Design Document for:

Minicar Madness

The Tiny But Mighty Racing Game

All work Copyright ©2009 by Team Travidon
Written by David Clark, John Hannagan and Troy Cumpsty
Version # 2.00
Monday, September 07, 2009
Table of Contents

MINICAR MADNESS .................................................................................................................. 1

DESIGN HISTORY ...................................................................................................................... 4

VERSION 1.00 .............................................................................................................................. 4

VERSION 2.00 .............................................................................................................................. 4

GAME OVERVIEW ...................................................................................................................... 4

PHILOSOPHY .............................................................................................................................. 4

Retro game play ......................................................................................................................... 4

No penalty for power sliding ..................................................................................................... 4

COMMON QUESTIONS ................................................................................................................ 4

What is the game? ....................................................................................................................... 4

Why create this game? ............................................................................................................... 5

Where does the game take place? .............................................................................................. 5

What do I control? ...................................................................................................................... 5

How many characters do I control? .......................................................................................... 5

What is the main focus? ............................................................................................................. 5

What's different? ......................................................................................................................... 5

FEATURE SET .............................................................................................................................. 5

GENERAL FEATURES ................................................................................................................. 5

GAME PLAY .................................................................................................................................. 6

THE GAME WORLD ...................................................................................................................... 6

OVERVIEW ................................................................................................................................... 6

THE PHYSICAL WORLD ................................................................................................................ 7

Overview .................................................................................................................................. 7

Key Locations ............................................................................................................................. 7

Travel .......................................................................................................................................... 7

Scale ........................................................................................................................................... 7

Objects ....................................................................................................................................... 7

RENDERING SYSTEM .................................................................................................................. 7

Overview .................................................................................................................................. 7

2D/3D Rendering ......................................................................................................................... 7

CAMERA ..................................................................................................................................... 8

Overview .................................................................................................................................. 8

Normal Driving ........................................................................................................................... 8

Turning ....................................................................................................................................... 8

GAME ENGINE ............................................................................................................................. 8

Overview .................................................................................................................................. 8

Game Engine Detail ..................................................................................................................... 8

Collision Detection ..................................................................................................................... 8

LIGHTING MODELS .................................................................................................................... 9

Overview .................................................................................................................................. 9

Shay's World Lighting .................................................................................................................. 9

Game World Lighting ................................................................................................................... 9

GAME CHARACTERS .................................................................................................................... 9

OVERVIEW .................................................................................................................................. 9

29/9/2009
USER INTERFACE ................................................................................................................. 10
    OVERVIEW ......................................................................................................................... 10
    POWER UP DISPLAY ........................................................................................................... 10
    TIMER ................................................................................................................................. 10

WEAPONS .............................................................................................................................. 10
    OVERVIEW ......................................................................................................................... 10
    POWERUPS .......................................................................................................................... 10

MUSICAL SCORES AND SOUND EFFECTS ........................................................................... 11
    OVERVIEW ......................................................................................................................... 11
    RED BOOK AUDIO .............................................................................................................. 11
    SOUND API .......................................................................................................................... 11
    SOUND DESIGN ................................................................................................................... 11

SINGLE PLAYER GAME .......................................................................................................... 12
    OVERVIEW ......................................................................................................................... 12
    AI CONTROLLED VEHICLES .............................................................................................. 12
    HOURS OF GAME-PLAY ........................................................................................................ 12
    VICTORY CONDITIONS ....................................................................................................... 12

CHARACTER RENDERING ...................................................................................................... 12
    OVERVIEW ......................................................................................................................... 12

WORLD EDITING ...................................................................................................................... 12
    OVERVIEW ......................................................................................................................... 12
Design History

Version 1.0

Version 1.0 includes the base of the design document with some parts unfilled.

Version 2.0

Version 2.0 includes a lot more of the design document completed; this is the version that was submitted for the assignment 1.

Game Overview

Philosophy

Retro game play

Our game is aiming for retro style game play which is based around the driving style of kart racing games such as "Diddy Kong Racing" and "Mario Kart".

No penalty for power sliding

One of the main design points of our game is that power sliding or drifting around corners is encouraged, and there is no speed penalty. In most situations it will be advantageous to power slide.

Common Questions

What is the game?

The main part of the game is a single player kart racing game, where the player will be racing against multiple AI controlled karts. To access the racing part of the game the player must approach an arcade machine inside the Murdoch tavern. The player is free to quit the racing game part of the game to return to Murdoch campus.

Why create this game?

We are creating this game because our entire team enjoys old-school racing games. We also believe that this game will scale well depending on our time schedule. We are also very interested in the physics of these styles of racing games.
Where does the game take place?

The game will begin at Murdoch campus where the player will be able to walk around the bush court area. To enter into the racing world you must visit the tavern and play the arcade machine.

The racing game will have have several different themed environments.
The Desert:
  - Australian Desert
  - Sunny barren wasteland.
  - Damaged Bitumen roads with potholes.
  - Boulders (Outside the map)
  - Kangaroos

What do I control?

The player will control one of several types of vehicles. Ranging from a racing truck to a hover craft. Each vehicle will have different driving properties.

What is the main focus?

The aim will be to win the race.

What's different?

Unlike all racing games these days the physics will be cartoony and fun, with a large focus on power sliding.

Feature Set

General Features

- Multiple Maps
- Multiple Vehicles
- Artificial Intelligence based competitors
- 3D Cartoon style graphics
- Cartoon physics
- Fun power sliding
- Various powerups for the players vehicles
Gameplay

The player controls a single vehicle from a third person perspective. We are aiming for unrealistic but enjoyable physics. This includes such impossibilities as extended power sliding.

The Game World

Overview

The game world will be set in the Australian outback. The track will be surrounded by either walls with arrows on them or rocky cliffs. There will be a bright blue washed out Australian sky in the background, with red sand outside the track.
The Physical World

Overview

The physically world will be made out of a terrain with individual entities that are placed on the terrain at different heights. The objects placed on the terrain will all be themed around the Australian Desert. The world will be encapsulated inside a sky box. The final appearance of the world will be a race course in the middle of a desert surrounded by rocks and various other obstacles.

Key Locations

The Australian outback.

Travel

Similar to Shay's world, the player will drive around the track. Their Y position will be determined by the terrain, while a simple 2d polygon collision detection will prevent the player from entering the obstacles on the course.

Scale

In our world, 1 metre will be 1 world unit.

Objects

Oil spills:

Oil spills are dangerous obstacles the player must try to avoid. If the player drives over an oil spill he will spin out of control for 3 seconds.

Rendering System

Overview

Shay's world and our extension will be rendered with no lighting, and high quality photographic textures. This will allow us to keep the style of our extension similar to Shay's.

The racing world will be rendered with lighting enabled. We will use bright colours and cartoon style textures.

2D/3D Rendering

We will be using OpenGL to render our world.
Camera

Overview

The camera in Shay's world will be first-person, and the camera in our game world will be third-person.

Normal Driving

The camera will rotate smoothly into its correct position behind the car.

Turning

When the car is turning the camera will turn a bit more than it needs to, this will create a greater sense of turning.

Game Engine

Overview

Our engine will separate the main game logic into individual states (See the state pattern). This allows for easily adding multiple worlds or states of the game.

Game Engine Detail

The engine will keep track of separate entity systems such as the wall bounding boxes, and the terrain collisions. In Shay's world the engine will keep a set of axis aligned bounding boxes (AABBs) which can be checked every frame. The engine will keep a set of objects loaded from text files which will be our add-on to Shay's world. We will be able to reload these text files at any time by pressing a special key. This will allow for rapid development of our extension to Shay's world.

Collision Detection

The collision in Shay's world will involve a world of axis aligned bounding boxes (AABBs) which will represent the collidable world around bush court.

Our racing game will use mostly sphere and plane collision. The edges of the race track will be surrounded by planes which the vehicles (spheres) can collide and slide against.


**Lighting Models**

**Overview**

Shay's world will remain as it currently is (no lighting) and our game world will use the default OpenGL lighting (Gouraud shading).

**Shay's World Lighting**

In order to keep our extension to Shay's world in the same graphical style as Shay's world we will not be lighting it. It would be far too tedious to add normals to Shay's world to make it match.

**Game World Lighting**

Inside the racing game world, all polygons will have normals and be correctly lit by OpenGL's fixed function pipeline. Models loaded from the OBJ file format will have per-vertex lighting applied to them. This will give a far more superior lighting effect. For flat walls and some other geometry the normals for the polygons can be easily calculated on the fly.

**Game Characters**

**Overview**

The racing drivers are oversized and characterised, which will help us achieve our cartoon style. Below is some concept art as to what the racing drivers will look like.
User Interface

Overview

Our interface will be very simplistic, providing only things such as the currently held power up, current lap time and position in the race.

Power up display

A small box will display a picture or symbol which will clearly show what type of power up the player currently has. If they have none the box will be empty.

Timer

The timer font will be in a bubbly or cartoon style. There will be a symbol of a clock next to the timer.

Weapons

Overview

There will be various power ups placed around the map. Power ups will give players a special advantage if they are skilled enough to collect them.

Power ups

Rockets:
Rockets will fire in a straight line, when they hit another vehicle they will cause the vehicle to lose control for a number of seconds.

Oil Barrels:
These will let the player place oil spills behind them when they activate the power up.

Boosts:
These will allow the player to boost their speed for a very short time.
Musical Scores and Sound Effects

Overview

The music will be a small tune that will loop throughout the race. There will sound effects that will be played at certain events such as hitting a wall, picking up powerups, etc.

Red Book Audio

We will be utilising the red book audio for most of our sound effects and music. If the red book audio does not contain sound effects or music that fulfils our requirements then we may record our own sound as we have access to recording equipment. The sound and music will be edited and mixed using trial versions of sound editing software that we have. If the red book cannot satisfy our need for a particular sound we will seek royalty free sounds off the Internet and reference the websites accordingly.

Sound API

We will be using the OpenAL sound API for our game and also utilising the ALUT library.

Sound Design

The music will be an upbeat and pleasant tune, which will create a fun and relaxed atmosphere for the player. The sound effects will be reminiscent of cartoon style sound effects.
Single-Player Game

Overview

In the racing world the player will be trying to beat a number of AI controlled vehicles around the race track.

AI Controlled Vehicles

The AI controlled vehicles will be driven by a series of way points placed around the map. At any point in time a vehicle will have 1 way point node as its goal to drive towards.

Hours of Gameplay

We believe that the game should provide at few hours of fun at first, and later become a casual game which the user can play time after time whenever they are bored.

Victory Conditions

The player will be victorious if they place first in the race.

Character Rendering

Overview

Our characters will be rendered in 3d. The vehicles will be textured OBJ files with per-vertex lighting.

World Editing

Overview

There will be a basic world editor that will allow various objects to be placed around our game world. The objects can then be scaled and rotated.