



Instituto Tecnológico y de Estudios Superiores de Monterrey

**Construcción de software y toma de decisiones
TC2005B – Grupo 401**

Campus State of Mexico

Project: Jump N' Bump - Percussive Arts Society

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Jump n' bump

a) Concept/Idea

This project is focused on helping young percussionists to acquire and refine their psycho-motor skills, used in a highly precise environment of performing music. Jump n' bump is a rhythm video game where a character is moving on a map with obstacles and the player has to make precise movements in order to finish the level. The game will try to make an environment that shows how the high sound level is dangerous to people.

b) Genre

Platforms/Rhythm video games

c) History and characters

The main objective is to limit the intensity of sound in decibels to a healthy level. The principal character is a person who wants to protect his ears from hearing loss, while the antagonist is a big speaker that is causing damage to the protagonist. "Lives" in the videogame are earplugs. Each time the player fails, an earplug is lost, leaving the character unprotected against loud music. The setting of the character begins in noisy situations of everyday life that will be represented through scenarios such as a house, streets and concerts.

d) Game mechanics

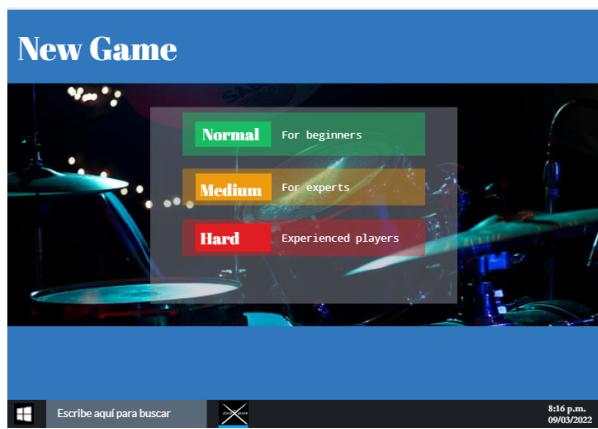
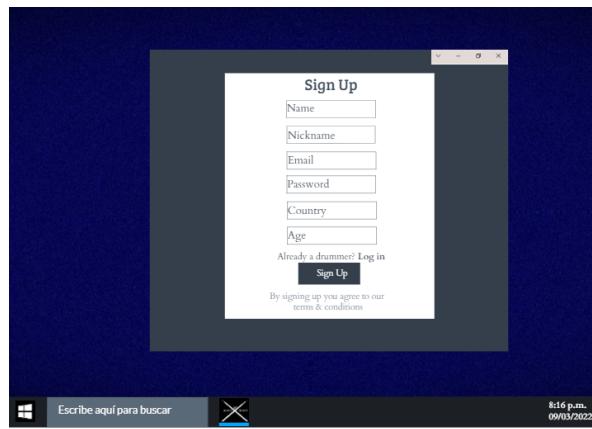
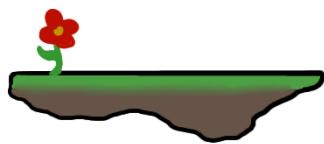
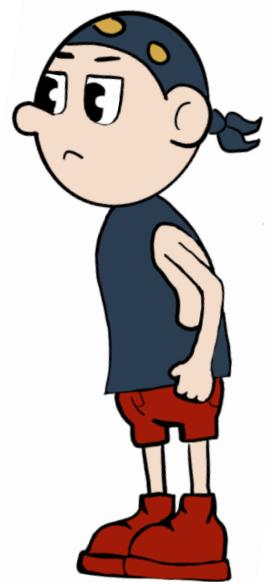
The character will have the possibility of performing several actions, including jumping, inverting gravity and restoring gravity. The player will have to overcome obstacles in the map and at the same time, will develop psycho-motor skills, necessary for performing percussive instruments.

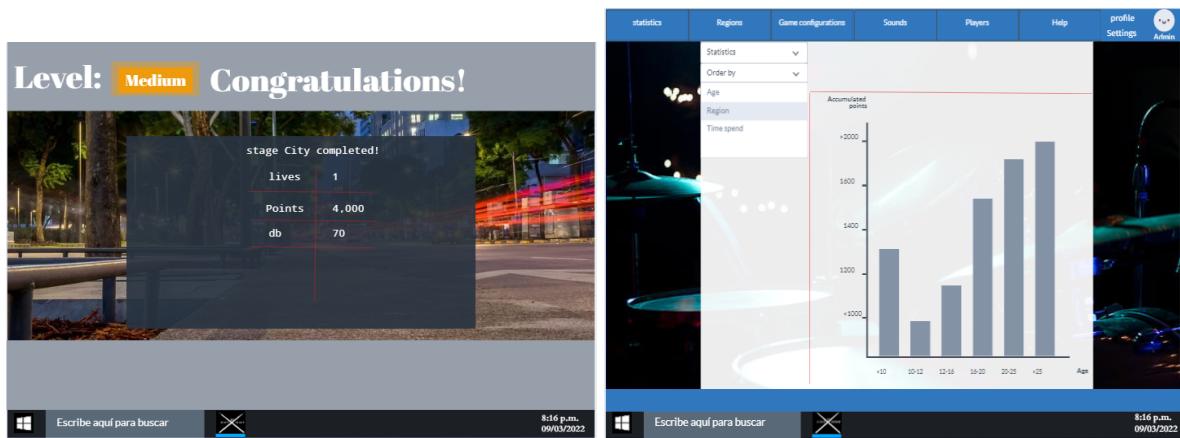
As added value, the video game will represent a failure as hearing damage, producing loud and distorted sounds and cutting specific frequencies from the audible spectrum of the music.

e) Level and design of the game world

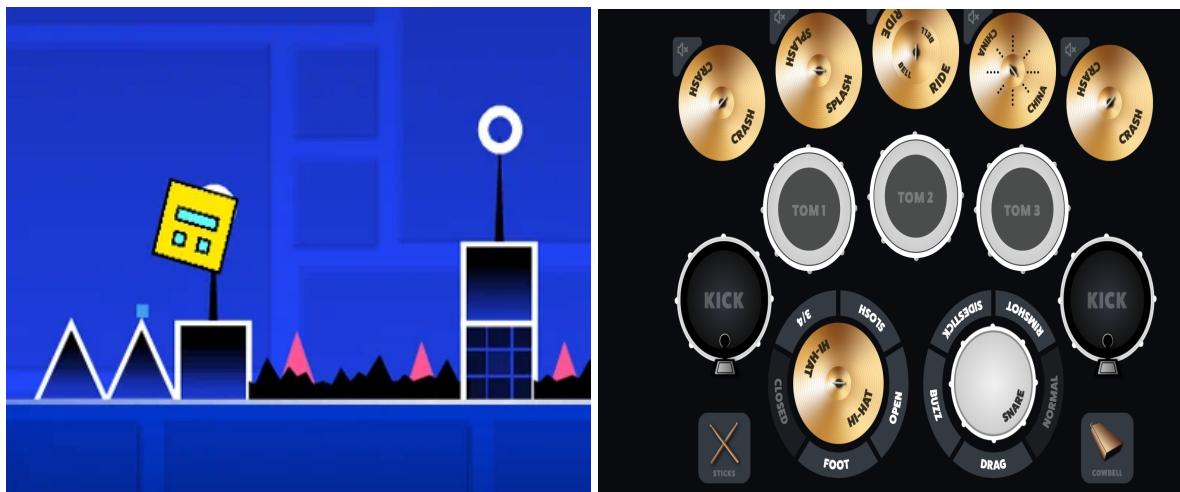
The game world will consist of a 2D map with several platforms and obstacles, where the player will have to make precise movements to prevent collisions. Each level is ambientated in a different setting of sound level: the first level consists in a house or city with ambient noise, the second level in a city with moderate levels of sound, and the third level in a concert with very loud music.

f) Art and mockups





Inspired by:



Problem Definition

The main objective of this project was to create a game that could be of help to aspiring percussionists by teaching them through the game about the things and skills that we considered are essential for them to learn.

Throughout many of the seminars PAS arranged for us we, as a team, identified 2 main areas of opportunity regarding the safety of the percussionist to use as the basis for our game. First we concluded that one of the things that people new to percussion should learn about is the risks associated with exposure to high decibels. Many people underestimate just how easy it is to develop some manner of hearing loss when exposed to high decibels. The second area we decided that our game should cover was about how crucial it is for percussionists to warm up before they begin to play because it is essential to not develop

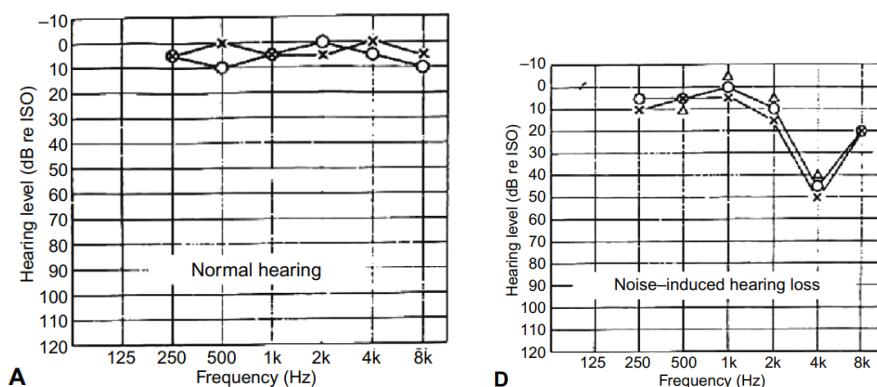
muscle cramps or worse muscular conditions. This in fact was also something that was mentioned to be underestimated and downplayed within those new to percussion instruments since the damage will not show itself right away but will accumulate over time making it very dangerous in the long run.

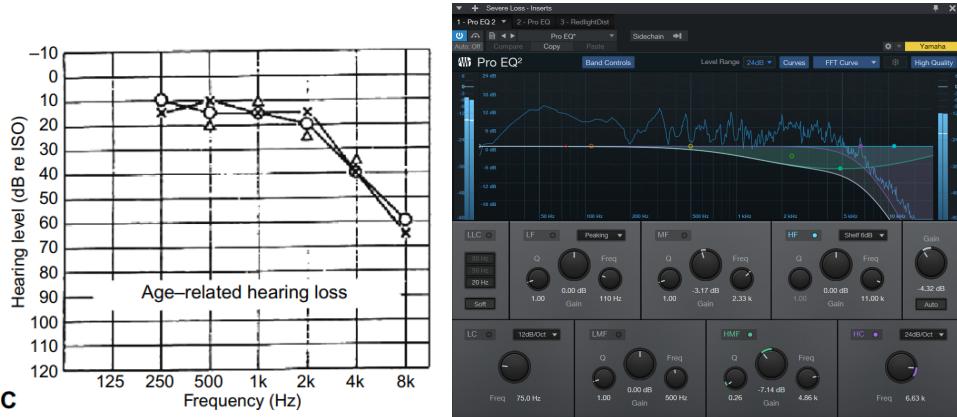
Functional specification

The game is composed of 3 levels with increasing difficulty. Also the main character can do 3 basic moves. Which are jumping, with the space bar, inverting gravity, with the right button of the mouse. And restoring gravity, with the left button of the mouse. This set of actions allows the player to follow the rhythm of the background music in each level.



The player has 3 lives for each attempt in the game. Lives are corresponded with a representation of a level of sound hearing loss reflected in the music. This music was equalized following an audiogram to simulate the hearing from a person with hearing loss¹. The less lives the player has, the worse hearing loss will be.





The web server allows Unity to communicate with the system database, to retrieve and update information about the login, attempts and the user. This information is then analyzed to generate useful insights to the organization.

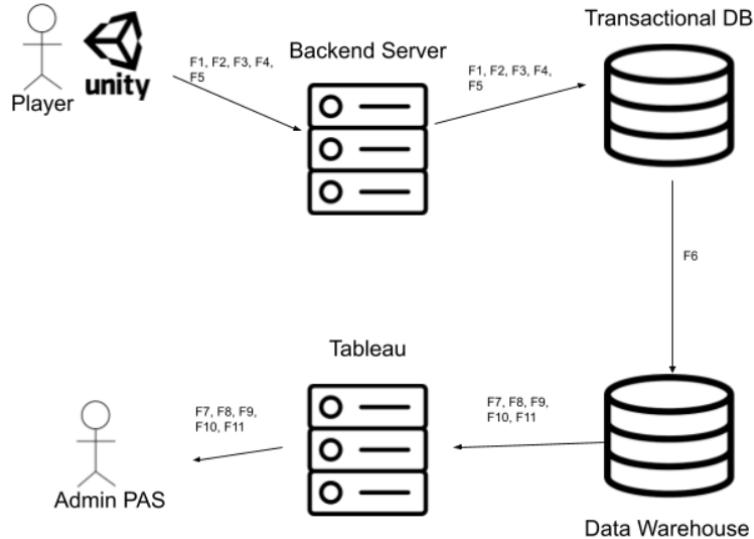
The technologies that we used for the project are:

Video game: Unity Platform, C#

Web Server (API): Node.js, Express.js

Database Server: Microsoft Azure SQL Server

System architecture

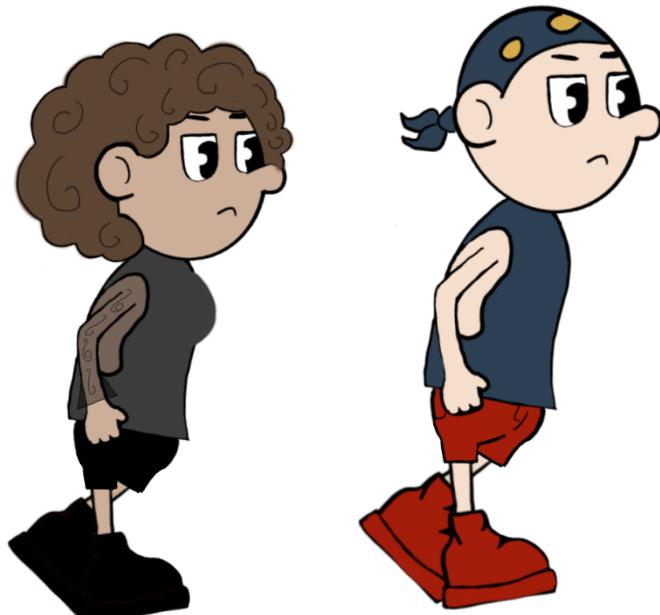


The video game in Unity Platform makes requests to the backend server, which holds communication to insert and retrieve data from the database.

The data stored is transferred to the data warehouse, where it is transformed into valuable information. Then tableau is used to visualize the data in the form of graphs to support the decision making of the PAS Admin.

Improvements to the system

The organization suggested the inclusion of a female character, because people usually assume that only men can be a percussionist. With this improvement we could increase the inclusion of females into percussionists and as well, the inclusion of more players into our community.



Summary of amount of effort

Analysis of the problem and inception of the solution: 10 hours

Game development: 60 hours

Web server development: 16 hours

Database creation and management: 30 hours

Documentation: 20 hours

Total: 136 hours

Conclusion

In the 10 week period we had to make this game possible we learned how truly complex the development cycle of a product is and how to better manage our resources and time to better complete our tasks. We also came to understand how important it is to create tools to facilitate the learning and development of new skills that will help others in the future, in this case it just so happened that our tool was a video game. We also learned how important it is to take care of loud noises, the ear is the best resource a person can have if that person will dedicate his life to an instrument or not. Finally we concluded that most applications and software nowadays aren't only composed of the coding of the product in itself but also is made of many other parts working together such as a web server to send data and visualization of this data through a web page.

Links of the project

<http://165.232.147.208/>

https://github.com/Adrian101-hnd/Jump_n_Bump

References

- Davies, R.A. (2016). [Handbook of Clinical Neurology] Neuro-Otology Volume 137 || Audiometry and other hearing tests. 157–176. doi:10.1016/B978-0-444-63437-5.00011-X