ETH Zurich, Game Programming Laboratory - SS12

Polarity

Group 4: Jakob Progsch, Werner Randelshofer
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1. Game Description

Describe your game idea in detail with approximately two to three pages of text plus three pages of mocked-up screenshots and/or sketches. Pencil sketches are fine. You don't need beautiful artwork at this point.
Your description should highlight how your game relates to the course theme. Each design decision should be justified in terms of theme. Choices shouldn't seem random. Instead they should follow directly from the theme. This section should provide an overview of your game that sets the stage for the remainder of the project notebook. Describe any background or storyline associated with the game. Comment on the overall gameplay.

Course Theme: Attraction

We decided to use electromagnetic attractive (and repulsive) forces as a major gameplay element.

Background story

Oops, due to a loose cable at the CERN labs in Geneva, the attractive Ms Boson has been sucked into the particle accelerator. There is a relativity theory suggesting that she will eventually crash into the collider at the end of the accelerator.

Luckily Dr. Higgs is to the rescue! He has entered the accelerator in his polarity device, a magnetic soap bubble, which can move through high-dimensional space and protects him from the gigantic electro-magnetic forces in the particle accelerator. Will he find Ms Boson before it is too late, or will he get too distracted by the shiny little stars that he so much likes to collect?

Game idea

This is a 2D jump and run game with multiple levels. The goal of the game is to reach Ms Boson at the final level in the shortest possible time while achieving the highest possible score.

Each level represents a section of the particle accelerator. Each level has a funny yet descriptive name. A level can only be played if all previous levels have been completed. For each completed level, the game records the elapsed time and the number of collected stars. Illustration 1 shows the game level screen.

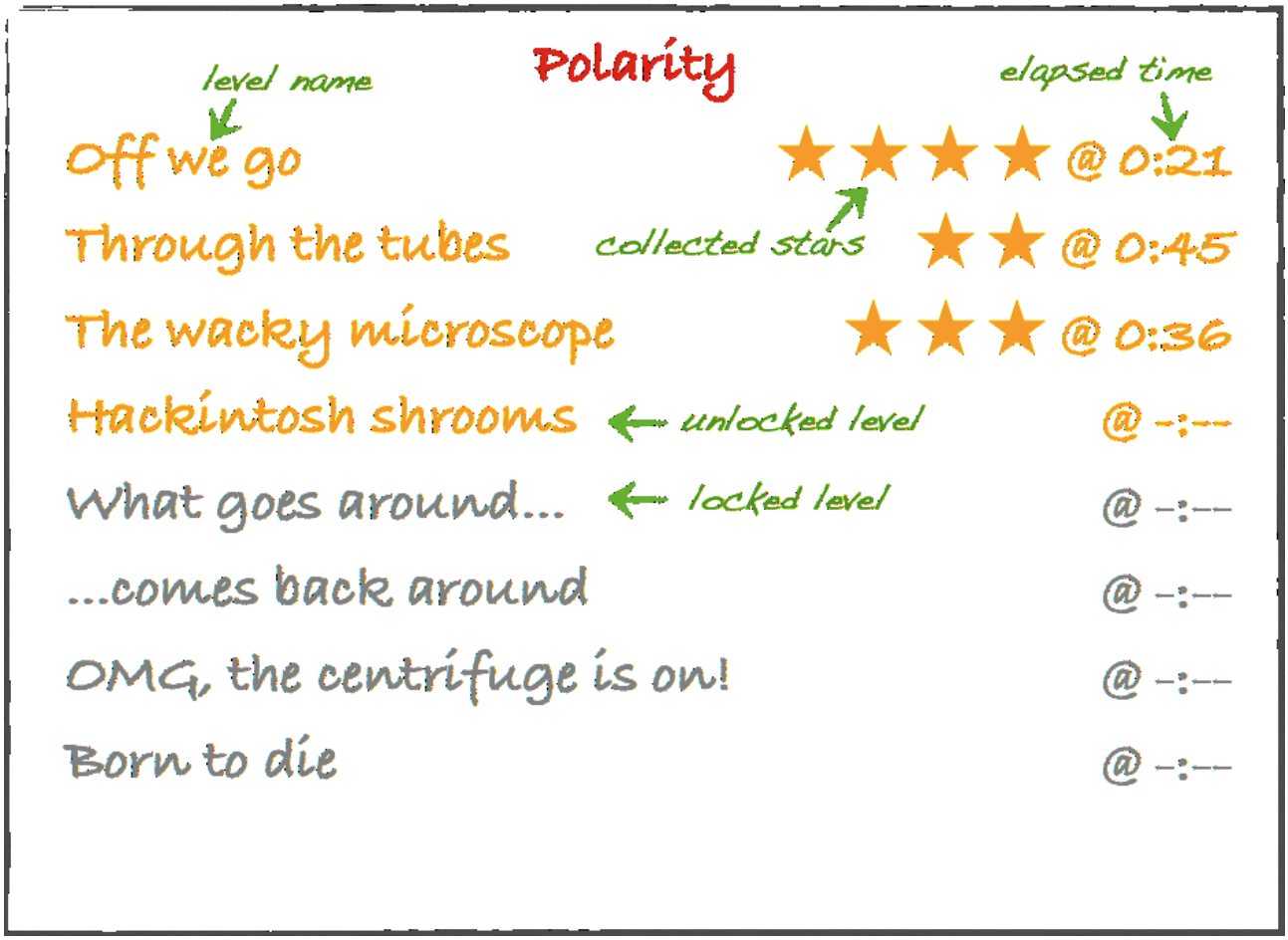


Illustration 1: Level screen

Dr. Higgs enters a level at the starting point, and we can see Ms Boson waiting anxiously at the exit. Dr. Higgs has to reach the exit without getting harmed. Unfortunately in all but the final level, Ms Boson is drawn deeper into the accelerator when Dr. Higgs tries to touch her. Only in the final level, he will be able to catch her just before she gets sucked into the collider.

Each level contains a number of stars which can optionally be collected. The stars have no influence on the game-play.

The difficulty of the levels increases gradually in a tutorial-style manner. New game elements are first introduced in an easy setting, later on, the player will have to make use of them in a more difficult setting.

The polarity device is a soap bubble with an electro-magnetic charge. Dr. Higgs sits inside the bubble. If the bubble hits something spiky, the bubble pops and Dr. Higgs jumps out of the level with a parachute. He then re-enters the game in a new bubble at the starting point of the level. In larger levels, he re-enters the game at a save place before the obstacle which burst his bubble.

A level consists of a series of connected walls on which tracks have been cut out. Although it is a 2D game, the walls are in 3D space and may vary in orientation and scale. The walls represent dimensions in a multi-dimensional quantum universe. We can only move along three dimensions, but there are more dimensions curled up. In the game, we can only move in 2 dimensions, but we can sometimes get a glimpse of a higher dimensional space.

The camera will always watch orthogonally on the wall which contains the player character and keep the game character in the same scale and orientation. This will yield dramatic transition effects when the character moves to another wall, or touches one the "Quantum effect" items. As a consequence, all game objects are rendered as 3D objects. They will reveal their 3D nature only during wall transition effects.

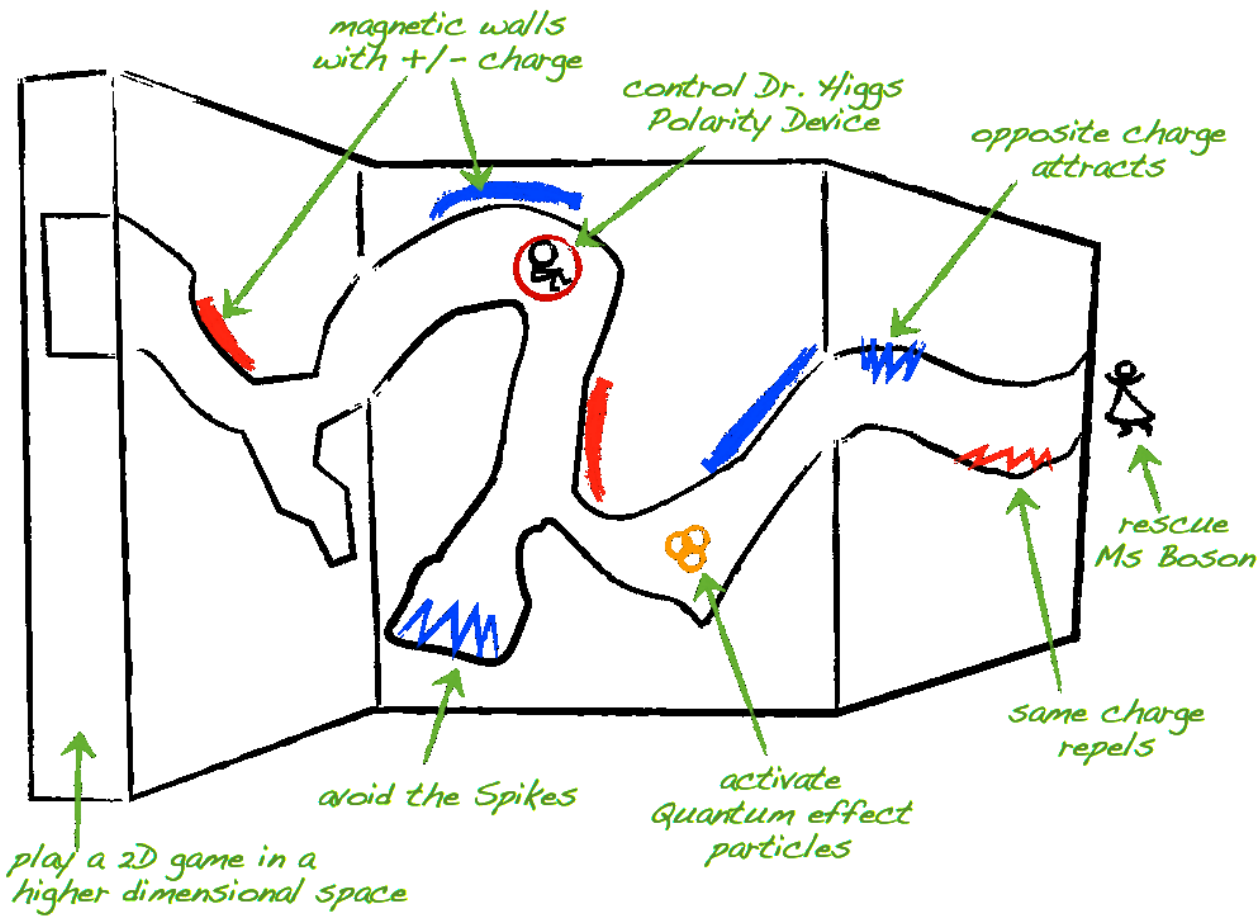


Illustration 2: Polarity gameplay

The polarity device can only move inside of the tracks. Usually, it rolls on the floor of the tracks, and falls down due to gravity. Elements of the track (floor, wall and ceiling) may have an electro-magnetic charge. The device is attracted by elements of the opposite charge and repelled by elements of the same charge. This can be used for rolling along charged walls and ceilings and for hovering over the ground. The track may contain spiky elements which must be avoided.

The track contains items which also may have an electro-magnetic charge. The polarity device activates an item by touching it. Items of opposite charge are attracted by the polarity device, items of the same charge are repelled by the device. Spiky items must be avoided. Power items temporarily affect the power of the device or its weight. Quantum effect items such as gravitons and quarks dramatically change the orientation or the scale of the walls. Electrons temporarily increase the electromagnetic power of the polarity device. Soap items add an additional live to the player.

The player can control the polarity device with the game controller:

- accelerate to the left,
- accelerate to the right,
- jump,
- toggle the polarity of the electro-magnetic charge.

The polarity device is affected by the following forces:

- gravity pulls the device down so that the device stands or rolls on the floor and falls down
- electro-magnetic forces of the opposite polarity attract the device so that the device can roll on charged walls and ceilings and fly towards them
- electro-magnetic forces of the same polarity repel the device so that the device can float above the floor and flay away from walls

The polarity device has the following state variables

- location, speed, acceleration
- weight
- power of electromagnetic charge
- polarity of electromagnetic charge
- scale and orientation
- score (=number of collected stars)

Scene elements

- Walls in 3D space and of different scales with 2D tracks cut out
- Tracks with different wall elements
- Smooth wall elements with positive, negative or no charge. Charged wall elements attract/repell the polarity device.
- Spiky wall elements with positive, negative or no charge. Burst the polarity device when touched. Charged wall elements attract/repel the polarity device.

Game items

- Nail with positive, negative or no charge. Bursts the polarity device when touched. Charged nails are attracted/repelled by the polarity device.
- Magnet with positive or negative charge. Temporarily increases the power of the polarity device when touched. Magnets are attracted/repelled by the polarity device.
- Anvil with positive, negative or no charge. Temporarily increases the weight of the polarity device when touched. Charged anvils are attracted/repelled by the polarity device.
- Feather with positive, negative or no charge. Temporarily decreases the weight of the polarity device when touched. Charged feathers are attracted/repelled by the polarity device.
- Graviton with positive, negative or no charge. Rotates the walls by +90 degrees. The gravity points now to a different direction. Charged graviton are attracted/repelled by the polarity device.
- Strange Quark with positive, negative or no charge. Scales the walls up or down by one scale factor. Narrow paths may become now large enough to pass through / big gaps in paths may become now small enough for jumping over. Charged quarks are attracted/repelled by the polarity device.
- Electron, always with negative charge. Temporarily increases the electromagnetic power of the polarity device.
- Star, without charge. Is collected by the polarity device when touched.

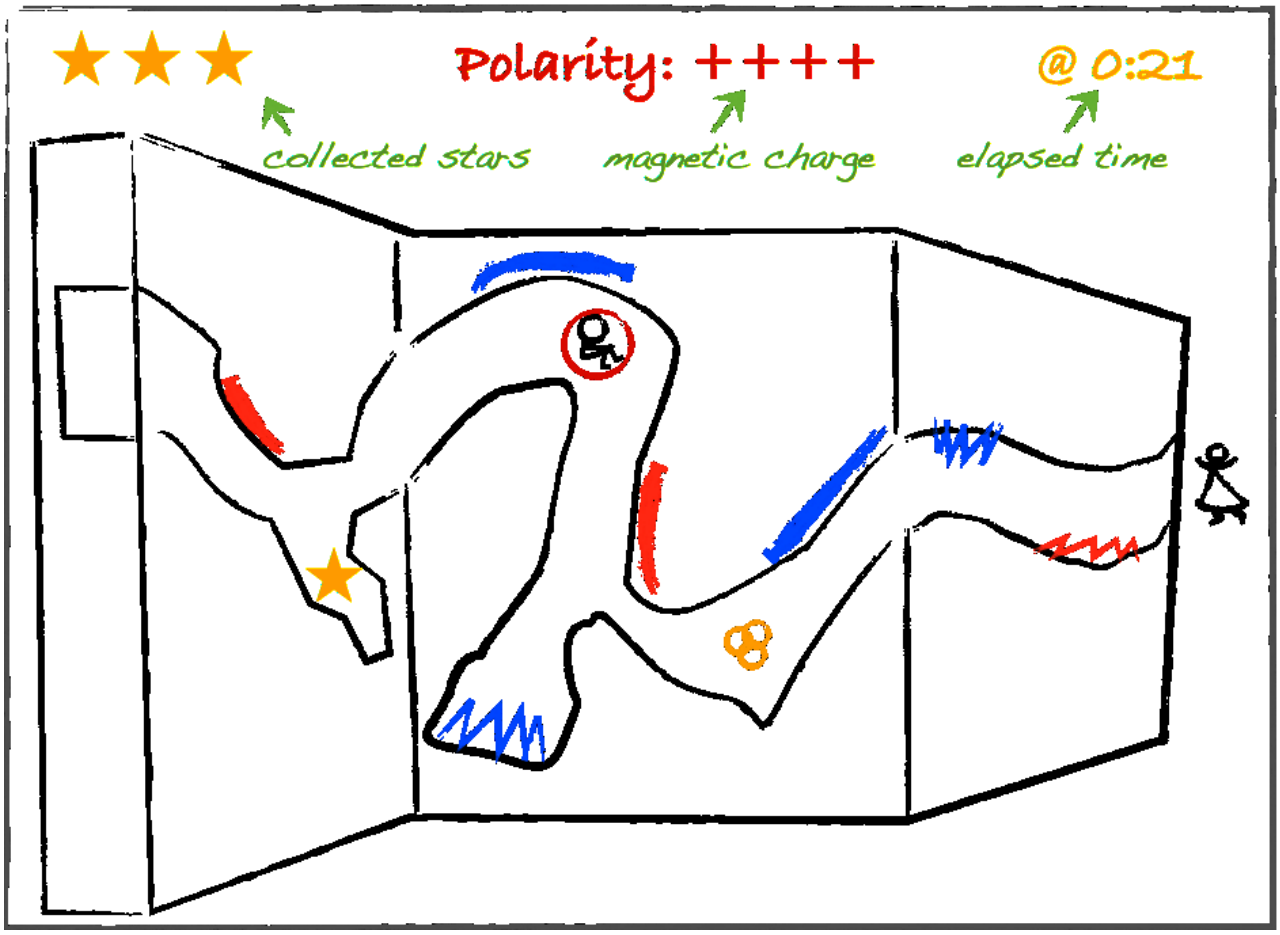
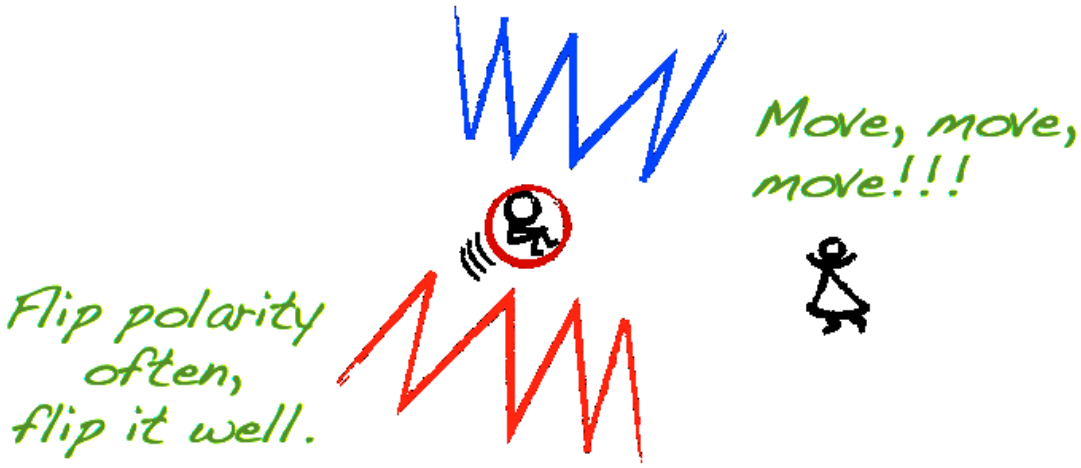


Illustration 3: Game screen, showing the number of collected stars on the left, the magnetic charge of the polarity device, and the elapsed time

2. "Big Idea" Bullseye

The "Big Idea" Bullseye is meant to highlight the primary and secondary drives of your game. Your entire team should agree upon and buy into these two concepts during the design phase so that everything that goes into the project is focused and aligned around a common and unified goal. It sounds a bit obvious, but it's a powerful tool.
Include a graphic big idea bullseye similar to the one used for Split Second. You can design your own, custom bullseye graphic. The primary and secondary drives should be short, direct, and to the point.



Be always on the move!
Use the proper polarity to avoid the spikes!

3. Development Schedule

The development schedule is crucial and should contain two basic parts. First, you must provide a layered development description of your game that divides the development schedule into five categories based on how crucial each element is. Second, you must provide a timeline for the course including major milestones and deliverables as well as detailed information about who is responsible for each task, when will each task be started, how many hours will each one require, etc. More information about the development schedule is given below.
1. Functional minimum: minimal items to make something that you might call a game. You'd be embarrassed if you only got this far, but at least it'd be something.
2. Your low target: Your target for what you want to get done--the least possible to feel sort-of OK about the result.
3. Your desirable target: This is what you're aiming for, if things go reasonably well.
4. Your high target: It might be possible to get this much done, if all goes extremely well.
5. Your extras: Stuff that you know you can't get done this semester, but you might add later if you decide your game is cool enough to keep working on after the class is over, just for fun.

Date	Milestone	Work items	Who
?	Functional Minimum	Scene description file	
		Game loop	
		Player character 3D object	
		Scene elements 3D objects	
		Game items 3D objects	
		Static intro and outro screens	
		Level 1 with a single wall	
?	Low Target	Multiple walls in different 3D orientations	
		Level 2 with multiple walls in different 3D orientations	
		Nail, magnet, anvil, feather items without charge	
		Level 3 with nails and magnets and multiple walls.	
		Level 4 with anvils and feathers and multiple walls.	
?	Desirable Target	Nail, magnet, anvil, feather items with charge	
		Level 5 with multiple walls and charged items	
?	High Target	Quark items with and without charge	
		Level 6 with quark items and multiple walls in different scales	
?	Extra Target	Level 7 with Ms Boson character	

4. Assessment

Tell us what the main strength of the game will be. What part is going to be the most cool? Who might want to play this game? What do they do in the game? What virtual world should the system simulate? Basically, you are setting up a world view for your subsequent design. What criteria should be used to judge if your design is a success or not?

The main strength of the game is the simplicity of the gameplay. A player only has to learn four different controls: left, right, jump and polarity change. The game remains challenging due to the variety of track designs and items that levels may contain.

The game is essentially 2D, but from time to time we get to see 3D transitions, when the player moves to a wall which has a different orientation in space, or when the player activates a Quantum effect item. We hope that these occasional effects increase the appeal of the game.

This is a game for all ages. Its a jump and run game with little background story and a simple gameplay.