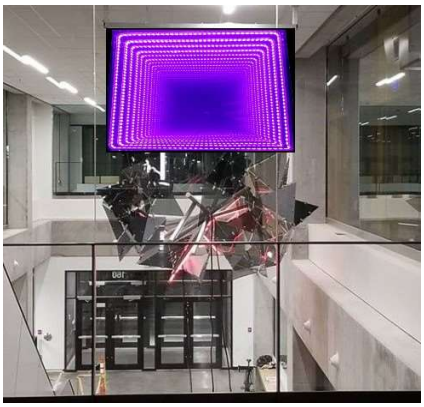
Deliverable D - Conceptual Design

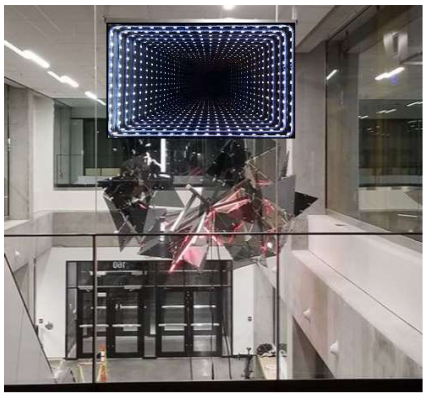
Introduction

The purpose of this document is to conceptualize, organize, select and develop several possible solutions for the client. Various impressive concepts devised by the group members will be presented, compared and evaluated. The apt design concept will be further developed. A final concept will be created based upon the other solutions, presented with a simple drawing and the thought process behind its development will be explained.

Design Criteria

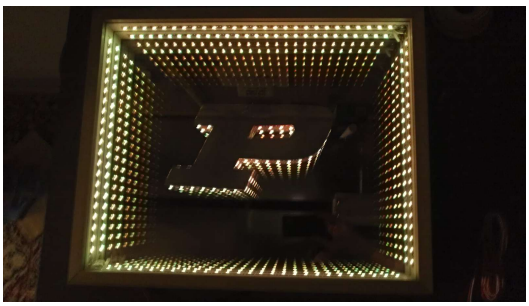
Mohammad's Concepts





(Any better concepts/ideas?)
Ideally:

- void in the middle will be a reflection
- leds are smaller, less spaced out
- less dramatic of an effect (smaller)
- gradient, interactive



-uOttawa/installation relevant print on mirror w/ effect

David's Concepts

1. Piano Music Sensors

Idea: Push a button at the top or bottom of the stairs that are connected to sensors in line with the rail of the staircase. Lets you play musical notes as you go up or down the stairs for 2 minutes which is linked to equilibrium to change notes according to the notes

Pros: Simple, not too many things need to be manufactured

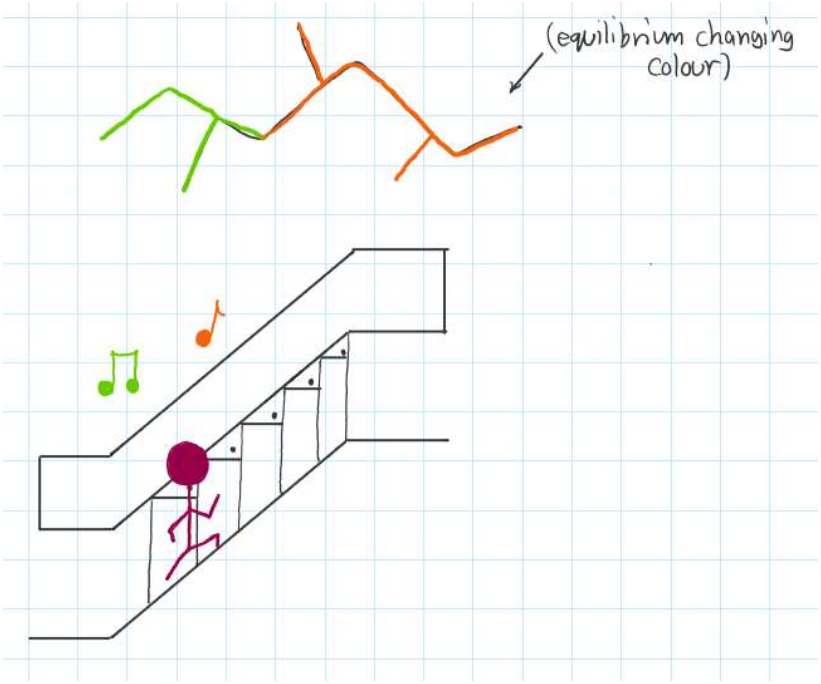
Cons: programming involved, need to somehow implement speakers given electric power limit and loud enough

Function: Noise plays when the sensor detects a step, sound changes given which step is stepped on

Aesthetic: Colors of equilibrium

Predicted cost: $90

Sketch:



2. Dance Dance Equilibrium

Idea: Set up a dance videogame at the bottom level of the stairs and have equilibrium changes colors or flashes based on the bpm of the music being played

Pros: Only the Arduino microphone needs to be programmed

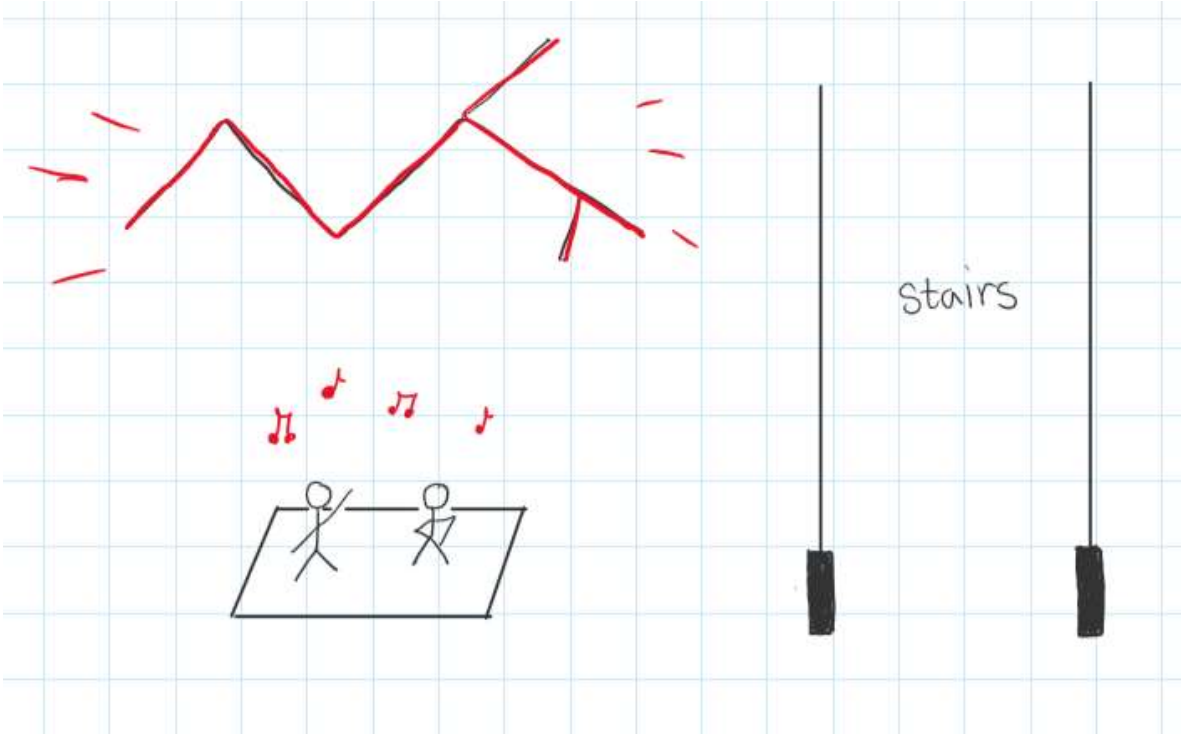
Cons: Finding lights that change color and flash for a good price

Function: Has microphones on an equilibrium that detect BPM of noise around it and acts on it

Aesthetic: Colors and flashing of lights

Predicted cost: $120

Sketch:



3. The Equilibrium Exercise
Idea: Scan your student ID at the top or bottom of the stairs, and you have to beat your record of time to get to the bottom or top of the stairs, the speed is set to a tough speed in the beginning and if your record is beat every consecutive week of a month, you get some prize compliments of the university (5% off of next semester's tuition perhaps) (Least likely idea)

Pros: Get exercise, reward system?

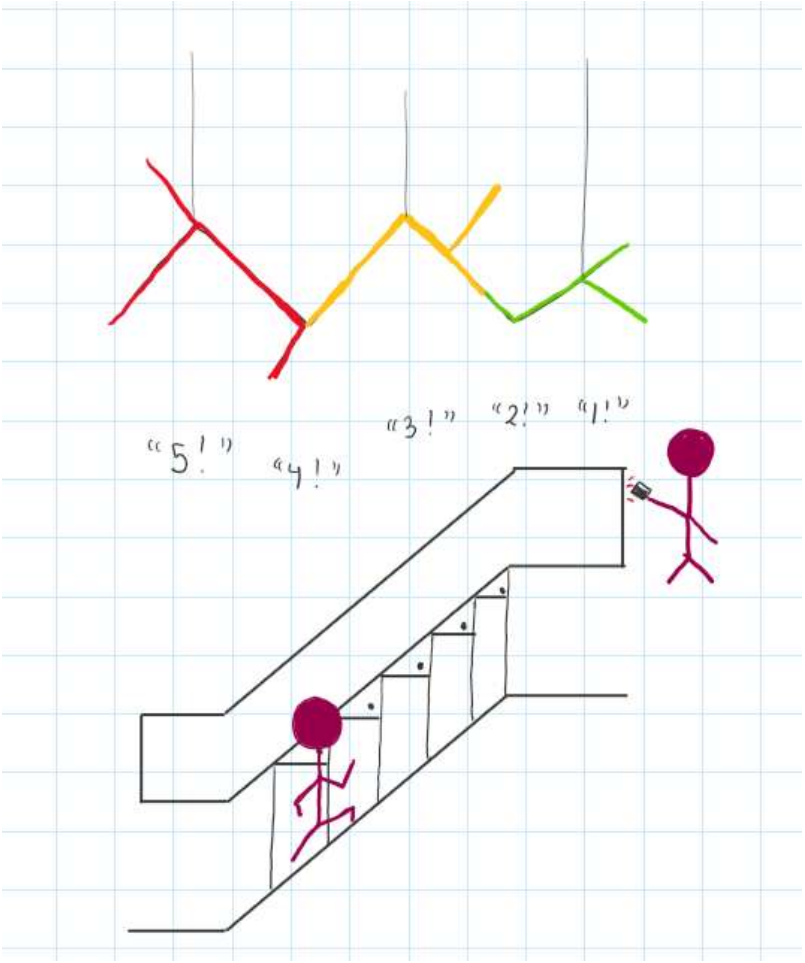
Cons: Must set up a scanning system linked to a database of every student at the university, set up a timer, program sensors, not too economical

Function: To keep a record of students getting exercise and if they beat there record

Aesthetic: While your running, equilibrium could change color from green to red when the time to beat your record runs out

Predicted cost: $200

Sketch:



Josh's Ideas:

Ceiling Infinity Mirror:

Infinity mirror located above Equilibrium, as you look up you will see the infinity mirror effect displaying Equilibrium in the middle. As Equilibrium changes colours the infinity mirror will do so as well, keeping the colours constant between the two.

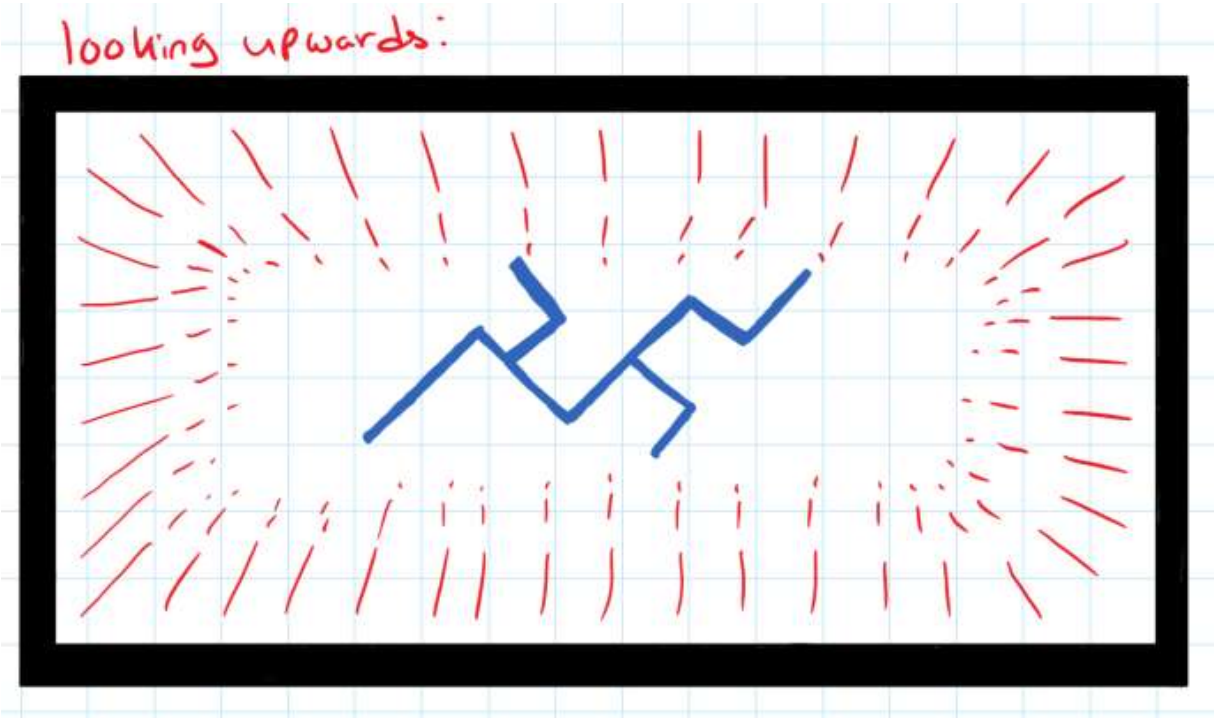
Pros: Very intriguing, looks nice.

Cons: Hard to implement on the actual Equilibrium structure.

Function: To have a cool design that encourages students to use the stairs more frequently.

Predicted Cost: $100

Sketch:



Fix Sensors:

The current sensors on Equilibrium are ultrasonic sensors and have a tendency to malfunction in the lobby. The fix is to implement different sensors which are not affected by the large open room.

Lights on Stairs:

Lights located on each step to give a more appealing look that encourages people to use them. The lights will change as the lights in Equilibrium changes.

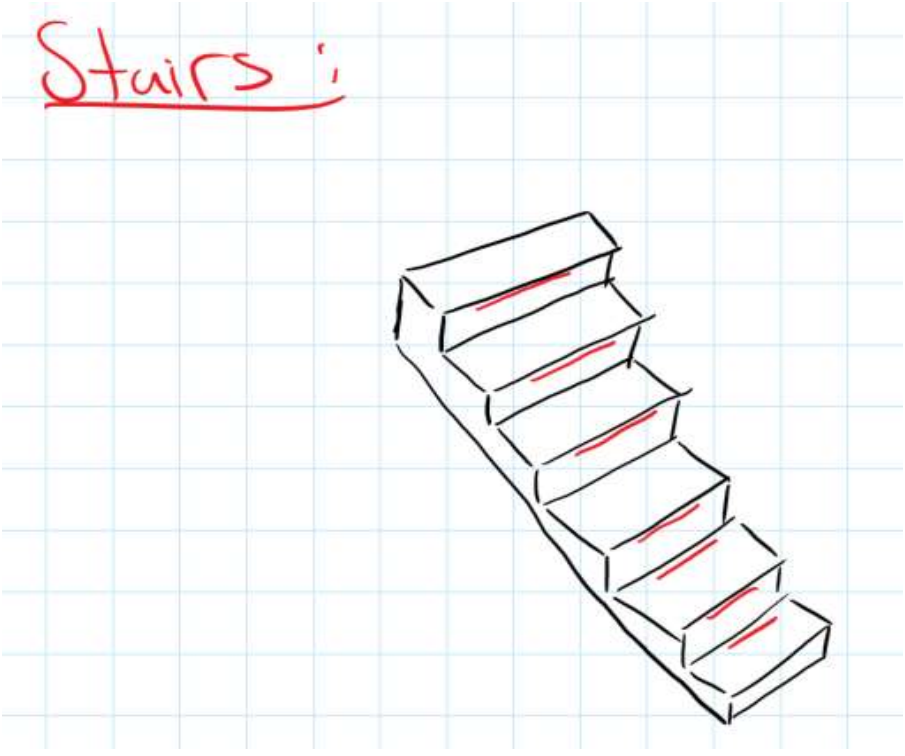
Pros: Makes stairs look more appealing

Cons: Might interfere with stair code regulations.

Function: Lights in sync with Equilibrium, making the stairs more intriguing.

Cost: $100

Sketch:



Harsh's Ideas:

1. **The Sound Amplifier**

   Change the already installed sensors in the staircase to newer more efficient ones, and then program them in such a way that as the number of people on the stairs increases the volume of the song playing in the background increases too.

   Pros: will get more people to use the staircase

   Cons: can be disturbing to set of audience

   Function: to play music that gets louder as the number of people of people using the stairs increases

   Aesthetic: adds to the sense of sounds

   Predicted cost: approximately $250

2. **More Power, More Beauty**

   Switch out the electricity box being used currently with more powerful ones. So that more lights can be attached to the 'equilibrium' to make it look more appealing.

   Pros: makes the equilibrium more reliable and efficient

   Cons: uses more power

   Function: to add more lightings and improved sensors

   Aesthetic: added lightings could make the equilibrium look more appealing

   Predicted cost: About $500 (includes licensing fee)

3. **Sound and Light Show**

   Attach speakers to the 'equilibrium' to play music when people walk up or down the stairs, however no change in the music or it's volume is caused by the passersby.

   Pros: will surely get more people to use the stairs

   Cons: can be disturbing to a set of audience

Function: to play music along with displaying lights whenever someone goes up or down the stairs

Aesthetic: While your running, equilibrium could change color from green to red when the time to beat your record runs out

Predicted cost: around $200

Jiahui's Ideas:

1.Make the color change related to the weather information.

Programing the light changing according to the weather information.

Pros:Use light for a more useful reason, and not just for good-looking.

Cons:People need to remember the weather which the color represent.

Function:When people go down,and are detected by the sensor. The lights start working for 5 minutes.

Aesthetic::Make color lights useful.

2. Set the projection of number of the temperature and weather condition

(example:sknow, rain, or sunny). The projection will be projected on the connection of the stairs, which is a flat ground. When the sensor detect people go down, the projector will be acavatived. People can see the weather information before they go out.

Pros:Give people weather information of outside, and they can prepare themself for going out in a bad weather.

Cons:projector position need to be considered carefully, due to the weight limitations.

Function:When people go down,and are detected by the sensor. The lights start working for 5 minutes.

Aesthetic:Give people weather information of outside, and they can prepare themself for going out in a bad weather.

3.simulate the sound of the weather.(birds chirp in a sunny day for instance).

Add a projector on the roof, and program it to a computer. Make color and projector related to the weather conditions.The weather information comes from internet,and update every 5 seconds.

Pros:Use light for a more useful reason, and not just for good-looking.

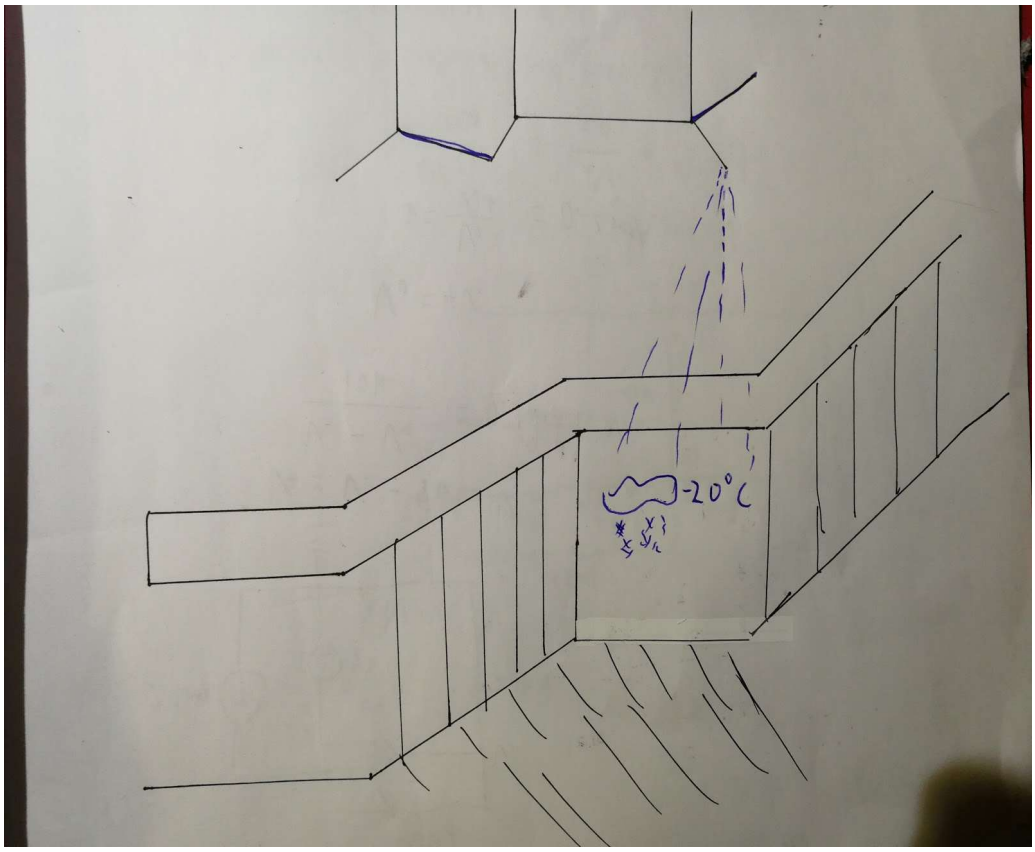
Cons:The program work could be hard for our group.

Function: Play weather sound.

Aesthetic:Make people fell all system are vivid.

Predicted Cost: 200$ total.

Sketch:



Benchmark (Top 3)

Project	1.Infinity Mirror	2. Sound Sensors	3. Weather Equilibrium
Pros	- Support lines would be hidden by infinite design - Highlights equilibrium beauty - Under 800lbs	- Sensors get fixed - Music can play	-People prepare for bad weather before going out - The projection of weather information decorate the flat stairs.
Cons	- Programming required	- Programming required	- Programming required
Function	- void in the middle will be a reflection - Provides a dimly lit hall and staircase if STEM lights are out - Sets a minimalistic yet complex ambiance	- To detect steps and play music accordingly	- The projection of weather information will be on the flat stairs, once people go down.
Non-function	- LEDs reflect off of mirror and is displayed infinitely on edge of mirror	- Changing lights accordingly	- Changing weather sound and color accordingly.
Predicted Cost	-At least $100	- At least $8 per sensor	-At least $200

Final Group Design Concept

Finally, as a group we have decided to go with the concept of attaching the infinity mirrors to the ‘equilibrium’. We as a group will develop two infinity mirror designs that go on both the sides of the equilibrium. The size of each of our final product would be around 4 ft x 4 ft x 2 ft, and it will surely weigh less than 800 pounds. Using this design we will be able to attract more set of people to use the stairs, which was in fact the main purpose of building the equilibrium.

Conclusion

Based on all the projects discussed, the best one is the Infinity mirror design. The reason for this decision is because our group figures it would bring more of a sleek, seamlessly infinite addition to equilibrium that would complement the already stunning looks of the design without over-consuming power in a resourceful and economical way. The pros outweigh the cons making this idea more realistic compared to the other presented ideas. This idea also lines up with our skills and abilities so problems can be overcome efficiently.