# Interaction Design Project Report
# SteerDroids

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**ABSTRACT**
Nowadays, most video games are created for home consoles such as computers, video game consoles and mobile phones. The goal of this project is to build a game aimed towards an exhibition in Nordstan, Gothenburg. It context is closely related to the classic arcade games. The concept of this game, called SteerDroids, is to build a robot, which can be saved and then loaded into a game level. The levels consist of a course with several obstacles where the player controls his/her robot and take it from the start to finish line using a gamepad. The difficulty of each obstacle depends on the attributes and the lightness of the constructed robot. Many things need to be taken into consideration when designing for an exhibition and making a lightweight and accessible game. The combination of interesting technology, visibility and intriguing gameplay goes a long way in this context.

**Keywords**
ID Project, game development, SteerDroids, interaction design, Gothenburg, exhibition, robot, platformer, level, editor, build, Haemodroids, "build-a-robot-and-play" game, gameplay

**INTRODUCTION**
This report aims to illuminate the reader of the work and thought process behind the project work that took the form of the computer game SteerDroids. The concept and final product was developed at the Interaction Design masters programme at Chalmers University of Technology, Sweden, as a part of an Interaction Design project course.

SteerDroids is the work of four students over the spring semester of 2011, with the aim of presenting the project, incorporating the theme "lightness", at an exhibition in late spring of the same year. The exhibition website can at the time of writing be found at: www.idxpo.se


**Figure 1. The main logotype of the game SteerDroids.**

Interaction Design is a field that deals with the interaction between people and digital products. It is a field that has very much to do with what is expected by the user of the product and therefore how the product conveys information, but it is also a field that explores new ways of interaction.

**BACKGROUND & RELATED WORK**
Computer games designed with public spaces in mind, such as exhibitions, are not uncommon historically. Even though, in Sweden at least, arcade halls are sparse and neglected, they have contributed to the evolution of games and there are plenty who reminisce and treasure arcade games still. In these arcade halls one can play games of different kinds, which are often designed along with hardware that is specific for a particular game. For example, a shooter game that runs on a machine designed for the purpose of running

that game, plus perhaps a gun that is connected to the machine that the player use instead of joysticks or buttons.

In this day and age, computer games are usually developed for one or several of the popular home consoles, PC, Mac or mobile devices such as smart-phones. Arcade games are still released on these platforms, and sometimes the publishers supply specific hardware for these games just as with the gun in the example above. In this project, the context of arcade games are introduced, through an exhibition in Gothenburg, to a game that is a more of a product of the home console era.

Quite the opposite of this approach is the R.A.G.E project [2], developed by fellow students at the Interaction Design masters programme at Chalmers. R.A.G.E is a recoil arcade gun experience that has the user wields a rather large gun with recoil, aiming at a screen and blasting enemies. Even though it was also presented at the same exhibition as this project, and so was demonstrated in its traditional arcade hall context, the developers early on promoted it as something to use at home.

Arcade games are also very much social games, and can be seen trough the perspective of games as social play, as presented by Salen and Zimmerman [1]. This explores how social relations and interaction effects how games are perceived and played. In the context of an arcade the social interaction that takes place is either between players competing or outsiders watching someone else play. How the game is played is different depending on the social relations between these persons. Is it played between friends or strangers? Who is watching you play? In addition to relations players might have outside the game they will also assume different roles within the game itself. These can result in different relations within the game.

## CONCEPT

SteerDroids is a computer game designed for an exhibition. The idea is to have people come by the game's exhibition booth and enjoy a few minutes of fun cooperative and/or competitive gameplay. The main concept is that of robot building and subsequently the testing of said robots. A potential player approaching the exhibition booth would be guided to the robot building part. The robot editor is a separate application from the game itself so that building and testing (that is playing) of robots can be performed concurrently.

After initially having chosen a frame or body as a foundation to build on, the player would choose different tools and items to add to the robot, perhaps trying to make the robot as efficient as possible, if they were so inclined. Then, after naming the robot, the creation would be saved so that it could be tested on the obstacle courses.

These obstacle courses, or levels, are part of a separate application devoted solely to gameplay related activities. Moving away from the robot building part, making room for aspiring robot builders, the player would pick up a gamepad and play around with his/her robot on a screen very much visible to the public. While playing the game the player could have other players join in - helping each other overcome obstacles or just messing around - with the availability of several gamepads.

All robots built are able to finish the level without the aid of other robots. A robot missing a certain tool is still able to clear an obstacle, though it may take a varying amount of time depending on the robots capabilities. When building the robot, the player would have to make compromises; choosing a seemingly powerful tool might restrict you from choosing another, one means of transportation might be better in a certain scenario than another. The theme lightness comes into frame here, where the robot's configuration affect the gameplay and with that also its lightness. Also, the lightness theme is infused in the concept as a whole since the game is made to be accessible to a lot of people and light in terms of the load it puts on its players; that is to say it is designed to be a lightweight game.

Having built a robot and tested it, the player would most likely want to know how his/her robot fared against other players' creations. To accommodate for this, the concept of a score for the robots that contribute to the completion of a level is manifested through a highscore list.

### Main goals

If the project had one main goal, it was to design a game for a public exhibition. This entails a lot of things in terms of sub-goals and the way in which to approach the development of a computer game. Such things can for example be how to deal with noise, crowds and lighting conditions.

A goal was to grab as many by-passers attention as possible, so the game had to be available to all ages and genders. Therefore, to have an easy and accessible concept to capture initiates, yet at the same time offer some deep in terms of gameplay was an important goal.

Another desired attribute was to have players feel connected through the game. This one also ties into the spatial social arena of the exhibition, where people share moments with strangers through, in this case, a game and then move along. The point was to make the effort spent in the game feel worthwhile.

Since the projects theme and concept was to be inspired by the concept of lightness, it was also a goal to incorporate this in the work, theme, gameplay, presentation etc.

In conclusion, the following were the main goals of the project:

- Tailored for exhibition
- A game for everyone
- Temporal connection
- Infuse lightness

### Ending up with the concept

As stated earlier in this report, the exhibition in Gothenburg (more specifically in Nordstan) was the event at which the SteerDroids project was to be presented. Since the nature of the demonstration context was known from the beginning of the project, SteerDroids was designed with the location in mind; it was considered to be an arcade hall style environment. Nordstan was visited on a few occasions in order to gather information about what had to be taken into consideration. This lead to some realizations on what would work and what would not.

The game idea itself started out as an idea of building robots or creatures by specifying joints and limbs, very much like the application Sodaplay. The idea grew into incorporating having the player steer the creation he/she had built through a course filled with obstacles. Also the detail at which you build these creatures in Sodaplay were simplified as it was considered to be a task too complex to be completed in just a few minutes, which is the time players would spend on the game. The core idea is still the same with the project that was eventually shown in Nordstan.

The process used early to find ideas was discussions within the group. Since the group collectively has accumulated quite a few hours of playing games of different kinds, inspiration for the project came from many different directions. Little Big Planet is one of these sources of inspiration. It is a PlayStation3 game where up to four players customize an avatar each and then play different platform levels together. The game has 3D-graphics, yet the gameplay is basically in 2D. Spore is a PC game that influenced the project with its creature creator, where players drag and drop limbs and features onto creatures. Robot Wars also deserves a mention; the TV show where contestants build robots equipped with weapons that face each other in battle. These were a few examples of concepts that inspired SteerDroids, in the beginning, as well has throughout the project.

## REALISATION

Prior to the development phase of the concept and game, we had scouted the location of the forthcoming exhibition - Nordstan, Gothenburg. Since the type of atmosphere this location provided eventually became a part of our concept, some of the observations made concerning the location became important keys in shaping the game and its setup.

The project would be set up inside a mall. The environment would be noisy and loud. There would also be a lot of people passing by throwing fleeting glances in the project's direction. The people visiting the exhibition were expected to come from a wide range of backgrounds and ages; and all with varying computer abilities. This was because of the nature of a mall, which attracts all kinds of people.

So when it came to deciding how to setup the project, there were a few things to keep in mind. In order to catch people's attention, over the commotion and over other projects, we figured that a large screen would help and therefore went with using a projector for the game. The hope was that it would help seize people's attention initially, and that they then would be drawn to the booth by the action they saw on screen. Another approach was chosen for the editor. We figured that we would need something intriguing for this part; we did not want to plug in a mouse and keyboard for the player to use, partly because we felt it might alienate a lot of people uncomfortable with the traditional computer setting, but also partly because it lacks any sense of novelty. We chose to use a touch screen interface for the editor, which we thought would provide an intuitive interaction for people. At the same time, in the midst of the iPhone and iPad era, we supplied an interface to our editor that could be considered very much "in" and popular.

Due to the noise factor, we also decided to skip sound-effects and soundtrack in the game. Being purely designed for the exhibition and not home use, additional sounds to the already buzzing environment would have little impact on the overall impression of the game. A few people could even be scared away by the additional noise. Therefore, we felt that the extra time required to implement this to the game was unmotivated. Sound is something that traditionally has been neglected by many game programmers and designers, but it is very much considered to be a very important aspect to game engines [4] and in extension games. Sounds can be used for player feedback, giving the player important clues to what is happening on screen, as well as providing a suitable atmosphere for the game [3]. The atmosphere was in the case of SteerDroids given by the external environment, and for player feedback it relied on visual cues.

Giving the player feedback on what is happening on screen is important, so that the player can understand and react to events in the game. Since sound was excluded as a feedback source, the focus was put on visual feedback. Examples of visual feedback in SteerDroids include dust clouds that appear when a robot is ramming a tree, or the fire that appears on the robot when it passes through a wall of flames. In the state the game was presented however, personal was needed at the location to explain certain aspects of the game.

Also related to the goal of making a game for an exhibition, was the accessibility of the game. To accommodate for this it was decided that the game should provide drop-in functionality. This means that at any time, a person can pick up a controller and join in with a robot; of either his/her own creation, or someone else's. It also meant not making the game too hard or complicated for inexperienced users.

### Methods

In the beginning of the process, after deciding a starting point with a theme to explore, the intention was to quickly get started with some prototyping to see if the current ideas would be sufficient for the project. As the early process plan

suggested, paper prototypes of the game components were going to be made for stating the structure and also software prototypes for testing the interaction with the real interface. Though the paper prototyping felt inconvenient for testing, and the most important realization that was extracted from it was how the design of the graphical interface should be and what the game components would be and look like.

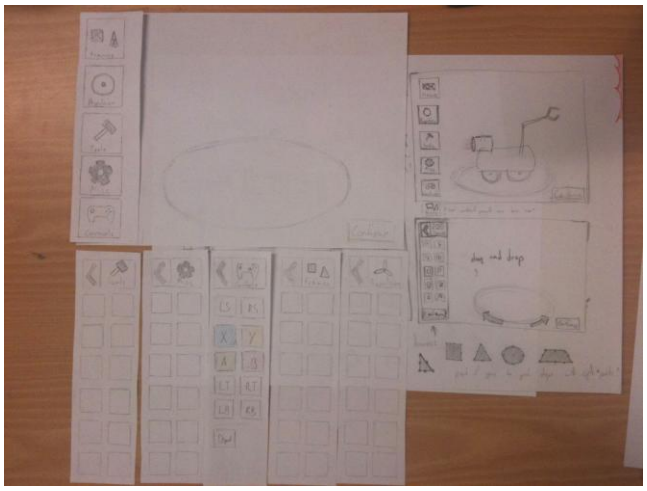

**Figure 2. Paper prototype of the editor.**

The two most prominent component types were building parts for the robots and course obstacles for the levels. Some of these were sketched during the paper prototyping, but a more complete coverage was achieved through brainstorming. This phase gave both a lot of silly suggestions and some useful things. To decide which of these to focus on, all suggestions were prioritised and most of them were neglected after that.

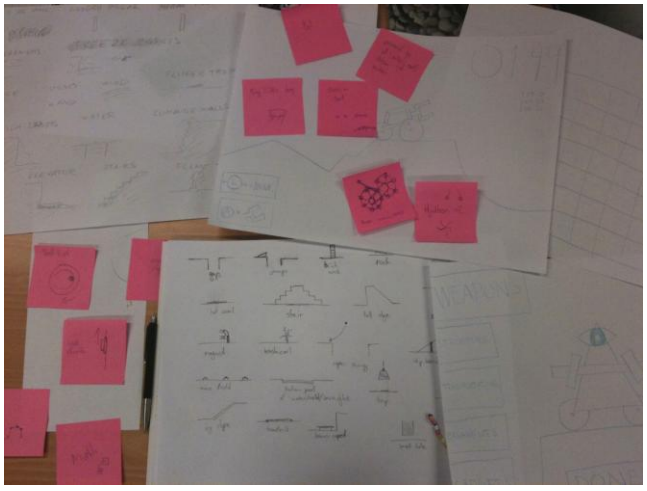

**Figure 3. Early sketches of obstacles and robots.**

The work on a software prototype started quite early, to get something to test and build upon. There was also a certain risk of questions arising while coding the game, being another reason to start as soon as possible. An iterative approach for the development was used. Responsibilities were divided, mainly but not completely into the two different parts of the project, being the editor and the game world. Another method used during the development was pair programming, mostly when code produced on two separate machines were merged. This and other bigger issues have often led to problems solved in pairs.

As the software prototype were complete enough to be tested, which took more time than expected, we performed some user tests which had some influence in further development. Although the game would benefit from being tested more thoroughly, time was not sufficient. And continuing getting other vital functionality implemented did seem a more important task towards the end of the project.

### Technology

The game was implemented using the Unity game development tool. A few other engines were considered. The main contender with Unity was the Unreal Engine and the Unreal Development Kit. The Unreal Engine offers many advanced features and is very powerful; however there was no need for these features. Unity on the other hand is easy to work with and is perhaps more suited for making other types of games than first person shooters. The decision to use Unity over the Unreal Engine was based on that we did not feel the need for the more advanced features of the Unreal Engine, and the expected shorter learning period with Unity would likely give more time to work with the project.

The coding was done in UniSciTE (Windows) and Unitron (Mac), both bundled with Unity. It is not classic code in the sense that you write a full program, since most of that functionality is built into Unity. Instead, we create scripts and attach them to different objects. These scripts were written in the scripting language JavaScript. It was also possible to choose C# and Boo but JavaScript was the language recommended by Unity and it also allowed us to bypass the need for includes in our files.

We also created a few 3D models for our project. For this we started using Blender since it is a free program that works both on PC and Mac. However, not everyone was comfortable with the program and those of us who had access to 3D Studio Max used that program in its place. For most of the models, we just added a material with a colour to paint them, but in a few cases, such as the umbrella, that was not sufficient. Instead, we created textures using the free painting program called The Gimp.

### Final result

The game consists of two parts, one application runs the editor where you create robots, and the other is the actual game. They communicate through a network connection; when a robot is created it is sent from the editor to the game application where it is stored locally.

In the editor you first choose a frame to build upon. Frames have different weights and number of slots where you can place tools. You can then start adding tools or propulsion parts such as wheels and legs by dragging them onto the

frame. You can browse all available tools in a menu to the left.

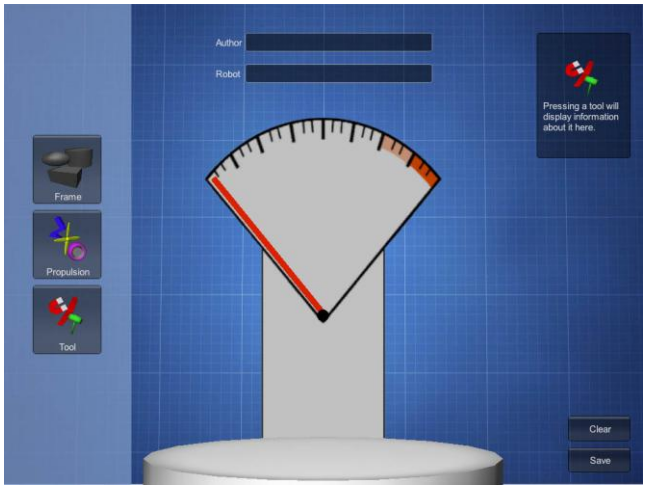


**Figure 4. The editor shown at startup.**

Just as every frame has a weight, every tool also has its own weight. The sum of all the tools attached to the frame, together with the frames weight, gives the total weight of the robot. The weight affects how fast the robot will be able to move and how much it affects, and is affected by, different obstacles. How heavy the robot currently is can be seen by a scale in the background. Each tool has a specific use in the obstacle course. To give the user some idea of what a tool does, a small information box contains a short description of the tool last held.

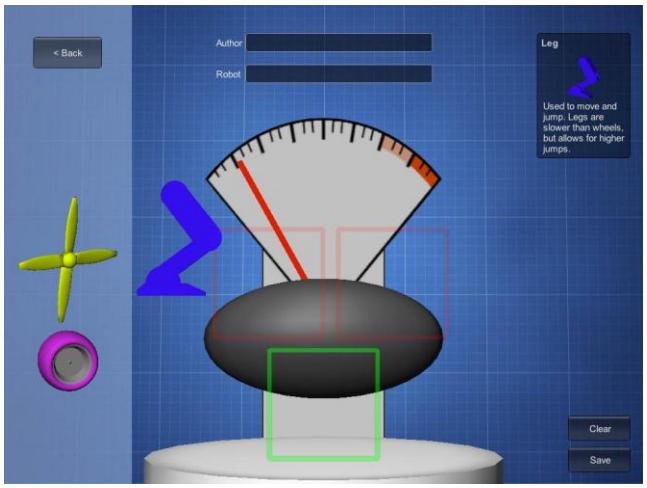


**Figure 5. Information for the held object (leg) is being shown at the upper right corner.**

Finally you can enter your own name and the name for the robot. By pressing one of the edit-boxes a keyboard appears. When both names are entered the robot can be saved. To allow the next user to quickly start building their own robot there is a clear button which removes the frame all attached tools as well as the author and robot name.


**Figure 6. The input fields move to the middle of the screen and the keyboard appears when an input field is pressed.**

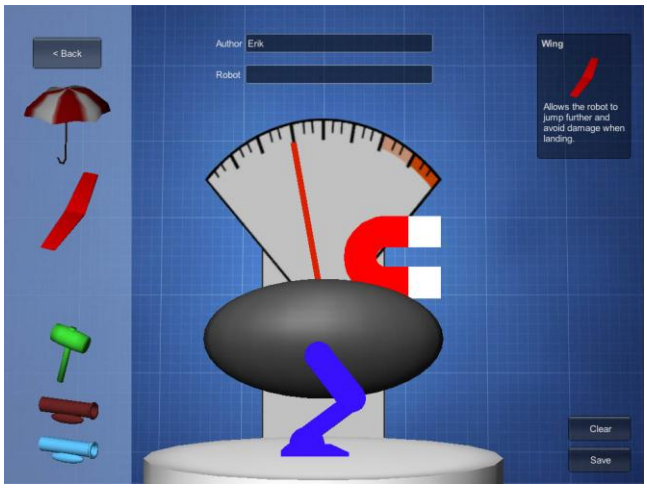


**Figure 7. The input fields moves back on top, containing the entered names when pressing "done".**

As soon as the robot is saved, it can be loaded into the game world and played with in a level. When starting the game the user is presented to a menu where three alternatives can be chosen. Either the user chooses to play a level, which leads to another menu where a level can be selected, or the user can look at the current highscore or read information about the program through the remaining two alternatives respectively.

Upon entering a level after it has been selected in the menu, a default robot appears on screen. To instead load a created robot into the world, the user presses the start button to get a list with currently saved robots where the most recently created robot is placed on top. After doing this, the robot can be played with using its tools and trying to get past the obstacles in the level as quickly as possible. A timer starts as the player exits the level, and the time is recorded at the finish; all of contributing robots are then added to the highscore list.

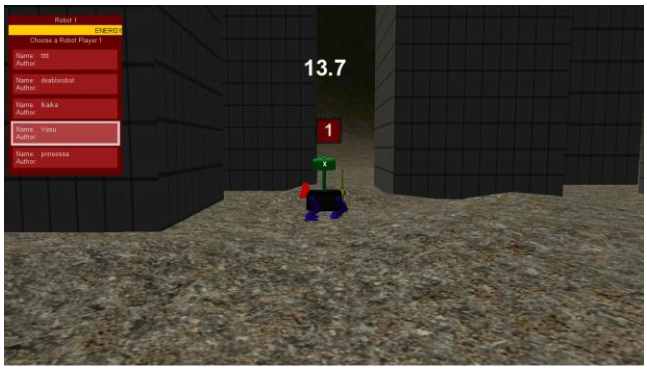


**Figure 8. Player 1 is choosing a robot from the list in the upper left corner.**

Hopefully the user will notice the consequences from the building part as the robot's progression will be hindered by having a too heavy robot, not getting past obstacles or loosing energy (taking damage). The latter could for example happen when being burnt by fire or falling from a steep cliff, two things which can be prevented by having the right tools.


**Figure 9. A robot trying to get past a tree by using the hammer to knock it down.**

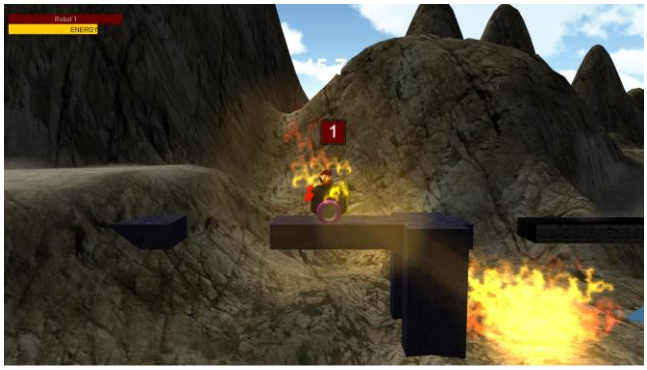


**Figure 10. A robot on fire, loosing energy and being slowed down.**

For the exhibition the computer running the editor was controlled via a touch screen, and the game was played with Xbox 360 controllers. The game was projected onto a projector screen.

**Figure 11. The physical setup at the exhibition.**

## EVALUATION

A general opinion about the game after the exhibition was that it worked very much according to the expectations and presumptions. Unfortunately there were some comprises done to the setup due to technical issues. Only one touch screen was used, where we had originally expected to have two, limiting the amount of robots that could be built simultaneously. Also the projector was not positioned in an ideal way, which resulted in the screen being occasionally and temporary blocked by by-passers. Also it was not as big as first intended. Looking at the goals however, the flow was quite good meaning that people could come by and get started, play through and understand the game rather quickly. People would drop-in in the middle of a game sometimes, not very frequently but sufficiently often to see how it turned out, which was alright.

The span of ages among the players was much interesting; a very broad span could understand and enjoy the game in various ways. Some users may not have been completely aware of the aims of the game, but still got something out of it. Regarding potential "expert" users some tried out the game mechanics really the way they were intended to work. An example would be building an arbitrary robot at first, then play the game before repeatedly making improvements in the building phase and trying out the robot's ability by playing a level. This was done by a few players at the exhibition, but would probably have been further explored if the players had more time to spend on it. This is one reason to extend the future work with adapting the game for being played on a single computer, for example with a mouse and keyboard (see the following section).

A look at the highscore list and the list of built robots that were recorded during the exhibition reveals that about 300 robots were created, which equates about 50 robots built each day of the exhibition. Also, almost 200 times a level was played through during the weekend that wrapped up the exhibition.


**Figure 12. Visitors playing the game at the exhibition.**

One thing among others that needs to be looked over, after performing the most extensive test at the exhibition, are to highlight and emphasise the importance of the building process and possibly enhance the interface to be more self-explained. Since the opportunity to guide the testers through the process was used, there was no problem with confused users at the exhibition. However, it may well be the case if the user by itself is confronted with the interface since the supporting information on-screen might not be optimally placed and no real tutorial is provided. Also, in the playing phase there was some guidance in the form of explaining controls to the players. This could also be done by some on-screen instructions or tutorials, which also was provided as the exhibition went on and some things were improved. One thing that was not fixed was the lack of possibility to just quit a level and restart or choose another one. This is, and would have been a major issue if the highscore feature had been working from the start of the exhibition. Unfortunately, since that was not the case, the effort of making it possible to restart a level were not that highly prioritised.

In regards to the project adhering to the lightness theme, lightness was worked into the gameplay. A robot and its components have different weights, and the robot handles quite differently depending on what components have been added to it, and what frame, or body, was chosen for the robot. In order to highlight this concept, the robot is placed on a large scale in the editor, so that the creator can see how heavy, or light, it is. Another aspect of the lightness theme was the small-scale, lightweight part. The game is small in scope, with its two levels to play through and the editor to play with robot configurations. Coupled to the goal of designing for the exhibition, the lightweight game concept aims not to have people strain themselves when passing by and picking up a controller. Instead, at least at the surface level, the game should present an easy to understand concept and inspire people to have fun with it during that small amount of time that they spend visiting the exhibition. Looking at the statistics present above, with the amounts of robots built, and levels played through, it would seem people approached SteerDroids in the intended way.

## DISCUSSION & FUTURE WORK

The attempt to form a temporal linkage between people did not work as intended. This was possibly partly because players did not have a good way to see what alternatives they had when it came to selecting which robot to play with. The list of robot available in the game was simply a list of their names and author. Instead a better description of the robot should have been given, for example a picture of what the robot looked like. Also the feature to edit old robots was removed eventually because of technical issues and time constraints. This would have allowed for a better way to connect with other players.

Something that was not considered enough was how to convey the goal of the game to the player in a sufficient way. As a result whoever was present at the exhibition presenting the project, had to explain that it was not necessarily meant to be a race between the players, but rather between other teams of players. It is not strange that the players were confused since nowhere is the fact that they are in a team shown. There is also no explanation of where to go with your robot. The players participating on the exhibition often had troubles understanding what the objectives to complete a level were.

Another issue we had during the planning process was that we did not always agree about all the details. We did spend sufficient time planning the game but in a few cases we just talked about it and left the final decision for later; motivated by that we would have more information to base the decision on. In later stages of the design process these decisions often turned out to be decided by whoever was responsible for coding that part of the game. The decisions were not necessarily bad on their own, but they sometimes clashed with other decisions made concurrently. An example of this was the drop-in feature allowing players to choose the robot in game combined with a highscore that gave a score based on the time from the start of the level.

One area that was neglected due to time constraints, among other reasons, was the GUI (graphical user interface) of the game part. While time was given to prototyping and designing the editor in some detail, the game part basically consisted of what would ideally have been only temporary GUI parts, or HUD (heads-up display). During the development of the game part, the time was spent on designing the key functionality in an effort to make the game as playable as possible and to reach our goals. The fact that the GUI part was given the shaft was unfortunate in that a good GUI helps improve the overall impression of the product, as well as providing useful player feedback. However, the rudimentary GUI that the game part has did fill its purpose, and since the project's exhibit was supervised at all time, it was considered a feasible thing to cut from the project during the final week. For example, the initial plan was to create a panel in the bottom of the screen

with small pictures of gamepad keys, which would be accompanied with a short text explaining what it does. This would have been very good to have as most users on the exhibition have never played the game before and it is always difficult to learn and remember the controls of new games. We did however try to comply with the de facto standards of game controls of today when it comes to which button to use for jump, etc.

### Future Version

SteerDroids was built exclusively for an exhibition. Thus, the current version relies very much on the exhibition setting. In a future version we would like to move away from that and tailor the game more for playing at home, since more players could enjoy it that way. As it is right now, the game would feel incomplete in an environment outside an exhibition setting as most focus was put on making the actual game rather than in-game content. This works well for an exhibition since most players do not spend a large amount of time playing the game. Naturally it would be reasonable to increase the amount of levels, the amount of obstacles and the amount of robot tools in a future version. More effort could also be put on making better models and textures to the game. The balance of the tools and levels is also something that should be improved. The game is also missing sound as it is right now and it would be good to have that in the future, especially if people are going to play the game at home. The select robot part of the game could preferably be placed in the menu as well as in the running game. This would give more space to show what the robots look like. Possibly, the robot display could also be used for the editor, since a feature to load old robots in the editor was planned, and abandoned only due to lack of time.

The touch screens worked well in the public format but they would not be suitable in a home setting. In addition to the rarity of home touch screens, it would feel more reasonable to use the same control device for both parts of the game. A decision should be made for which platforms and controllers to tailor the game for. Another problem with the game in its current state is the poor information on how to control and play the game. The game should be less dependent on always having someone there to explain it. There needs to be more and better feedback from the game. Even a version, like the current one, targeting an exhibition setting would benefit from this. Additionally, a manual explaining all parts of the game thoroughly should be added.

Another idea that was mentioned by some players at the exhibition was to add a death match mode where the robots could fight each other. This would be a good way to test the robots and also add another kind of gameplay that appeared to be wanted by many players. The idea of adding a level editor was also mentioned but that is low priority since the levels are made in Unity right now and not an editor of our own creation.

A good level editor not directly connected to the Unity editor would be very difficult to make, and it is not a feature we believe would greatly enhance the game.

The overall presentation in SteerDroids worked quite well, considering the circumstances of the exhibition. However, it is one area that is lacking, most prominently in the gameplay part. Making the game look better, run better and perhaps most of all: present better, would be a priority for future work.

## CONCLUSION

This project set out to introduce a cooperative/competitive game, usually played on a couch in front of a TV, to the context of an exhibition. The result, SteerDroids, was played during almost a full week and weekend. Its concept, visibility and accessibility helped it achieve almost 200 level playthroughs during the weekend alone, with player building roughly 300 robots over the whole exhibition. In short, the game worked well in the exhibition setting. The project was visible and attracted attention. The creation of robots seemed to intrigue many and the concept was received well by most. The touch interface of the editor was functional as well as a catalyst for people to try out the game.

When it comes to the development process, time - as so many times before - turned out to be an enemy in the end. This could possibly be attributed to poor planning, yet the most crucial parts of the project were implemented and the things that did not make it were often well motivated to cut. The early stages of the project did consist of a healthy amount of planning, however, the amount of features that was planned to be implemented turned out to be on the optimistic side. If possible, we should have more information to base our decisions on when estimating the time and effort it takes to implement features. Redoing the project today, focus would be on trying to be more organized in the beginning of the project, whatever changes in decision making that would entail. More communication between team members throughout the whole process is something that never hurts, even if the overall communication was considered good.

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