



جامعة بيروت العربية  
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# **Road-bound Legends**

## **Unity 6 Based Motocross Racing Game**

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## Project Overview:

**“Road-bound Legends”** is a 3D realistic physics racing & adventure game designed and programmed using **Unity 6 engine**. Players will experience adventurous high-speed motocross racing, explore our interactive world including vast environments. The game offers dynamic gameplay and easy to learn mechanics leading to an unforgettable riding experience. The project serves as both an entertaining racing experience and a learning exercise for software engineering, with a focus on gameplay design, environment construction, and optimization.

## Objectives:

- Develop a 3D motocross game in Unity 6 with easy to play experience
- Designing wide & vast environments featuring different time-of-day and weather settings.
- Integrate realistic physics simulation and smooth turning mechanics.
- Implementing machine learning agents that learn, adapt, and maneuver smoothly throughout the designed environments

## Background:

Dirt-Bike racing games have come a long way, from basic 2D designs to detailed 3D worlds. Today, they attract both casual and serious gamers. With the popularity of mobile and easy-to-play games, there's a demand for racing games that are simple yet fun. Features like customizable skin, dynamic environments, day-night cycles, and easy controls make games more engaging.

But motocross isn't just about crazy graphics it's about the experience. Realistic physics brings weight to every jump, bump, and landing. ML agents (AI powered opponents) can create smarter opponents that adjust to player gameplay, guaranteeing that each new race brings a whole new experience. This review looks at how these features can be combined to create a fun and accessible 3D motorcycle racing game for everyone

## Literature Review:

The purpose of this literature review is to analyze similar products (web, apps, and other games) and research papers from both Lebanon and other countries, focusing on motocross racing games and relevant technologies. Each product or research is evaluated based on its description, advantages, and problems. A table at the end summarizes these aspects along with the references.

## Similar Products and Research Papers:

### I. Road Rash (App):

A popular racing game with a focus on combat mechanics. Players ride motorcycles while fighting opponents to win races. It is known for its fast-paced gameplay and dynamic combat system. However, the game lacks realistic physics and often feels arcade-like rather than immersive.

### II. Motocross Madness (PC Game):

An older motocross racing game that offers impressive terrain simulation and stunt mechanics. The game is praised for its physics-based gameplay and open environments but lacks modern graphical fidelity and AI advancements seen in contemporary games.

### III. Rider (Mobile App):

A simple 2D motocross game where players perform stunts while riding on a physics-based track. It is highly addictive but lacks realism and depth compared to 3D motocross games.

### IV. Microtransactions in Gaming (ResearchGate, Serbia, UK):

Microtransactions have become a prevalent monetization strategy in video games, allowing players to purchase virtual goods or services. Research has

identified both positive and negative implications of this model. A systematic review found that microtransactions, particularly loot boxes, are associated with gaming and gambling disorders, raising concerns about ethical implementation. From an industry perspective, microtransactions have transformed business models, leading to increased revenue streams but also sparking debates about their impact on game design.

V. [AI and Machine Learning in Racing Games \(ResearchGate, NVidia\):](#)

Artificial Intelligence (AI) plays a significant role in modern racing games, particularly in providing realistic opponent behavior. Traditional AI methods, such as waypoint-based pathfinding and behavior trees, have been used to create dynamic opponents. Recent advancements have introduced reinforcement learning techniques, where AI agents learn from experience to navigate complex racetracks, optimizing lap times and adapting to player behavior.

VI. [Internet Gaming Disorder in Lebanon \(Journal of Behavioral Addictions\):](#)

This study investigates the prevalence of IGD among Lebanese adolescents, highlighting associations with age, reduced sleep, and lower academic performance. The research focuses on high school students and emphasizes the impact of online gaming on youth behavior.

## Summary Table:

Ref No.	Authors/Source	Description	Advantages	Problems
1	Road Rash (App)	Combat-focused motocross racing game	Fast-paced gameplay, dynamic combat	Lack of realism, arcade-like physics
2	Motocross Madness (PC Game)	3D motocross racing with terrain simulation	Realistic physics, stunt mechanics	Outdated graphics, limited AI capability
3	Rider (Mobile App)	2D stunt-based motocross racing game	Simple, addictive gameplay	Lack of depth, unrealistic physics
4	Nenad Tomić, University of Kragujevac	Effects of microtransactions on the video game industry	Financial benefits for developers	Potential for gambling behavior
5	Peter Edwards, NVidia On Demand	Training AI agents to race using reinforcement learning	Dynamic and adaptive AI	Computational intensity
6	Erin Gibson et al., Nottingham Trent Uni.	Video game player experiences with microtransactions	Insights into player dissatisfaction	Monetization reduces satisfaction
7	Nazir S. Hawi et al., Journal of Behavioral Addictions	Internet gaming disorder among Lebanese youth	Insight into IGD prevalence and related factors	Focus on IGD rather than general trends



## Conclusion:

The development of *Road-bound Legends* aligns with current research on game development best practices. Leveraging Unity 6's advanced features, integrating physics-based simulations, AI-driven opponents, and procedurally generated environments ensures a dynamic and engaging experience. Additionally, ethical considerations surrounding microtransactions highlight the importance of designing monetization strategies that enhance rather than hinder player satisfaction.

This literature review provides a solid foundation for the game's development, ensuring that industry standards and research-backed methodologies are applied effectively.

## Project Planning:

### Constraints:

#### I. Implementation Environment of the Current System:

The motorcycle game will be developed using **Unity 6**, leveraging the **Unity Asset Store** for pre-made assets to assist with physics and environment building. This approach will significantly reduce development time while ensuring quality and realism in gameplay and keeping game in line with alight system requirements.

## II. Minimum System Requirements:

- **Processor:** Intel Core i5 or AMD equivalent
- **Graphics:** NVIDIA GTX 970 or AMD R9 390
- **RAM:** 8 GB
- **Storage:** 10 GB available space
- **Operating System:** Windows 10 or macOS Mojave

## III. Recommended System Requirements:

- **Processor:** Intel Core i7 or AMD Ryzen 7
- **Graphics:** NVIDIA GTX 1080 or AMD RX 5700
- **RAM:** 16 GB
- **Storage:** 20 GB available space
- **Operating System:** Windows 11 or macOS Monterey

## IV. Off-the-shelf Software:

The project will utilize the following software:

- **Unity 6:** Game development platform
- **Unity Asset Store:** Pre-made assets for physics and environment design
- **Blender:** for 3d designs.
- **Git:** Used for version control and source code

## V. Anticipated Workplace Environment:

The project will be developed primarily in a **university lab**, with additional work completed on **personal laptops**. Access to the lab is granted by the university, allowing for collaboration and testing in a controlled environment. Unity easy to run requirements benefit us as the project could be worked on from any device with relatively medium to high end specs.

## VI. Schedule Constraints:

The project timeline is set to **12 weeks**. Additionally, scheduling must account for **lab availability** and coordination among group members.

## VII. Budget Constraints:

The project operates on a **low budget**, with expenses mainly directed toward **paid tools and assets from the Unity Asset Store**, for the future a higher budget is needed mainly for server allocation, Anti-cheat software and extra development cost .

## VIII. Project Issues:

Currently, the primary issue is **finding a game publisher to release the game under**. Which is important in the long run since it gives us access to proprietary software not released to the public and huge resources like bigger budget and team, this matter remains unresolved and will be addressed as development progresses.

## IX. Migration to the New Product:

Migration will involve **updating and integrating new assets or features** to align with modern gaming standards and player expectations, in addition to releasing the game on more platforms other than windows (mobile, game console...).

## X. Risks:

The key risks include:

- **Budget Overruns:** Due to unforeseen software costs
- **Time Constraints:** Managing the 12-week deadline efficiently
- **Technical Challenges:** Implementing realistic physics and optimized performance
- **Release Challenges:** Securing a game studio for publication

## XI. Team Members' Tasks:

- **Manager:** Project oversight, timeline management, and resource allocation.
- **Designer:** Environment creation, asset integration, and visual consistency.
- **Developer:** Coding mechanics, physics implementation, and debugging.

## XII. Ethical Issues:

Potential ethical issues Primarily include **Microtransactions**, and age ratings also less prominent issues include fair use of assets, data privacy for users and maintaining accessibility standards.

Microtransaction can be seen as exploitative as some say it preys on little children by using colorful skins and loved collaboration, in some countries a form of microtransaction (loot boxes) is considered gambling and treated as one legally.

The age limits most motor games as 7+ but some argue it is too low, and this type of game inspires kids to replicate movies seen on games.

### XIII. Software Model Process:

The project will follow an **Agile development methodology**, focusing on iterative improvements and regular feedback.

Reason for choosing the agile methodology:

1. Project that **requires a prototype** before working on the final version
2. Project **require multiple tasks** that require strong collaboration
3. Project has **no specific outcome** or vague requirements

### XIV. Feasibility Study:

The feasibility of the project is supported by:

- **Technical Feasibility:** Unity's robust environment for game development
- **Operational Feasibility:** Accessible lab environment and personal laptops
- **Economic Feasibility:** Low-budget approach with minimal software costs

### XV. Standards:

- **Coding Standards:** Consistent naming conventions and modular code structure
- **Art and Design Standards:** Realistic environments and accurate physics

- **Testing Standards:** Regular bug tracking and performance testing

#### **XVI. Milestone:**

- **Week 1-2:** Planning and initial asset collection
- **Week 3-6:** Environment and physics implementation
- **Week 7-9:** Game mechanics and feature integration
- **Week 10-11:** Testing and bug fixing, adding game menu
- **Week 12:** Final Review and presentation

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