Urban Wave/Alexandria

AA Alexandria Visiting School '12

HyperSpace dB

Team Name:
Ahmed Eid Rihan
Sarah Ezz el-Arab
Youmna el-Ghazi
Mohamed Gohar
Maha Hosny el-Gowaly
Fatma Magdy
Mohamed Mahmoud Saleh
Mohamed Rihan
Sarah Salama Soliman

AA Alexandria Visiting School,
Programme Director
Merate Barakat

Visting School Director
Christopher Pierce

Visiting School Coordinator
Priji Balakrishnan

T +44 20 7887 4014
F +44 20 7414 0782
visitingschool@aaschool.ac.uk

AA Alexandria Visiting School
36 Bedford Square,
London WC1B 3ES,
Tel +44 20 7887 4000

All rights reserved. No part of this publication may be reproduced
or transmited in any form or by any means, electronic or mechanical,
including photography, recording or any information storage and retreival
system, without prior permission in writing from the publisher.

Content copyright © 2012 AA School of Architecture

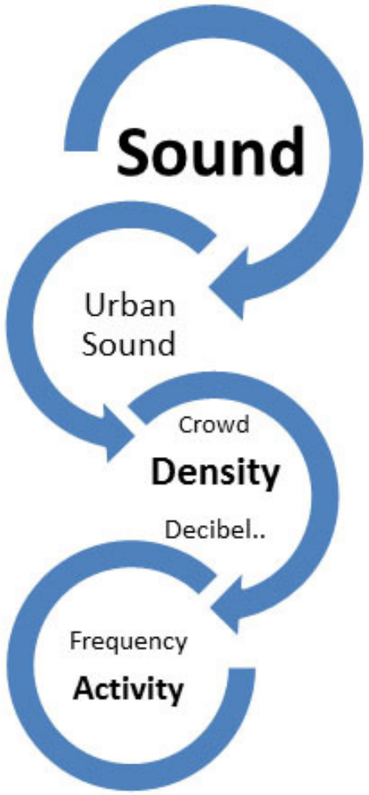
Table of Contents

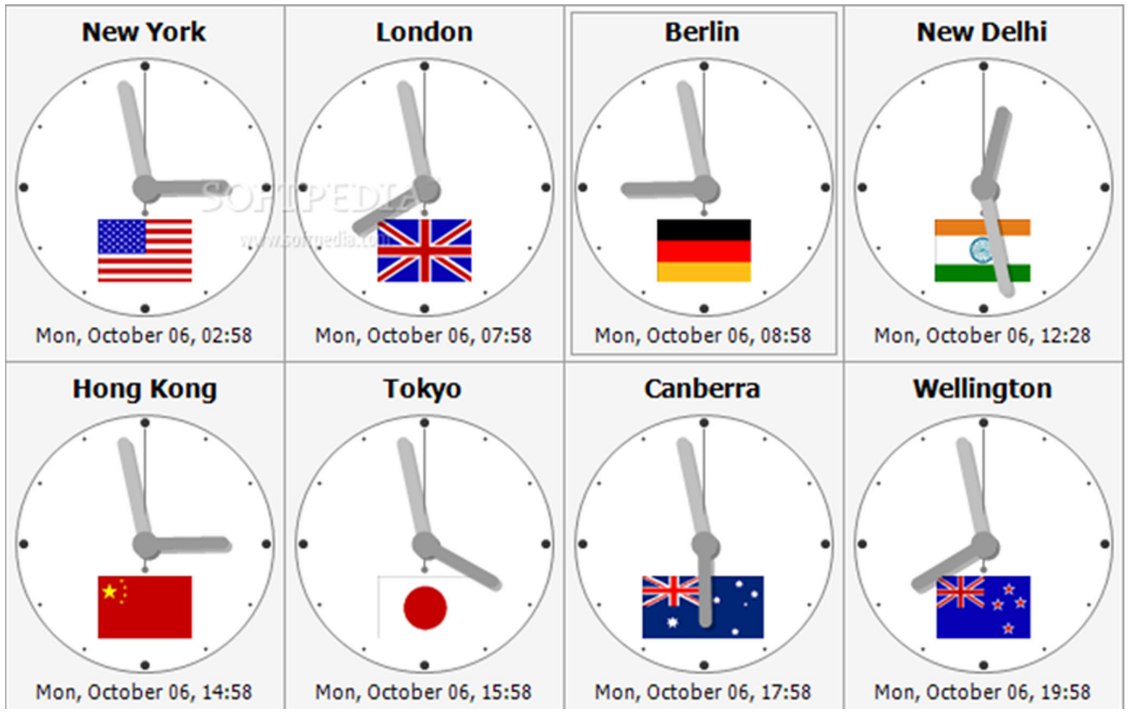
Inspirations

-**Gramophone**, one of the ancient tools that converts rotation into sound. the initial idea was reversing this process from sound as an input to soundv as an output from the kinetic motion.

-**Sound of the city**, the city is the most rich, unexpected input where city streets are full of layers and dense frequencies that will output variously and more innovatively.

-**The urban clock**, by choosingvvthe main cities around the world as an input and connecting them together through the device producing one synchronicity composition of voices.





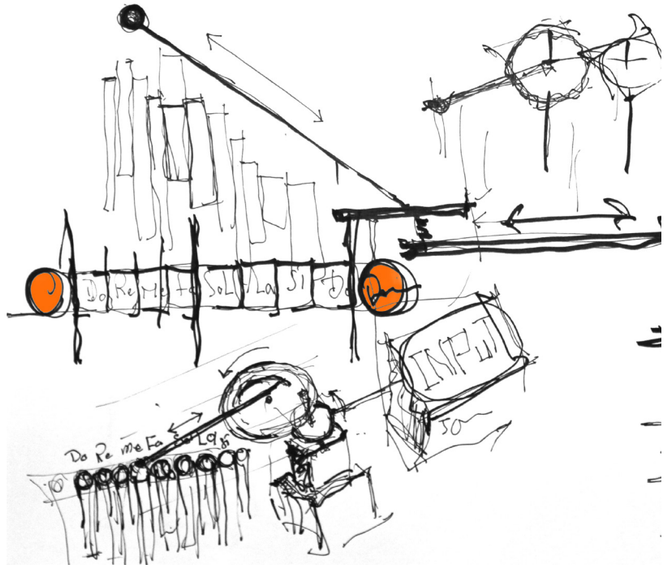
First logic

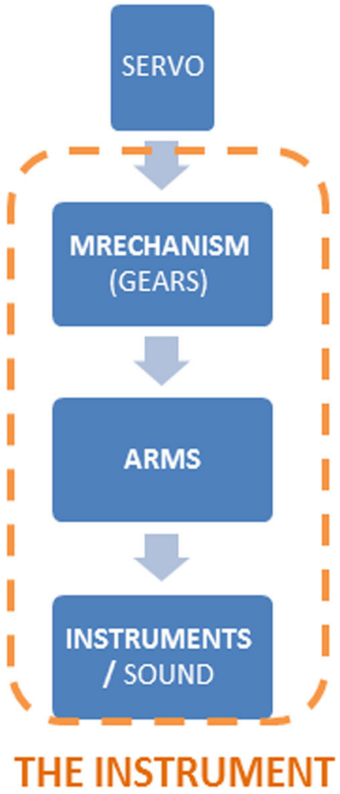
-Using sound sensors to record urban sounds as inputs and then translating them into numbers that change following the frequency. these number will be interpreted as physical motion.

First experiment

-We connected the grasshopper with the firefly to the microphone of the laptop. by reading different sound frequencies the slider changes the number readings .

-The problem with this experiment is that it cannot get connected directly to a recorded sound track. it has to be a live recording

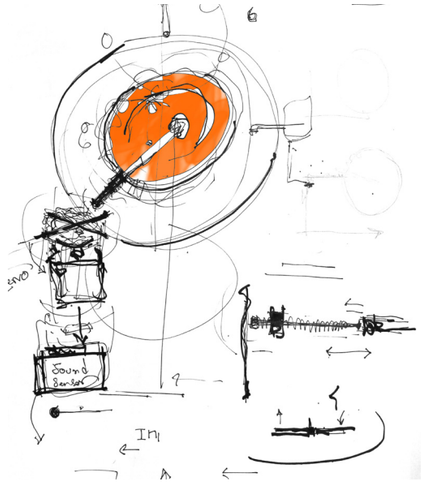




Input
- Sound Tracks (NY, London, Alex)
- Vibration (User interaction)
- Light graph

Process
- Remapping for the sound frequencies to a rotation speed
- Remaping the vibration signals to arms movement

Output
- Geometry: rotating discs
- Sound: different tones



Progress

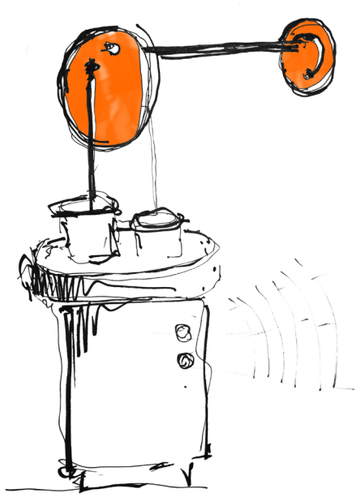
-Multiplying the number of inputs by multiplying the number of discs used.

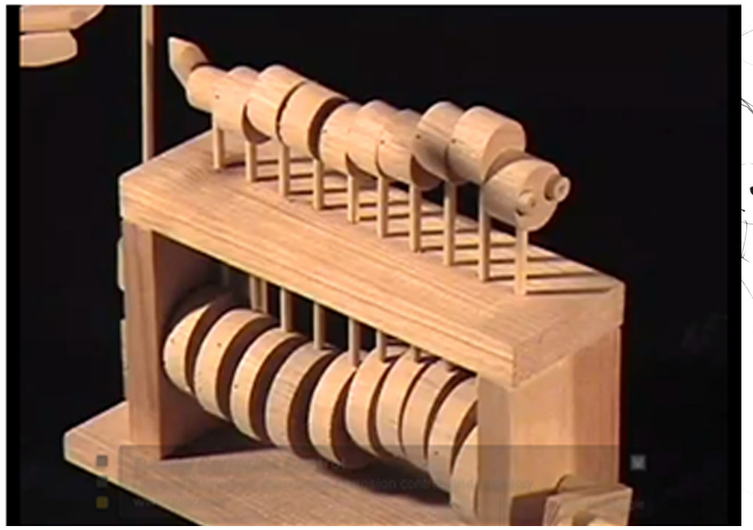
-Off-centerevd Discs ordered in a pattern of three.

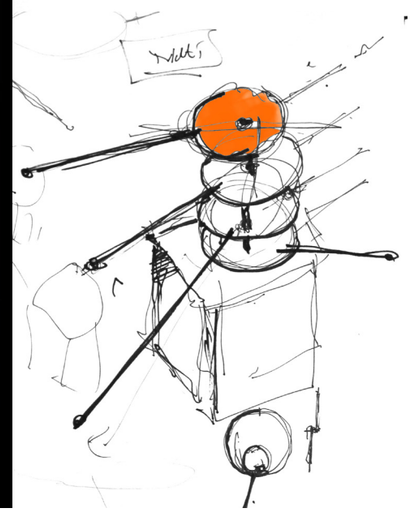
-Three planes of different metal materials representing a city that result in different tones.

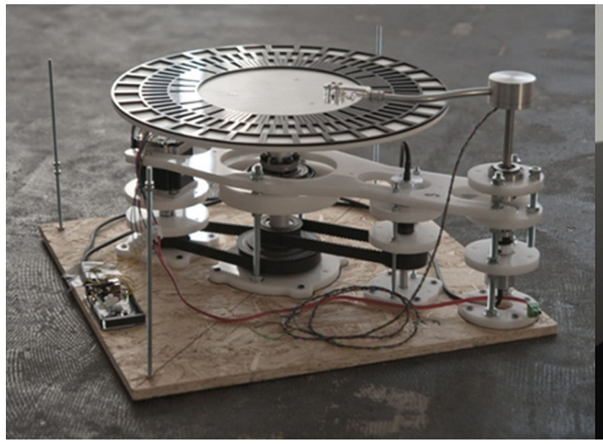
- Each disc has an arm that hits a plane according to the vibration signal received.

-Sound sculptures precedence with the same idea of converting kinetic energy to music, depending on material or size differentiation or even with varying the suspension points of the discs. Inspired us with the idea of the changing discs.







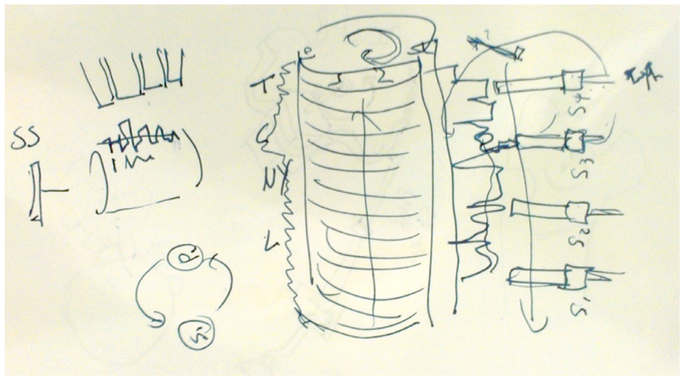


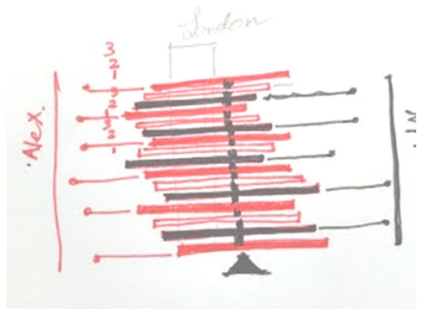
The changing discs

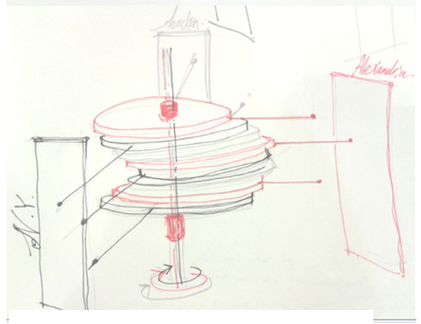
-First idea was changing the disc suspension points and let them revolve around the same axis with same speed, would give us a change in profile but with the same speed.

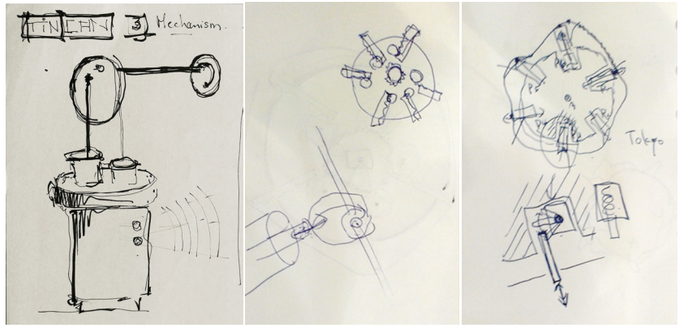
-Then we thought about changing the profile of each single desc, by adding three pistols for each desc and surrounding the whole layout with elastic material, that expands and contract responding to the pistols.

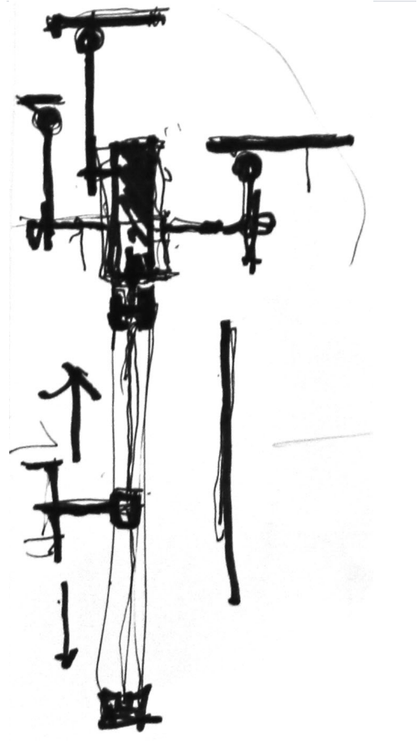
-Then we tried doing both changing the layout and speed of each desc to get a kinetic sculpture responding to different sound tracks.

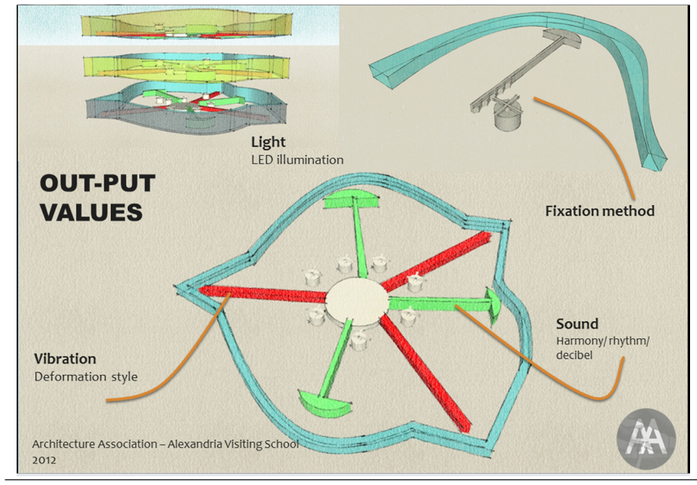






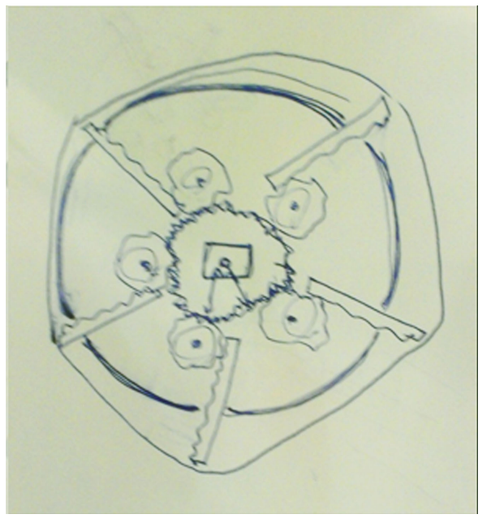






BUT

Logistics
Technical problems
Budget
Time range



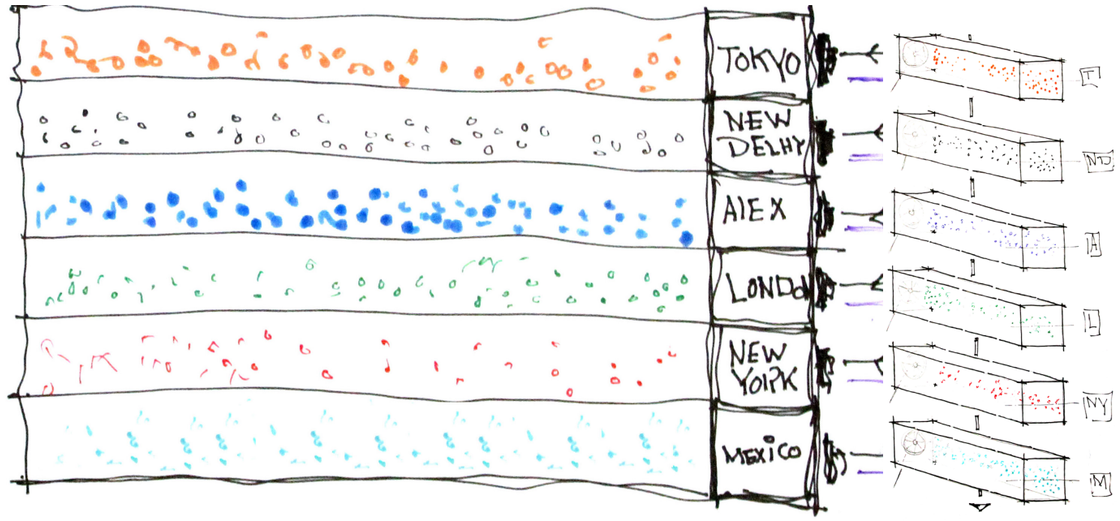
-While developing this idea we faced a technical problem, that the cables connected to the arduino are from a fixed source are spinning inside the main axes connecting minimum of 3 wires for each desc.

-We solved the problem by adding a rotating electric conductive surface, that transfers the electricity from the arduino to the revolving cables, but the solution was complicated an out of budget so we decided to think again .

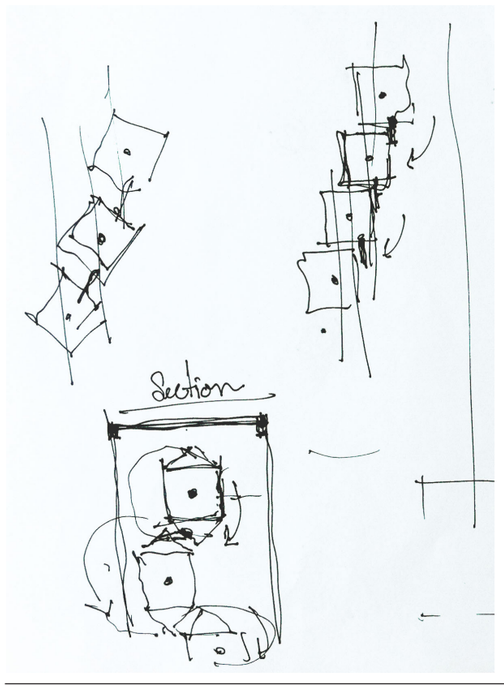
-We decided to use the same action of rotation but trying a different physical output.

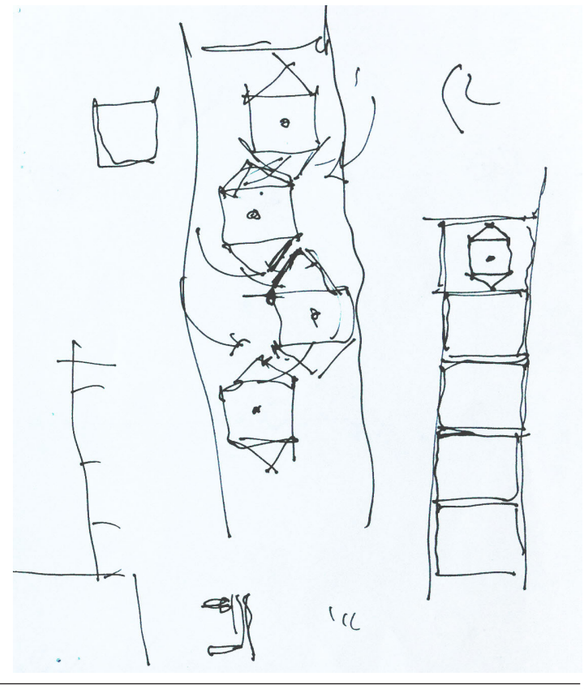
Balls

Flying balls or anti-gravity objects that fly responding to the sound, synchronized with the harmony of the played tone. In the precedent video the balls flew responding to strong fans push them according to the played music.



First logic applying this to the urban theme making a separate line with separate tone for each one of the 6 cities, to give a total wave composed of six different frequencies and 6 different profiles.



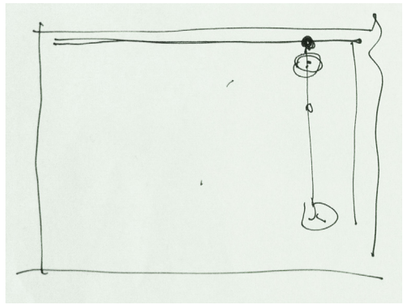


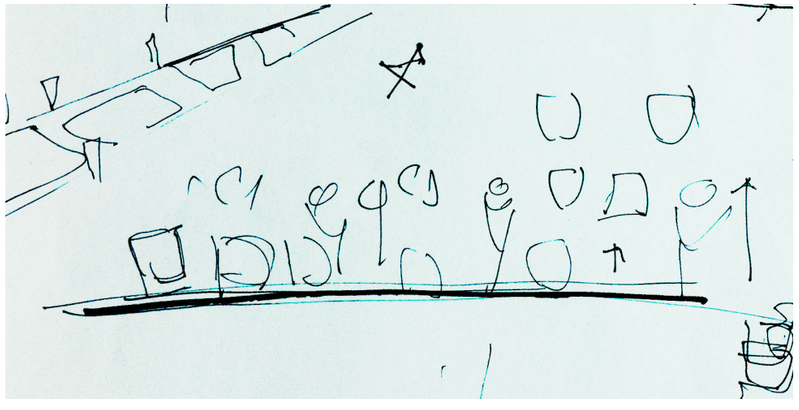
First trial

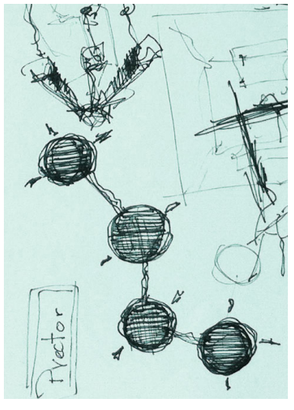
-Instead of using just one line of the ball we though of making a whole surface full of synchronized balls, moving together along with the music.

-The mechanism depended on moving mainly the base surface (the mesh) correspondingly the pixels (balls) will move forming an imaginary surface filled with balls. Thus we started by choosing a hard material to hold the pixels all together and move them at the same time.

-were disappointing, as the wires hanging the balls kept revolving around each others ending with one mass of attached balls, also the fabric used were too tight and couldn't get us a smooth motion.



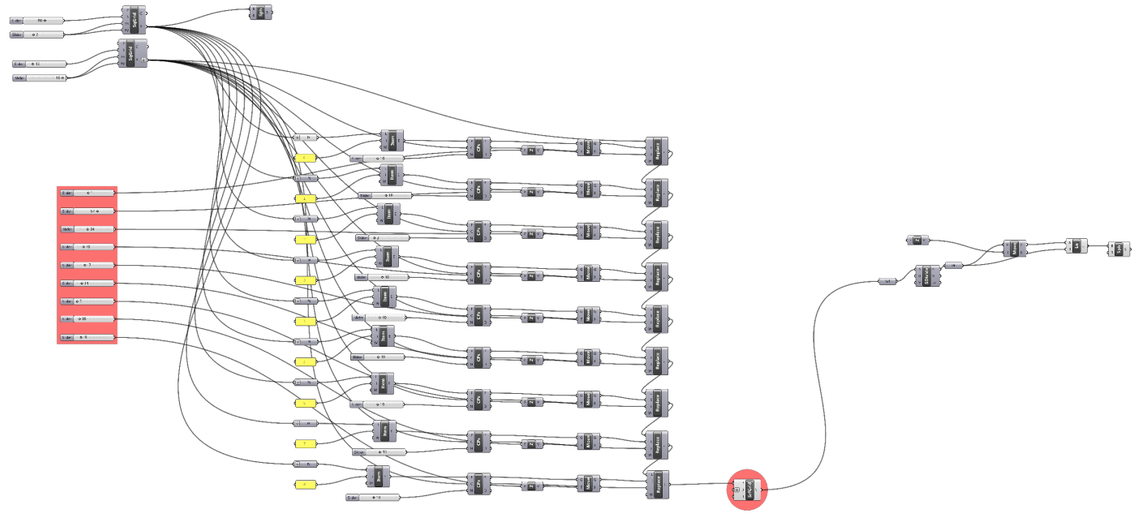


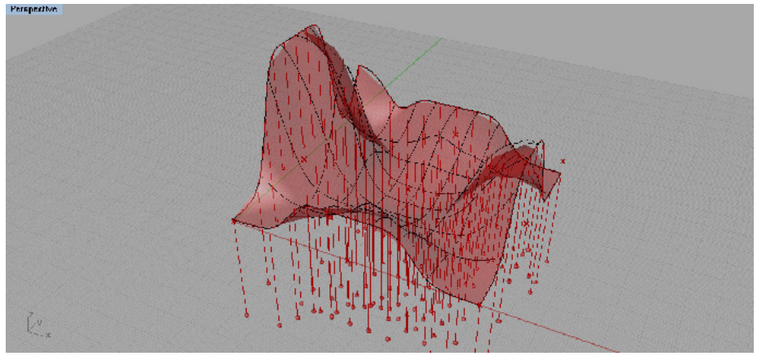


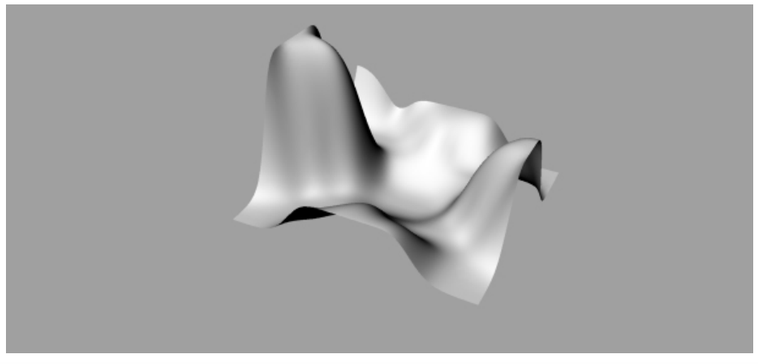
Second trial

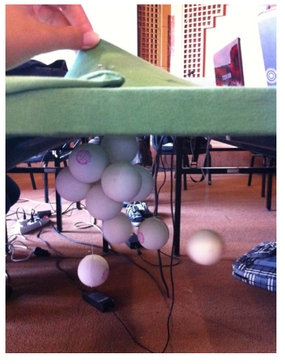
We tried a more elastic material it gave us more homogeneous surface but even more wire complications.
the idea of that mesh was the control points, these control points are connected to the upper surface of the mesh while the lower face of the mesh is connected to the pixles of balls that form the flying surface.

These control points act as collectors to a range off pixels to catch them at the same time and let the whole surface move homogeneously







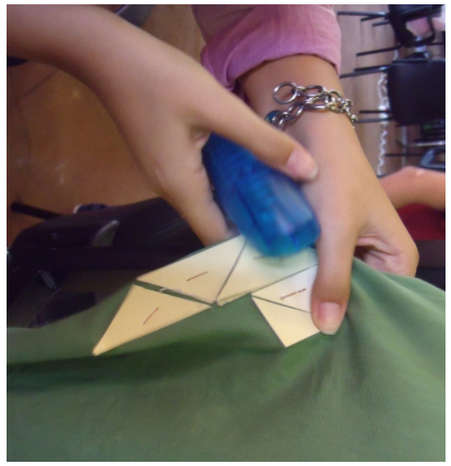


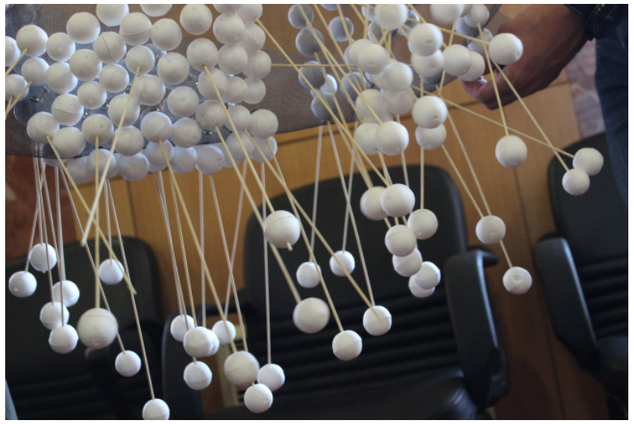
Third trial

-We tried different hanging options for the same concept, one were too fixed and didn't move, others were too lose couldn't get us a smooth motion.

-The mesh, some of them were too tight others were too lose and didnt respond to the control points.

-Control points we tried them on randomly they gave us an haphazard surface, totally unexpectved and chaotic result, so we decided to grid them according to the mesh parameters. Too much control points gave us a rigid result and was out of budgev t as each point is connected to a different servo. so we kept the number of control point in ratio to the number of vertexes.

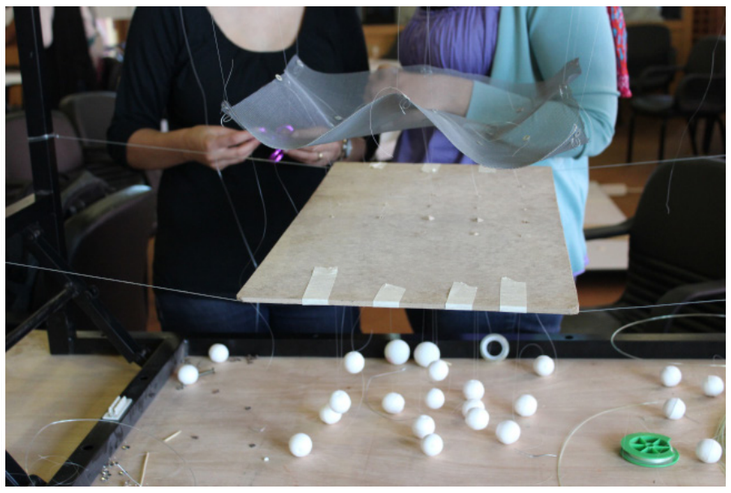




BUT

-The wires kept revolving and revolving although we changed the wire material the weight of the ball the the length and number of wires and nothing was good. conclusion is that when the control point pick up the surface up, balls respond differently with different force resolution that collects them at the same point.

So we decided to add an organizing surface that hold each wire in different hole, no matter where the control point tries to move it, it will only respond up or down.



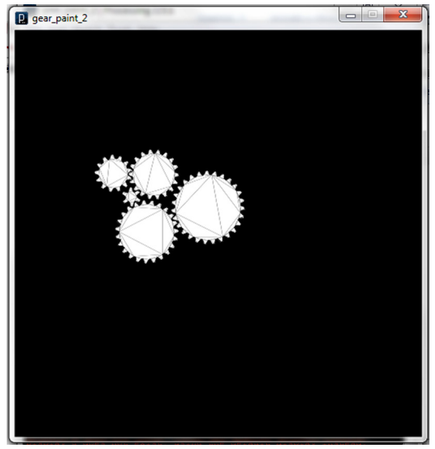
Mechanism

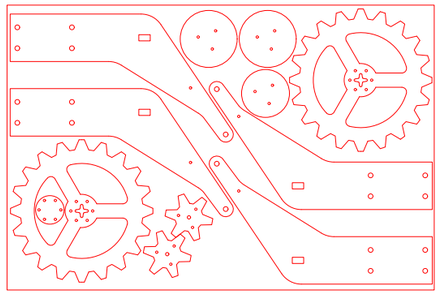
-First concern was the motion of these control points, how will they respond to sound how would they push the surface up, drop it and then catch it back.

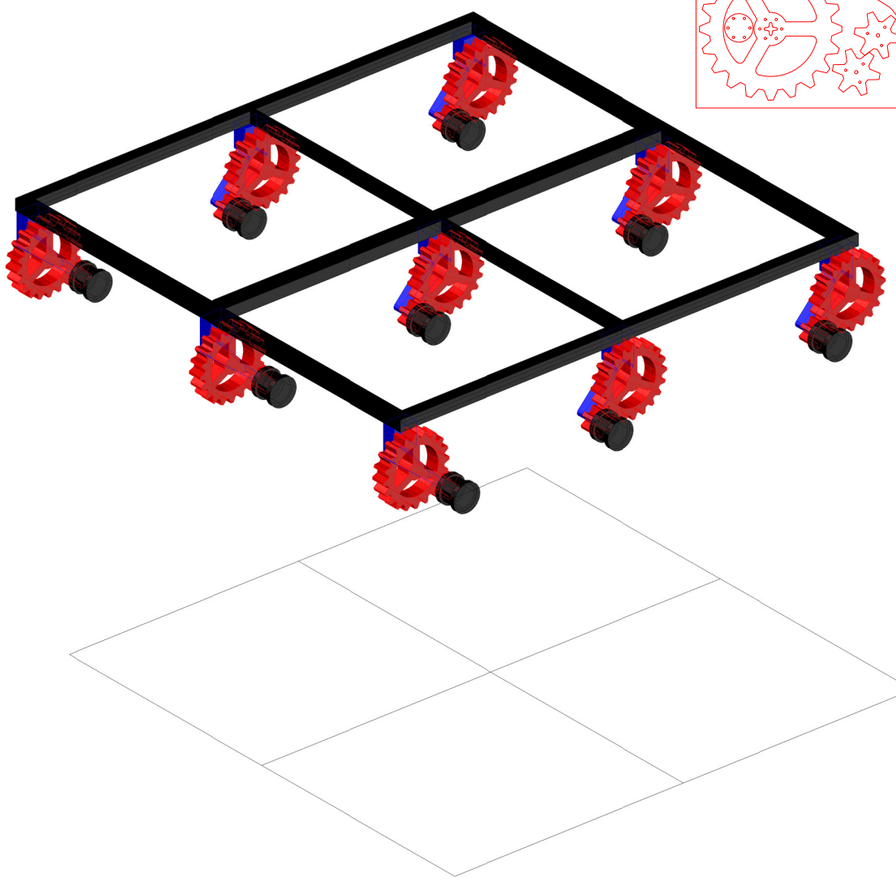
-Since we have a background of moving discs we though of gears. the velocity of the speed is directly proportioned to it's radius, and speed of spinning, and since it would be connected to a servo we had to be cautious about the material and how heavy it would be.

-We did a script for connecting gears together to an calculated the distance between the control points and the mesh, in proportion to the gear velocity and came up with conclusion to use the big gear at the picture to revolve 180 degree since each half circle this gear does the smaller one revolves 3 times picking up the wire 1m distance.

-These control points were to hold the surface from its vertexes mainly and then the central center points.



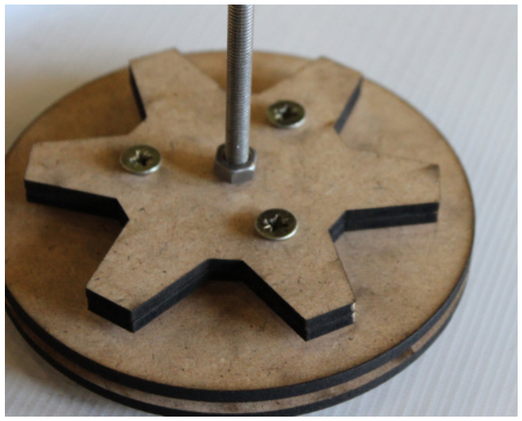




BUT

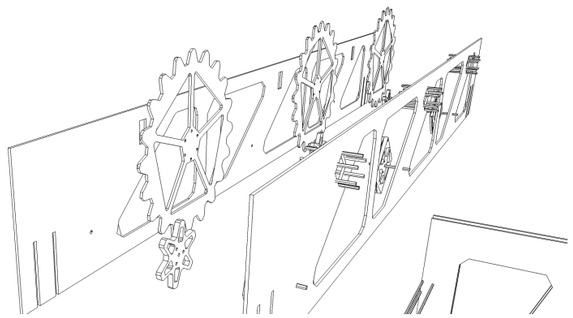
-The structure holding this control points connecting them to the flexible mesh from it to the controlling board holding the flying balls with transparent wires. we started by designing 9 separated arms each one is carrying a single servo connecting it to one control point.

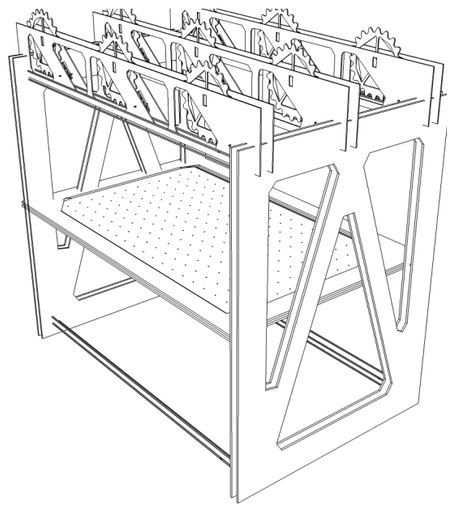
-This separated arms were not strong enough to hold both the servo and the gear at the same time, it started vibrating then the whole arm



So

We had to design a whole frame carrying the 9 servos connecting them to the control points. this structure is to hold the whole installation starting from the gears all the way long till the flying balls.



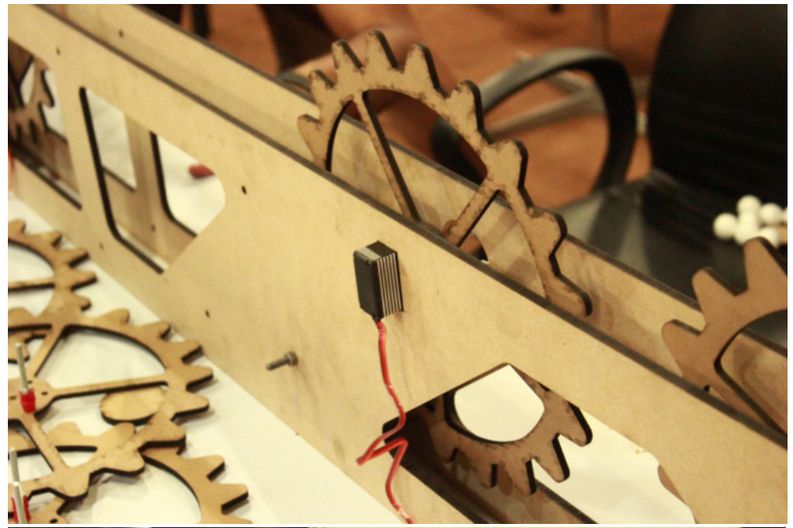


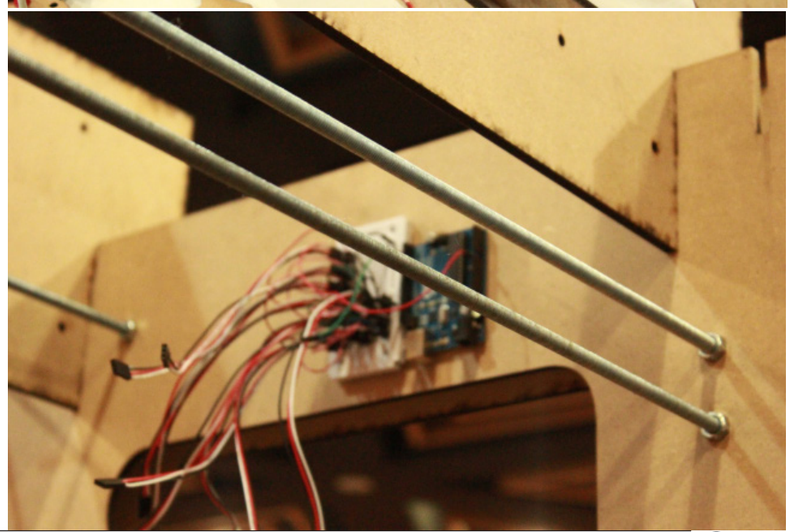
Assembly

starting with the wooden frame it has three beams holding two vertical perforated walls, also the beams were perforated to save material and load. the beams were double layers of MDF carrying the gears in between, to control them from deflection. each beam has three gears connected to the mesh (control points) an the other end was to the servo that's connected to the arduino.

Materials

four different materials were used, MDF for the whole structure, the mesh was elastic wire and the balls were ping pong balls, hanging wires were transparent to minimalis the color coding.





FLYING