

Functional Requirements Document

Car Racing Game Prototype

Contents

1. Introduction.....	1
1.1 Purpose.....	1
1.2 Scope.....	1
1.3 Document Structure	2
2. Key Functional Requirements.....	2
2.1 Cars Move Along the Track and Determine the Winner	2
2.2 Car Speed Influenced by Multiple Factors.....	2
2.3 Obstacles Affect Race Dynamics	3
2.4 Pit Stop for Refueling and Maintenance	3
2.5 Race Management and Results Calculation	4
3. Non-Functional Requirements	4
3.1 Visual Representation.....	4
3.2 Randomized Data	4
3.3 Scalability	4
3.4 Performance	4
4. Conclusion	5

1. Introduction

1.1 Purpose

This document defines the functional requirements for the Car Racing Game Prototype. The game is designed to simulate a car race with dynamic elements affecting gameplay. The main objectives include:

- Enabling cars to move between multiple stops on the track.
- Calculating total race time for each car while introducing randomness for realism.
- Visually displaying the race process and determining the winner.

1.2 Scope

This document outlines the primary functional aspects of the game but does not cover technical implementation details, such as programming languages or system architecture.

1.3 Document Structure

The document is structured as follows:

- Section 2 defines key functional requirements.
 - Section 3 lists non-functional requirements.
 - Section 4 provides a conclusion summarizing the document's scope.
-

2. Key Functional Requirements

2.1 Cars Move Along the Track and Determine the Winner

Description

- Multiple cars participate in the race, moving from one stop to another until they reach the finish line.
- The track consists of multiple stops, and each car follows a unique path.
- The system calculates the total completion time for each car, with the fastest car winning the race.

System Behavior

- Once the race starts, cars follow their designated paths from start to finish.
- The system records the time taken for each movement and calculates total completion time.
- Speed is affected by track conditions, weather, and obstacles.

2.2 Car Speed Influenced by Multiple Factors

Description

Car speed is dynamic and influenced by several factors:

1. Engine (Engine): Affects maximum speed.
2. Tires (Tire): Different types (Soft, Hard, Wet) impact grip and durability.
3. Fuel (Fuel): Affects car weight, influencing acceleration and speed.
4. Wheels (Wheel): Affects aerodynamics and steering control, impacting speed and stability.

- Carbon Fiber Wheel: Reduces weight, improving acceleration and handling.
 - Alloy Wheel: Increases durability, providing better resistance to wear and tear.
5. Driver (Driver): Driving styles (Aggressive, Cautious, Balanced) alter race strategy and speed.

System Behavior

- The system continuously updates car speed based on these attributes.
- Speed dynamically changes during the race (e.g., tire wear reduces speed).
- The system records real-time speed changes.

2.3 Obstacles Affect Race Dynamics

Description

Obstacles appear randomly on the track, affecting car performance:

- Oil Spill: Reduces grip, increasing skidding risk.
- Debris: May damage tires, slowing the car.
- Pothole: Affects stability and handling.
- Water Puddle: Temporarily slows down the car.
- Speed Bump: Requires braking or causes suspension damage.
- Barrier: Forces braking or detouring.

System Behavior

- Obstacles are randomly placed on the track.
- When a car encounters an obstacle, speed and tire condition are affected.
- The TrackManager dynamically adjusts track conditions, such as adding or removing obstacles and changing surface conditions like wetness, which impacts car performance.

2.4 Pit Stop for Refueling and Maintenance

Description

Cars may enter a Pit Stop for:

- Refueling: To avoid running out of fuel.
- Tire Change: To replace worn-out tires.
- Repairs: To fix damage from obstacles.

System Behavior

- The CarManager monitors car status and schedules pit stops.

- The PitStop provides refueling, tire changes, and repairs.
- After servicing, cars wait a set time before re-entering the race.

2.5 Race Management and Results Calculation

Description

The RaceManager oversees the race, handling:

1. Start Race: Signals cars to begin racing.
2. Monitor Race: Tracks progress, speed, and obstacles.
3. Coordinate Pit Stops: Determines optimal pit stop timing.
4. Calculate Results: Records total race time for each car.
5. Announce Winner: Declares the fastest car as the winner.

System Behavior

- The RaceManager initiates the race and controls game flow.
 - The TrackManager updates track conditions.
 - At race end, the RaceManager calculates results and displays the winner.
 - The system should record race data, including each car's speed variations, pit stop times, and final rankings, allowing users to review past races and analyze performance trends.
-

3. Non-Functional Requirements

3.1 Visual Representation

- The game must include graphical or animated visuals of the race.

3.2 Randomized Data

- The system must generate random values for track conditions, car speeds, and obstacle locations.

3.3 Scalability

- The design should allow future expansion, such as new car types and weather effects.

3.4 Performance

- The race should run efficiently, avoiding excessive delays or infinite loops.
-

4. Conclusion

This document outlines the core functionalities of the Car Racing Game Prototype, covering car movement, path calculation, random elements, pit stops, and race management. The game is designed to provide a dynamic and strategic racing experience, ensuring unpredictability and engagement for players. Future expansions can build upon this foundation to introduce additional complexities and enhancements.

End of Document