



RACOL

Rural Advanced Community of Learners

Design Document for:
Mirror-x

Issue 1



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Produced by Luke Ilett
Written by Luke Ilett and Deifante Jay Walters
Illustrations by Luke Ilett

Version # 1.3

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1.1 Design History

1.1.1 Version 1.0 – First pass

1.1.2 Version 1.1 – Input from Deifante Jay Walters Added

1.1.3 Version 1.2 – Additional input from Deifante Jay Walters Added, remove General World Map area

1.2 Game Overview

1.2.1 Philosophy

The player must help Maya, a 15 year old school girl and inventor, save her community and its environment from a malicious redevelopment corporation called Dent-Tec. This is done through solving problems that use their knowledge of light and refraction, that remain fun in a detailed comic book style city. The game play will consist of strategy and arcade style action. The game can be played in story mode where objectives range from simple to hard or Each Objective can be loaded independently if the student wishes to focus on a particular principle.

1.2.2 Environment

The game takes place in a busy lower class section of a metropolis called Nova in a distant galaxy, the buildings are old looking and are architecturally similar to that of Hong Kong's. There are many street shops selling various things from food to cheap electronics. Even though this is one of the poorer neighborhoods almost every one has a personal computer as they are cheap and common place. Viewed from top down isometric, the graphics will be pre-rendered to look half way between realistic and comic book, designed to draw the player into the game world.

1.2.3 Story

Our story begins in a city called Nova, in a lower class area with a tight nit community that is being threatened by a malicious redevelopment corporation called Dent-Tec. Dent-Tec has not consulted with the community and has little regard for their environment. Maya is a school girl who lives in the community with her mother Ava, behind the grocery store they both run. Maya is an inventor and is always trying out new things with lasers and re-purposing consumer electronics to solve problems around the shop. She has a strong sense of community and doesn't want to see the developers destroy her neighborhood.

So she decides to undermine the developers and take matters into her own hands. She designs a device using an old vcd player that attaches to her arm that fires a laser beam, though to get enough energy to fire she needs to be standing in a public energy zone where the device can be charged. Help Maya on her mission, using lasers, stealth tactics, and your physics knowledge.

1.2.4 Hours of Game play

Each objective will take between 2-5 minutes

1.3 Camera

1.3.1 Overview

As the game is a 2d isometric, the view will stay the same for all the in game screens

1.3.2 Game Engine

The game Engine is built in java and the Mirror-x tile editor can be used to create the game maps.

1.4 Game Characters

1.4.1 Maya

The protagonist of the game, a 16 year old school girl who lives with her mother Ava behind the grocery store they both run. Maya is an inventor and is always trying out new things with lasers and re-purposing consumer electronics. Maya has a strong sense of community and doesn't want to see the developers destroy her neighborhood.

1.4.2 Ava

Maya's Mother, Ava runs their convenience store and supports Maya's interest in science.

1.5 Musical Scores and Sound Effects

1.5.1 Overview

The music will be fun and have contemporary Rhythm and Blues influence, and will be unique for each objective.

Sound Effects list

General

Laser fire
Objective fail
Objective succeed
Maya foot steps
Mirror reflection sound
Ambient city sounds

Objective 1

Score: Minimal ambient
FX:
Stereo: hitting the stereo with the laser turns on and off an electro beat loop

Objective 2

Score: Sneaky spy influence
FX:
Cars
Irrigation machine start
Police car

Objective 3

Score: dark fast
Objective success: party electro
FX:
Machinery sounds
crowd

1.5.2 Game objectives

The player is presented with three different objectives they can choose from to help stop redevelopment or help the natural environment of the area using their physics knowledge.

The Student can choose from either story mode and play the objectives in the order below or load an objective of their choosing to focus on its particular physics content.

1.5.2.1 Objective 1: Training and preparation (A,B,C)

The game begins in Maya's hide out behind the convenience store, where she can practice her laser firing and the player can get to grips with the game's basic physics concepts.

A: Laser speed measurement

To understand more about the laser device Maya wants to see how fast the beam is traveling.

There's an area where she can fire the laser and the time it takes to bounce back to Maya is measured with her stop watch and displayed on the screen indicating the amount of time it took for the light to bounce back and forth. The distance from the player to the mirror will be given to the player as well.

The player will then have to calculate the speed that the laser is moving at.

Difficulty: easy

Physics covered: Solving for the speed of an object. Solving the equation will take simple equation manipulation. $V = D/T$. Player will be given the distance traveled and the time it took for the light to travel this distance. Using this equation the player will have to figure for velocity.

B&C: Mirrors and lenses

Next the player must angle the laser from a energy spot so that it bounces of a mirror and hits a beatbox and turns it on. Next the player must move a pile of old tires so that it blocks that laser path and they must now fire the laser through a window of a car door hit the mirror and target the beat box again.

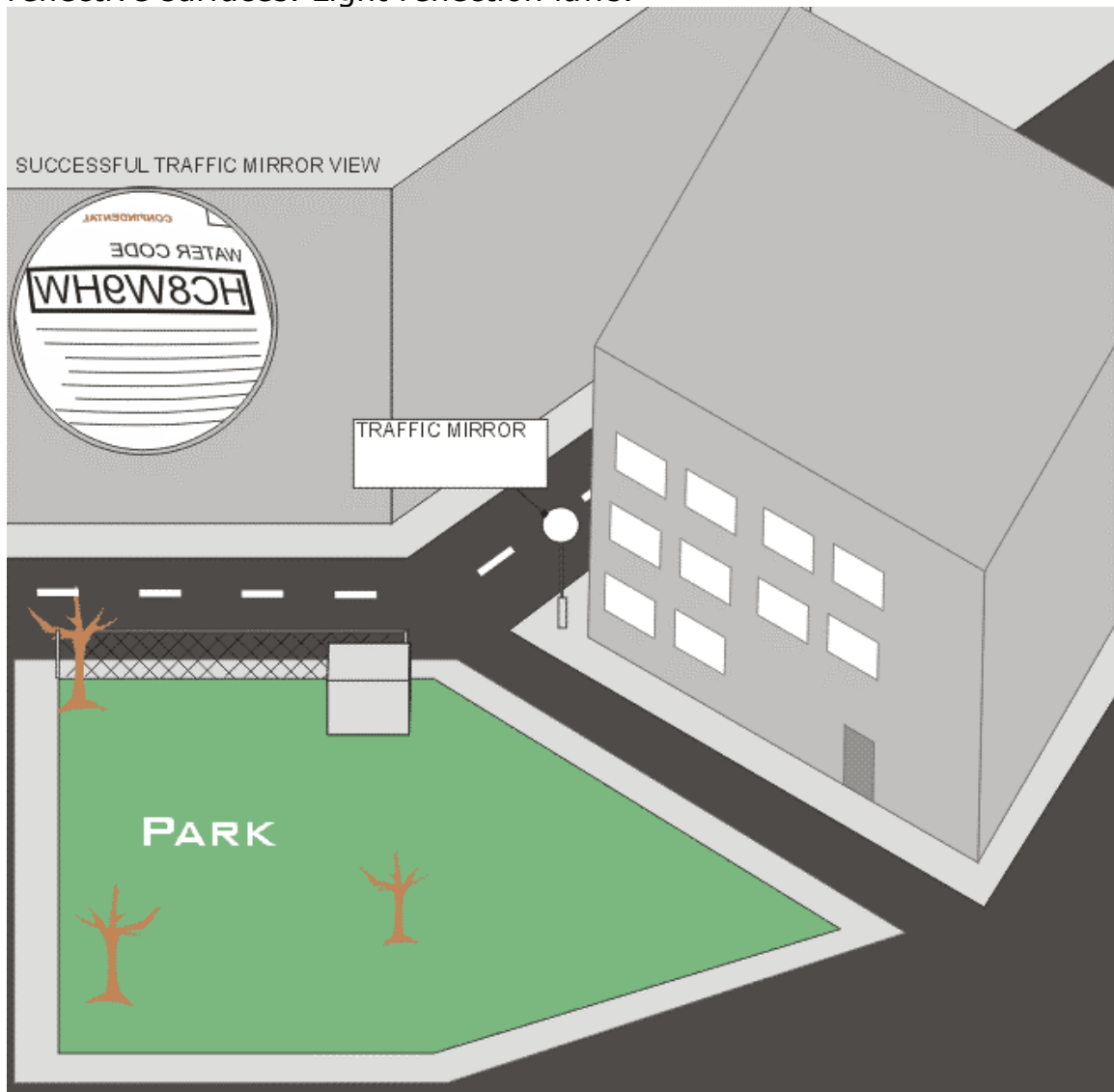
This will get the player familiar with the basic concepts of the game such as changing the angle of mirrors refraction and moving objects around.

Physics covered: Basic laws of reflection and refraction, snells law, indices of refraction. Physics related trig to solve for various angles and vectors.

1.5.2.2 Objective 2: turn the irrigation back on

The park in nova is drying out; to save it Maya must see the control code to turn the water back on at the site. Using a set of mirrors, including a traffic mirror that you must move while not be seen by a patrolling police car, (other wise the Maya will get caught and the objective must be restarted) so that she can see into a window where the code is stored. Allowing the irrigation to be turned back, transforming the park to become green and beautiful before the player.

Physics covered: Physics based trig. for solving angles between reflective surfaces. Light reflection laws.



1.5.2.3 Objective 3: Save the community break dance school

The developers want to tear down the community break dance school, Maya must angle a set of reflective construction signs and position a box of glass so that her laser can bounce around and stop the machine's engine in time. There is a time limit on this objective that is connected to the time it takes the machine to raise up its arm and starts destroying the building, if the student fails to do it in time the objective will be restarted giving the student another chance. When the objective is completed successfully the sound systems comes alive and the break dance students celebrate by dancing.

Non Playable Characters:

On looking break dancer

TEXT: Perhaps that box of glass could help, hurry!

Physics content: Refraction through the surface of the refractive surface and reflection off the signs in the environment reflection.

