

# In Memory of Murph

Post Mortem of HyperDuct

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## 1 Introduction

The project was to create an arcade game that does not use traditional inputs (such as keyboard, mouse or gamepad). We, of Team Overscope, wanted to create a game that provides a feeling of ‘instant fun’. After going through several ideas, the one we decided on was a combination of air hockey and pinball (since both are very popular arcade games, even though they don’t have the flashy computer graphics of others). We decided to make the play area an actual tunnel! The purpose of the tunnel was to make the game more engaging, immersive and unique. Players control two paddles each, using motion tracking controllers. The game responds to the movements intuitively, without the need of pressing any buttons!



My role in the project was that of lead programmer and my main contribution was the input for our game, Hyperduct.

## 2 The Bad

In this section, I want to talk about the things that were more bad than good. Things that affected the project in a predominantly bad way.

### 2.1 Paddle mechanics

We wanted to add a lot of features to the paddles, such as a tilt mechanic (where the player turns the paddles by turning the controllers) or a smash mechanic (where the player moves the controller in a fast movement to bounce the ball back faster than normal). I took on the task of doing this, but in the end, I failed. I did manage to implement the smash mechanic but it didn’t feel intuitive on it’s own. To get it working properly, we needed to make it so that the paddles can move backwards and forwards (in addition to the already existing sideways movements). But, even though I wrote the code for it, there wasn’t enough time to test it or polish it. In the end, we decided not to include it. There wasn’t enough time and we had other tasks to focus on. As for the tilt, I couldn’t get it working at all, because I wasn’t familiar enough with the rotation system (Quaternions and Euler Angles) used in the Unity game engine and I couldn’t figure it out in time.

### 2.2 PSMove/Wiimote

We started our work with PSMove and Wiimote controllers, as they were cheaper and more easily available. I was able to get the data from them. The problem was, the data wasn’t very precise. The PSMove randomly detected the bright objects in the room, including bright T-Shirts. There were some suggestions about the players wearing ponchos while playing! In the end, we decided not to continue with the PSMove unless we ran out of options. As for the Wiimote, the plan was for them to track IR Diodes which we planned to attach to our custom made (physical) paddles. I

managed to obtain the IR data tracked by the Wiimote, but it turned out that they also tracked the infrared radiation in sunlight! We may have been able to fix this by using more powerful diodes, but I did not want to risk it, especially since the controllers seemed to have some connectivity issues as well. In the end, I decided to buy an HTC Vive since the controllers for those offered a much higher precision and would save us a lot of time. This turned out to be the right choice, and our game probably wouldn't have turned out as good as it did if I hadn't done that!

### 2.3 Working in a team

Working as a team in itself is not a bad thing. Nor did I have a bad team. However, I am writing about it here, because I had some trouble fitting in, in a team. I want to emphasize this again, I did *not* have a bad team, it was my own trouble with working as a team. I am not used to it and I had trouble because of that. The team members were tolerant of this to a high extent, and tried to help me fit in, but it still wasn't easy. My previous project ended with me having a lot of doubts about whether I should have been more open about my disapproval of some things the others did. I felt as though I was betraying myself. So, in this project, I did the opposite. If someone did something badly (in my opinion), I stated that openly. And it did lead to some tension. I did not approve of some of the ideas or work methods of the others and I told them directly. However, I think that overall, it was for the better that I did so. But it did probably result in me being rather annoying to the others. In retrospect, I should have listened more and tried to communicate better. But I didn't and that is something I should work on. Although, for now, perhaps it is better I work alone. Mainly because I don't want to drag others down for my failings.

## 3 The Good

Nothing is ever completely bad or completely good. Now, I want to talk about the good parts of the project.

### 3.1 Vive

Perhaps the best thing that happened to the project was getting our hands on an HTC Vive. Once I got it, I managed to implement an input based on it in a matter of minutes (thanks to the work I've already done with the PSMove and Wiimote controllers). The precision offered by these controllers were amazing! It tracked all the movements precisely and allowed us to make the paddle movements natural and intuitive. We were also able to run a few simulations of the tunnel in Virtual Reality, to test how it would feel and adapt accordingly. And, for our future plans of making it into a VR game as well, the Vive would prove an invaluable asset!

### 3.2 Input

Although a part of the Vive, I am writing about the input separately. Here, I want to talk about the process through which we reached the final input we used and how it turned out to be so good. Not about the hardware that was used, but the thought process and teamwork. The initial idea was for the controller to only move the paddles when the arms are fully outstretched (the rest of the team were adamant about this). I did not think this was a good idea, however I made the code for it anyway (I did not enable that part though). The first test proved my theory right, it was exhausting to have the arms outstretched at all times! But the way I implemented it had a few flaws as well. The testing revealed that it felt more intuitive to move the arms forward a bit, towards the balls coming to you (as though you want to catch it). But the code considers this as an angular movement and moves the paddle away! The second iteration of the code fixes this, but it still had the problem that it needed to calibrate base positions before it can move paddles. For the third iteration, I changed this so that the controller gets calibrated automatically with pre-determined points. This code was working well enough, but towards the end, after many patchwork, it started to look a bit messy. So, for the last iteration, I wrote a simpler version of the code, combining four scripts into two simple ones. This made the code easier to understand, work with and manage.

### 3.3 Trailer

Even though it wasn't really the best trailer we could have had, I think the one we ended up with was more good than bad. We wanted to make a trailer with live footage of gameplay in the tunnel. But we couldn't get the projection working in time. On May 19<sup>th</sup>, we had a deadline for the Beta version of the game and for the trailer. We spent all day trying to get the Beta working, and failed. So, we had approximately two hours to make a trailer and no good footage of the tunnel! With this, I set to work. In about one hour, I managed to get some gameplay footage, music and an animated logo. Our designer and project manager came by and lent their hands. And, literally in the last minute, we had a trailer ready and we uploaded it. It was a decent trailer, but it could have been a lot better. Fortunately, we got a chance to improve it. Even though we were past the deadline, we were still allowed to upload a newer version. With the extra time, I managed to improve the clips that were used and the text between the clips. In the end, we had two new trailers. One with the game running on a computer screen (gameplay) and one with actual footage (live action) of the game projected on the tunnel. But, we couldn't decide which one to use. Most of the team wanted the one with actual footage if possible. The problem was, we weren't sure at that point if we will have the tunnel working! In the end, we went with the gameplay trailer, both because the actual footage wasn't of very good quality and because we were still unsure about having the tunnel. We all would have preferred one with good quality live footage, that would have been the better choice, but we had to resort to using what we had. Even so, I think the end result was good.

## 4 Summary

It was a long and difficult journey, but in the end, we managed to pull it off. Most people thought we wouldn't succeed. Even I didn't think we would manage to finish it. The hardest part was the tunnel, we ran into a lot of problems, one after another. There was even a joke about the tunnel being haunted, which led to us naming the tunnel 'Murph' (after Murphy's Law). But, in the end, we did it! We made a huge tunnel and a game that works in it! We managed to get the projections working and the game running along the walls of the tunnel! The Vive input (after the several iterations) was easily integrated and worked almost flawlessly. Overall, in my opinion, we had a good, fun game. People enjoyed it, and some came back several times to play another round. We may not have won any awards, but we managed to make a game that people liked. I learned a lot from this project. From an academic perspective, I learned how to work with different controllers, how to work with an HTC Vive (both the VR headset and the motion tracking controllers). And from a more personal point of view, I learned a bit more about working in a team (which is perhaps the harder challenge for me), of what to do and what not to do. But despite all the trouble along the way, for me, the moment we got the projection working, and the game running on the tunnel, that one moment makes up for everything else! We tried out the game and then sat down gazing at the tunnel, just enjoying the moment. That single, unforgettable moment, that makes the whole journey worth it!