BattleBalls - Formal Game Proposal

1. Game description

Summary

Our game will be a multiplayer party game. Each player is represented by an alien-vehicle in form of a tremendous ball. The game world is restricted to a rectangular area which will not be too big. At the edges of this rectangular game world are holes. The goal of the game is to push the other players from the game platform into the abyss.

Genre and Related Games

One can order our game in the genre of action games with some elements of game of the fighting genre. The basic idea of our game is similar to these other party called “Micro Machines”, “Super Mario Karts” and “Bomberman” where one can just distribute controllers among the attending players and immediately have fun together for quiet a long time. It is important to note that these games are all very simple regarding the controls, so that even a player who’s new to the game can immediately engage, without having first to learn about how to control his game character.

The main factor why these games are fun is the personal competition between the players, so that in the end everyone wants to be better than the rest what give the winner sort-of satisfaction. The other fun thing is the possibility to “knock others out” of the game. That is especially fun when all the players are sitting together in the same room and knocked out players can insult their tormentor and vice-versa the others can laugh at the loosers.

Our game also combines some strategic element (mass/energy dilemma) in the basic party game gameplay so that it will not become boring too fast even for experienced players, what was the major drawback in the games mentioned above. The mass collection feature and the idea of “giant balls in a city” could in some way be related to the game called “Katamari”.

Game Setting and Background Story

Some strange aliens who are addicted to playing games are coming to earth. They play a game called “BattleBalls" which is similar to a battle royal in wrestling. These Aliens really love mass destruction so they cut out a part of a big city and lift it up to the sky to use it as their play field. Directly around this field is “nothing” than the sky so that the gladiators in their fighting machines can fall out of it.

In a certain distance to the field there is a stand around it filled up with the audience which are fans of one of the particular players. They will also cheer up and show their affection for players which are performing well (i.e. players which raze all what’s in their way).

Detailed Game Description

Game Elements

Player
Each player can control one of the balls. Up to 4 players can challenge each other. The ball of the player can't be controlled directly by the joystick of the pad in the sense of directly moving it around, but each player has control over the acceleration of the ball. This will lead to a somewhat indirect control over the ball which is important for the "feel" of the game.

Ball
Each player has two main resources, which are related to his ball:

- The ball's mass
- The maximal power that the player can act on his ball

These are crucial for the steering behaviour and the mess the ball can produce. *The destruction vehicles are powered by dark matter, which is present everywhere in space, but cannot interact with normal matter expect for it's mass. A main part of the balls interior consists of dark-matter collectors, which absorb dark matter and constrain it to the body of the ball, increasing it's absolute mass.*
To cause more damage, the player must rise the mass of his vehicle. The bigger the mass of a ball the more power one needs to still be able to control the vehicle. On the other hand the player has only limited maximal amount of power, that he can act on the ball. Therefore one conflict of the game is to have a good balance between power and mass which leads to a balance between the controls a player has over its destruction device and the damage the ball causes on other players and the environment.
When a player hits another's ball with his own, he can influence in what direction the enemy bounces after the crash, by pressing a direction on his gamepad. Like that it is easier to push the enemy off the game map, what is the ultimate goal of the game.

Mass
The gain of mass happens automatically over time (since the collectors absorb dark matter from the space), but very slowly. The balls can also gain more mass by transforming bright matter into dark one by collecting destructed building parts and rubbish around the map. As a high target of the game we would like to create buildings that produce rubbish to collect, but it would also be possible to have mass-power ups (see below). *Since dark matter can pervate every kind of normal matter, it's not possible to hold it completely inside the body of the ball.*
Therefore, with every collision - especially attacks from other players - some of the dark matter will be lost and the ball shrinks.
It is important to note, that the masses of the balls define the ability to push others away at a collision (i.e. the heavier ball will of course have more chance to push the other around).

Power

The player is able to spend up to a maximal amount of power as a force to the ball to control its movements. This can be done by holding the primary analogue stick with an appropriate amount in the desired moving direction. How much force is influencing a ball is visualized by a glow halo around the ball. The player has a base force he can act on the ball and additionally the balls have energy converters, which allow to transform some of the dark matter into energy. This energy boosts up the power, a player can maximally bring up to steer the ball. This action is done by the analogue shoulder key of the gamepad with that he controls how much additional force is converted. That gives temporarily more control over the vehicle (faster response) but also decreases the mass over time. There are also power-ups to enhance the maximal power.

Power-ups

One of the main reward factors of the game are the possible power-ups the players can gain. They are graphical eye candies and give the player the feeling of being powerful and mighty. The power-ups in the game map are hidden in the buildings of the city. (Remember, the game map consists of a rectangular part of a city). A player has to destroy a building to uncover its hidden power-up. A player can collect power-power-ups as described before, as well as weapon-power-ups of which every one has it's unique gameplay feeling. The weapon power-up a player currently holds is displayed in its status bar visible for all players. With a button press a power-up can be consumed and its abilities are released immediately. Some power-ups give new possibilities of controlling and other are passive and act automatically as the ball moves.

Here are some possible weapon power-ups (this list may be expanded or changed in future):

- **Hook Shot/Rope**: The hook shot is a chain with a grapple which can be shot at buildings or other players. This way one can cut corners or catapult other players. It could be challenging to implement the rope-physics which are necessary for this.

- **Fire Thrower/Bomb**: The ignition of this power-up results in a ring of fire around the player or alternatively the fire burns down the street for a long distance as seen in "Bomberman".

- **Ice Ball**: Everything that gets into contact with the ball freezes suddenly. Enemies which roll over a freezed surface loose control. Also, freezed buildings can be destroyed much faster. But the ball itself is also much more damageable.

- **Lord of the board**: The player will double its size for a short moment of time, the size of all the other players will shrink. During this time the ball can do almost anything with other balls which are in its way.

- **Magnet**: Magnets are fun! you can produce an adducent or repulsive magnetic field, which will affect yourself as well as your enemies.

- **Rocket Launcher**: Several rockets get shot up to the sky and launch into your target. While the player is aiming toward the target of the rockets, he can't steer the ball anymore until he releases the aim control of the rocket launcher.

- **Energy Bumper**: an energy-deflector around the ball which can be expanded at the push of a button to bump away other vehicles.

- **EMP:** The other players loose the control over their vehicles for a short instance and the balls roll around at random.

- **Bounce**: You turn into a bouncing ball, which causes a lot of damage but is verry difficult to steer.

- **Hyperspace:** Stops the time for the rest of the world. The player that gets this power up will remain the only colored ball and the whole rest of the map turns into gray and everything stands still. In some little time the only thing that moves is the players ball, all other stand still. So the player can position his ball optimal for a knock-out when time contious.

Map

Initially the game map consists of some buildings that contain random power-ups, some streets and in all corners the initial positions of the spawned balls. The building can be destroyed by a player by crushing into it with the ball or by using some of the weapon-power-ups (see above). The destruction of the building should look as realistic as possible together with a good graphical particle system. However - the destruction physics for the buildings are only eye-candies and not part of the gameplay itself, since we don't want to base our gameplay upon features we're not sure about how well they will work.
The city is initially flat. But the terrain has the property that its local height enhances, when a building gets destructed or it sinks when an explosion occurs. So there will be more and more slopes holes in the map as the battle continues and will result in more interesting movements of the balls.

Multiplayer game cycle

There are different game types to choose from, that specify the long term goal of the game. It would be possible to integrate team based game types, but for the moment the most obvious game type is "championship", where all the players fight each other and try to win as many battles as initially specified, for example 10 battles. The best performing player over all

rounds e.g. the one that survived the most battles then wins the whole championship and hence is the champion of the game.

Battle

A battle begins and all players can move around and collect power-ups by destroying buildings only to try then to knock other players out into the abyss and try to avoid falling down self. The battle is over when there is only one final surviving ball on the map that, will win this round. After each battle, the map resets to the initial state, all balls respawn at initial positions and a new battle begins. This cycle continues until the championship is over.
Anytime a player wins a battle, he can choose one power-up as reward that will be available to him at the beginning of the new battle.

Ghost mode

As soon as a player's ball gets knocked off, he changes to the ghost mode where he's just able to indirectly influence the game by firing from time to time a massive ion- cannon (mounted to the mothership of the aliens). This destroys the buildings at the target position and breaks the city ground. This produces a new hole in the terrain, where players can fall into. The target position is first marked for some seconds, before it finally fires. So players can be aware of newly appearing holes. Like that even the already finished players can still have fun by destroying the city and try to influence the others play instead of just boring wait until the battle is over. To be able to fire the cannon all ghost players have to react as soon as the ion cannon ready symbol appears on the screen, and the first player that press the button is then allowed to once fire the cannon. So there is still some competition even if you are dead.

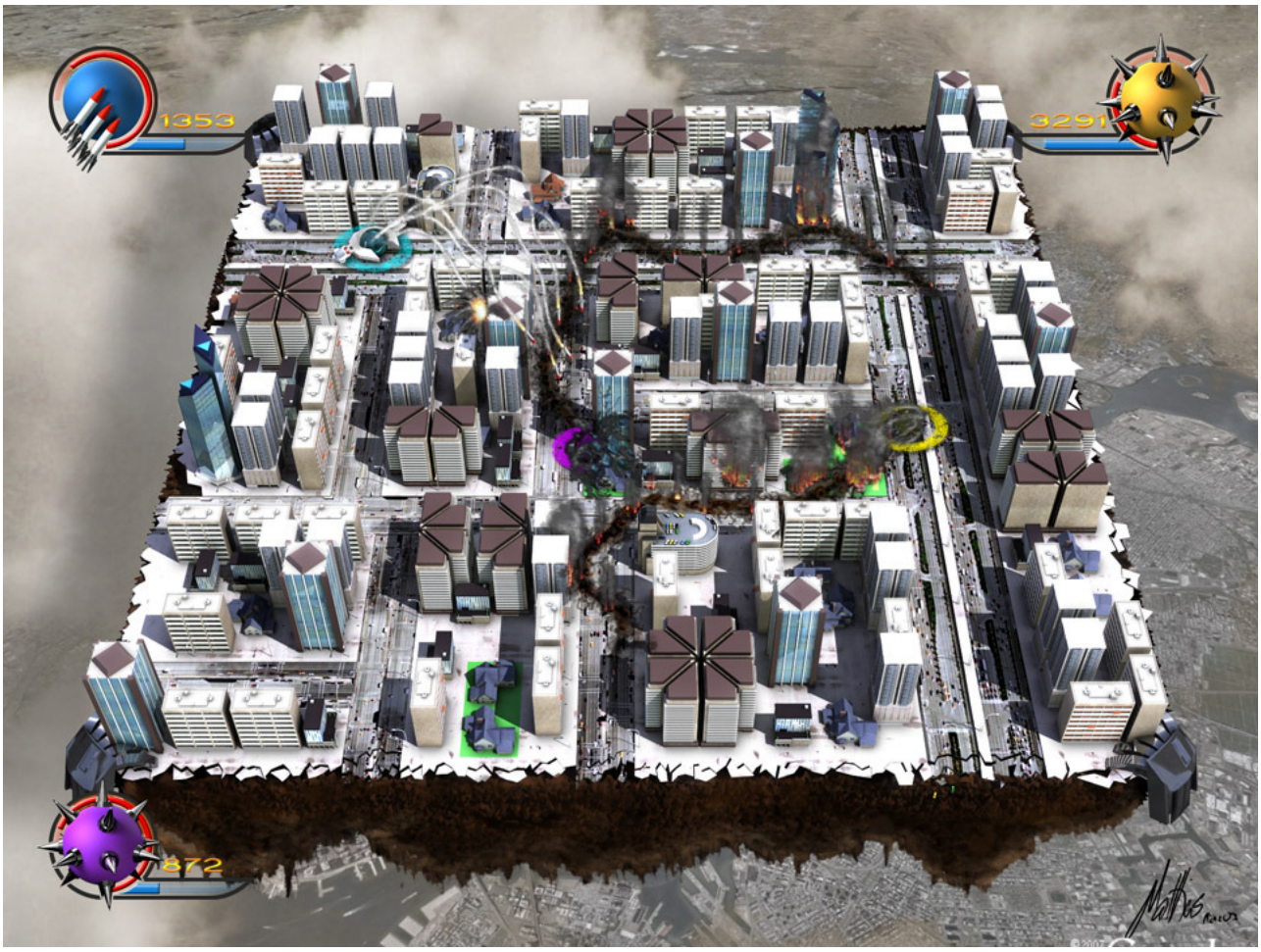
Single player

We will also implement a single player mode with some enemies that try to knock the player out, controlled by an AI. The primary goal of the single player mode is to practice for the next multiplayer match against other, very skilled human opponents.

Game Display

The game is in 3D and played in a vertical top-down perspective in which you can see all players participating in the game (we want to avoid split screen, since we don't want that every one "plays a multiplayer game alone" but that the action is verry concentrated and the players are always in direct conflict). During the game the view direction of the camera will be fixed. But it can zoom in and out and change its position according to the positions of the balls. The main constraint is that always the whole action is visible on the screen.
When a player has won a game the camera can also move and show the audience and other parts of the game world.

The maximal power and the mass status for every player are always displayed during the whole game as they are the most important elements to know for each player. These elements are shown as a status bar on the edges of the screen.



Concept Art: Ingame study of a multiplayer battle

Technical Elements

Game Logic / State Management

One of the major elements of the game is of course the game logic that consists of the gamestate management (championship, begin battles etc.), handle dead players (ghost mode), definition how the power-ups influence the player and the world (e.g. different control style while guiding a missiles), controller input, force feedback and everything else that's not covered by the other points below.

Basic Physical Simulation

This point covers the "world physics", that are crucial for the gameplay of the game. This contains the general Collision Detection, Ball Physics, Deformable Terrain and Rope Physics. We plan to not implement a general purpose physics engine for that project because of the very limited available time. We primary just simulate the balls and handle collisions between them and the rest of the world, because these are the only rigid things that move in the

scene. We will implement the ball as a point mass (not a simulated sphere that rolls), that receive a force controlled by the player. We need to implement collision detection and the responses for the following cases:

- Ball/Ball collision - Calculate appropriate bounce for both balls
- Ball/Building collision - Damage the building at the hit point and bounce the ball
- Ball/Ground collision - Simple heightfield query at the balls position

For other purposes of the gameplay where physics matters like the power ups, which can also need some collision detection and physical behaviour (rockets, magnets, ...) we will implement special, sometime not necessarily physically correct physics, because our main goal is to create a fun game, not a scientific correct physical simulation.

Rendering System

The rendering system primary needs a scene organization like a scene graph where all the displayed objects can be organized in a hierarchical way. We will also address the generations of shadows (in a high target we would like to implement shadow volumes that even influence particles). Another element is a proper “Render Path Manager” where we can define different paths for a material, which allow a nice integration of shaders into the system. As high target “Ambient occlusion” would also be nice to have.

Particle Systems

One main technical element will be a particle system. There is a lot of action on the screen, like buildings which are destroyed and the unleashing of some powerfull powerups. All these things can be displayed with particle systems. This will lead to a flexible system which can handle all of the required uses like rings of fire dust of destructed things and react on spacewarps like near explosions, wind and so on.
We will first implement a prototype that evaluates the challenge of implementing a particle system based on a vector field that can influence the particles for example by an explosion.

Building Physics

Another main part of the game’s rocking appeal consists of the destruction of the buildings. To accomplish this we need an appropriate physical simulation. But our main goal is to make this look good and not to make it act realisticly. Once the building is destroyed it will not have any impact on the game. We restrict ourself to this as we know that it is very hard to implement a physical system which works and is realistic. We will most likely build it up until it looks good enough for our purposes by playing around with it.

Pedestrian Simulation / Basic Agent AI

The game takes place in city. So it would be nice if there are cars driving and people running around. But as this is not important for the game itself it will rather be a nice to have feature on which we only will concentrate ourselves if the rest of the game works well.
We would also need some basic AI for the single player enemies that could be a combination of steering behaviour and a little path planning.

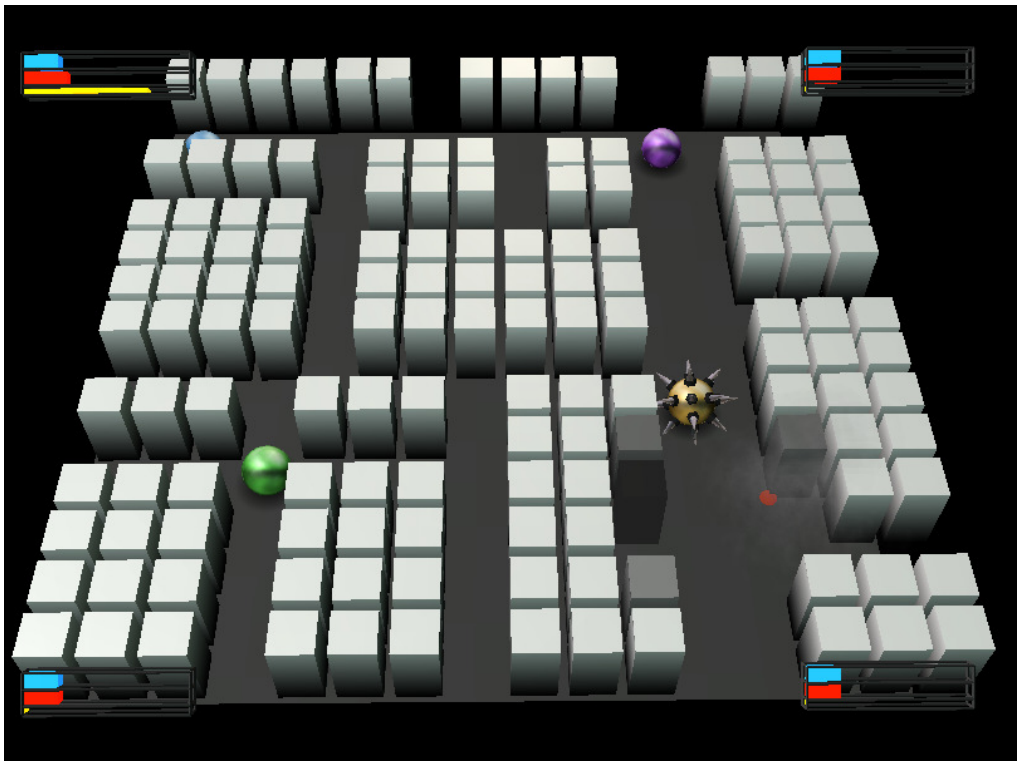
2. Development Schedule

Prototypes

Additional to the final game we will first implement some prototype applications, that analyze some of the major advanced techniques that we would like to use in the game. That concerns the building destruction, the rope physics and the “global particle system”.
Additionally this gives the team members the chance to get familiar with the XNA framework and test some basic concepts without directly mess up the code of the final game. After that we are then ready to define a good design that fits in the XNA world and from the beginning we can take care of the advanced techniques we would like to implement.

Layered Plan of development

Functional minimum: We have a game board which somehow represents a city by simple shapes. There are at least 2 players which can move the balls around and pick up power-ups. The player can also push the other players around and of the game board which is the main goal of the game. So in this state the game is playable but will not look as good as expected. As the following stages base on the functional minimum stage, the result of this stage should be as open as possible, so we can easily add the remaining features. We have a prototype application that represents the goal of this stage.



Screenshot of our current Prototype, developed in Shockwave

Low target: In addition to the above the game board will look more like a city. The particle system is implemented and it will look good if a player destroys a building. Also some of the weapon power-ups are implemented and will work well. We also implemented 2-3 power ups that already work fine, but maybe do not look perfectly.

Desired target: In this state the game board will look like a city with a lot of high quality models and used shaders. The sounds and the music are implemented and work well together with the rest of the game. The game is quite balanced and it will be enough fun to spend some time with it and is also fun as the player gets more experienced. Above that the game has implemented all the necessary screens and highscore tables, the player management works well in the sense that each player can select his name and its desired color. In a sentence the game is finished and looks like a game.

High target: The crowd simulation is implemented and the city will look like a living city moving cars and people. Also there is more realistic looking rope-simulation implemented for the hookshot and the particle systems react on spacewarps and deflectors. Also the collection of building parts, that fall to ground will be implemented as high target. There is also a simple single player mode implemented in the high target, which is maybe the most important part of the high target.-

Extras: The physical simulation is expanded and the things which you can do with it like destroying buildings and throwing parts and/or cars to each other would have an impact on the gameplay itself.

Timeline

(DE = Daniel Egger, MB = Matthias Bühlmann, BB = Benjamin Berger)

Until Date	What	Who	Plan Time	Used Time
3.4.2007	Brainstorming	All	60	36
10.4.2007	Demo Building Physics	DE	25	-
10.4.2007	Demo Rope Physics	BB	25	-
10.4.2007	Demo Particle System	MB	25	-
10.4.2007	Requirement definition / UML designs / Algorithms / Gameflow design	All	10	-
10.4.2007	**Milestone 1** (Class skeleton ready, begin of implementation)			
8.5.2007	Funct. Min. Rendering Engine	MB	8	-
8.5.2007	Funct. Min. Game Logic	BB	8	-
8.5.2007	Funct. Min. Basic Physics	DE	10	-
8.5.2007	**Milestone 2** (First functional version of the XNA game ready)			
15.5.2007	Low Target **Design Decisions**	All	9	-
15.5.2007	Low Target **Content Creation (3D Models etc.)**	MB	30	-
15.5.2007	Low Target **Particle System**	MB	6	-
15.5.2007	Low Target **Rendering (Shaders)**	MB	5	-
15.5.2007	Low Target **Building Physics**	DE	6	-
15.5.2007	Low Target **Game Logic**	BB	30	-
15.5.2007	Low Target **Base Physics**	DE	10	-
5.6.2007	Desired Target **Content Creation**	MB/All	120	-
5.6.2007	Desired Target **Menus**	DE	10	-
5.6.2007	Desired Target **Music/Sound**	BB	30	-
5.6.2007	Desired Target **Shadows**	DE	20	-
5.6.2007	Desired Target **RenderPath Manager**	BB	15	-
5.6.2007	Desired Target **GameLoigc**	BB	35	-
5.6.2007	Desired Target **Rope Physics**	BB	4	-
5.6.2007	**Milestone 3** (Desired target reached, game “finished”)			
12.6.2007	High Target **Ambient Occlusion**	All	20	-
12.6.2007	High Target **Pedestrian Simulation**	All	30	-
12.6.2007	High Target **Single Player**	All	20	-
19.6.2007	**Milestone 4** (Final project presentation)	All	10	**-**

3. Assesement

The main strength of our game will be that it is fun to play. We want that some people can sit together start this game and have fun for half an hour and more. This will most certainly not be a game which you will want to play alone and invest a lot of time in it (It is even almost multiplayer only, remember ;-) This also requires that the game is very easy to pick up. Every one which want to participate in the game should be able to play it in less than a minute.
To test if we have achieved this goal we have to bring together 2 to 4 people give them the pads start the game and be quite for the rest of the time and watch our test-participants having fun!