and constructive feedback that encourages learning rather than punishment.

From a professional perspective, risks such as poor communication, uneven workload distribution, or missed deadlines are managed through regular meetings, clear task allocation, and documented progress. Using structured sprint planning and maintaining records of decisions and feedback helps ensure professional conduct and accountability throughout the project lifecycle.

For a more descriptive and deeper dive into the LSEP factors we have considered for this project, we have drawn from our Game Design Document and provided them in the next section.

Legal, Social, Ethical and Professional Factors (LSEP)

L – Legal Factors

The following legal considerations are taken into account during the design and development of the driving simulation system:

1) No Certification or Licensing Claim

The simulation must not be presented or interpreted as an official driving qualification or certification. Clear disclaimers will be included within the application and documentation stating that:

- The system is a training and educational simulation only.
- It does **not replace formal driving lessons, examinations, or licensing processes.**
- It is developed **solely for research and academic purposes** as part of a university module

2) Data Protection and Privacy Compliance

During the collection of user data (e.g. session logs, performance metrics, or feedback):

- Data collection will comply with relevant UK data protection regulations (e.g. UK GDPR)
- Only the minimum necessary data will be collected
- Data will be anonymised where possible
- No personal identifiers will be stored without explicit consent

3) Informed Consent for Data Collection

Users participating in testing or evaluation must be:

- Clearly informed about what data is collected
- Told how the data will be used (evaluation, research, improvement)
- Given the option to decline participation without penalty

4) Intellectual Property and Licensing

To avoid copyright and legal disputes with using resources which are licensed and not available for free use, we must ensure that:

- All third-party assets (Unity assets, models, sounds, libraries) must be used in accordance with their licenses
- Any open-source code used must be properly attributed
- Project ownership and usage rights must be clearly defined for academic submission and potential future use

5) Liability Limitation

The project report and documentation will clarify that:

- The developers are not liable for real-world driving decisions made based on the simulation
- The simulation is not guaranteed to reflect real-world driving conditions with full accuracy

S – Social Factors

The project aims to be inclusive, supportive, and socially responsible

1) Accessibility and Inclusivity

The system should be usable by as many people as possible by:

- Providing subtitles or text-based instructions
- Allowing adjustable sound levels and visual clarity options
- Using clear, readable UI elements and simple language

2) Non-Judgemental Learning Environment

As mentioned earlier in the research section, low-pressure environments are complementary for learning. So the simulation must be designed to:

- Feel like a safe practice space, especially for new or anxious learners, allowing users to build confidence gradually.
- Encourage learning through trial and error
- Avoid shaming or punitive feedback
- Present mistakes as learning opportunities

3) Avoidance of Harmful Stereotypes

If characters, voices, or avatars are added:

- They should avoid reinforcing stereotypes

- Representation should be neutral and respectful

E – Ethical Factors

Ethical responsibility is central to the project's design:

1) **Promotion of Safe Driving Behaviour**

The simulation must not glorify or encourage:

- Reckless driving
- Dangerous manoeuvres
- Disregard for road laws

Unsafe behaviour should:

- Be clearly flagged as dangerous
- Carry in-simulation consequences
- Be accompanied by educational feedback

2) **Transparency in Data Usage**

One of the goals of the project is to obtain user evaluation data which can be useful for a potential study performed by our client. Therefore, it is critical the following is enforced:

- Users must understand how their data is used
- No hidden tracking or analysis will occur
- Participation in research or testing is entirely voluntary

3) **Educational Integrity**

The system should prioritise learning outcomes over entertainment, ensuring that realism and safety messaging are not compromised for gameplay appeal.

P – Professional Factors

Professional standards guide both development and delivery.

1) **Clear and Maintainable Documentation**

The project documentation must:

- Explain system architecture and design decisions
- Describe how the simulation works “under the hood”
- Enable future developers to understand, modify, or extend the system

2) **Potential for Professional Extension**

While developed for academic purposes, the system will be designed such that:

- It could be adapted for professional or institutional use
- Further validation, certification, or expert oversight could enable broader application

3) **Good Software Engineering Practice**

- Version control will be used throughout development
- Code will follow consistent style and structure
- Changes and decisions will be documented
- Frequent project team meetings that will be documented to plot out the design decisions

4) **Client Communication and Accountability**

- Regular updates will be provided to the client
- Requirements and changes will be clearly recorded
- Feedback will be actively incorporated

5) **Professional Presentation and Handover**

The final product will be delivered with:

- Clear user instructions
- Technical documentation
- A professional standard suitable for academic assessment and client review

Communication Plan

Effective communication is essential to the successful delivery of this project and is maintained through a combination of online and in person meetings. The project team communicates regularly using Microsoft Teams, which serves as the primary platform for discussions, planning, and coordination. Team meetings are typically held once or twice per week, depending on the development phase, and are occasionally conducted in person when appropriate. These meetings are used to review progress, discuss challenges, and agree on next steps.

In addition to internal team communication, formal meetings are held every two weeks with the client, Tyler, and the project supervisor, Ji-Jian Chin. These meetings act as sprint reviews, allowing us to present progress, receive feedback, and confirm that development remains aligned with expectations. Feedback from these sessions directly informs subsequent development decisions and prioritisation.

Quality Management

The quality management within this project focuses on ensuring reliability, clarity, accessibility, and learning effectiveness; this can be achieved throughout iterative testing, user feedback, and continuous refinement and usability testing ensures that core mechanics operate as intended.

From a technical perspective, quality is maintained through regular testing of core features such as vehicle controls, driving mechanics, and user interface functionality. Features are implemented incrementally and tested as they are developed to ensure stability and consistency. Particular attention is given to control responsiveness and predictability, as these are critical to both user comfort and learning effectiveness. Performance testing is also carried out to identify and address issues such as frame rate drops or input lag that could negatively affect the user experience.

Usability and learning effectiveness are also key aspects of quality management. The simulator is designed to be intuitive and accessible for beginner users, with clear instructions, simple scenarios, and constructive feedback. Informal user testing and team-based reviews are used to evaluate whether instructions are understandable and whether users can complete tasks without unnecessary confusion.

Monitoring and Evaluation

Monitoring and evaluation are used throughout the project to ensure that progress remains aligned with the project objectives, scope, and timeline. Progress is monitored on a continuous basis through sprint planning, task tracking, and regular review meetings. Trello is used to track the status of tasks across sprints, allowing the team to monitor completion rates, identify delays, and adjust priorities where necessary.

Evaluation is carried out at both technical and process levels. From a technical perspective, the simulator is evaluated through iterative testing of core features such as vehicle controls, driving mechanics, and user interface functionality. Feedback from internal testing and user interactions is used to identify issues related to usability, performance, and learning effectiveness.

Budget

The budget for this project is minimal, as development primarily relies on existing University-provided resources and free software tools. No direct financial expenditure is required for software licensing, as the project uses Unity and other freely available development tools and online platforms. Version control, collaboration, and project management tools such as GitHub and Trello are also used at no cost.

Hardware resources, including development computers and any available driving simulation equipment, are provided by the University, further reducing project costs. By making use of these existing resources and avoiding paid software solutions, the project demonstrates a cost-effective and sustainable approach to development.

Change Management

Change management is used to ensure that any modifications to the project are handled in a controlled and professional manner. Given the length of the COMP2003 module and the possibility of evolving requirements, it is important that changes to scope, features, or timelines are carefully assessed before being implemented.

Any proposed change to the project, whether initiated by the client, supervisor, or development team, is first discussed internally to evaluate its potential impact on the project scope, schedule, and available resources. This includes considering whether the change is feasible within the remaining development time and whether it aligns with the original project objectives.

If a change is deemed viable, it is then communicated to the client and supervisor for review and approval before implementation. Approved changes are documented and reflected in project planning tools such as Trello, ensuring transparency and traceability. Tasks related to the change are added to the appropriate sprint and prioritised accordingly.

This structured approach ensures that changes, particularly those requested during Semester 2, do not negatively affect the stability of the project or compromise existing deliverables. By managing changes in this way, the team maintains control over development while remaining flexible and responsive to stakeholder feedback, in line with professional software development practices.

References

Fisher, D. L., Rizzo, M., Caird, J. K., & Lee, J. D. (2011) Handbook of Driving Simulation for Engineering, Medicine, and Psychology. Boca Raton: CRC Press.

Sweller, J. (1988) 'Cognitive load during problem solving: Effects on learning', Cognitive Science, 12(2), pp. 257–285.

Austin, K. and Moreau, E. (2026) Learner drivers may have to wait six months before taking test. https://www.bbc.co.uk/news/articles/clym5jvgdepo.

Appendices

The GDD (Game Design Document) on the github can be accessed through this link below:

https://github.com/Plymouth-University/comp2003-2025-2026-team-17/tree/main/GDD

Client Approval

For the project approval, we kindly ask you to provide the details below. By providing these details, you confirm that you have reviewed the project plan and approve the project's objectives, scope, and proposed direction. You acknowledge and support the development of this project as outlined and agree with the approach, resources, and methods described herein.

Name: Yun-Quan "Tyler" Cheng
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Signed 8/1/26