(Download Young People Listening To Music Illustration Concept, n.d.)

CONNECTION
PROPOSAL REPORT

Team: Pop5

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Physical Computing & Interaction Design Studio Proposal

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THE CONCEPT/INTENDED EXPERIENCE

Our team is going to design a music-sharing device that aims to strengthen the social connection between individuals by allowing them to interact with each other in a musical environment.

The device consists of a crystal ball connected to the ground. It will provide a piece of base music and each participant represents a type of instrument or melody. There should be at least one person connecting to the ball and the others just need to connect to the first one so that the ball is able to give visual and auditory feedback. Since everyone represents a type of instrument or melody, the more people join in the activity, the more colorful the ball and the richer the music will be. Additionally, the ball can reflect each individual's mood, which means that the quality and the rhythm of each piece of music played by each instrument will be changed depending on each individual's mood. For example, if a person is negatively responding to the other, his/her physical conditions like the heart rate will be detected and transformed to the device which controls the instrument to be performed poorly. Also, the same kind of ball can be installed at different places. Each ball in a different location will respond synchronously in terms of visual and auditory feedback in order to provide a remote interaction between different groups of people (e.g. different families).
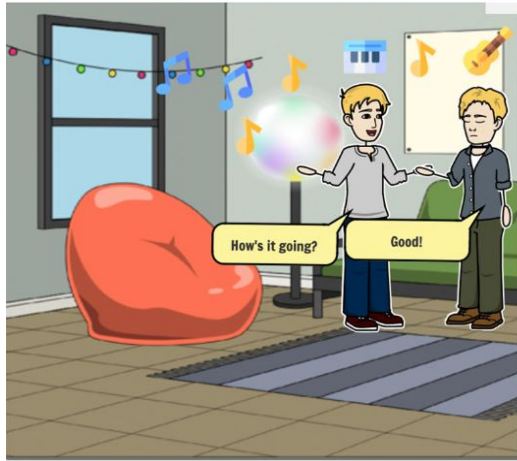
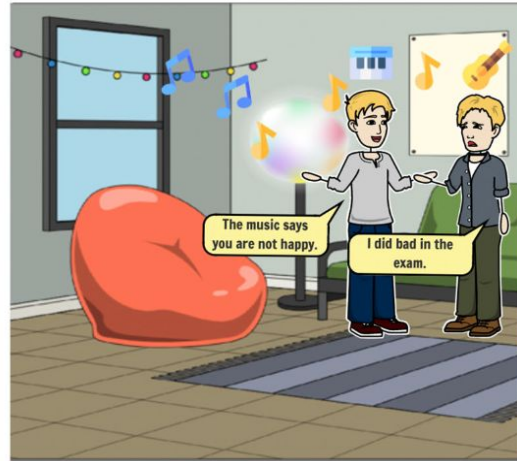The storyboard below illustrates our concept.
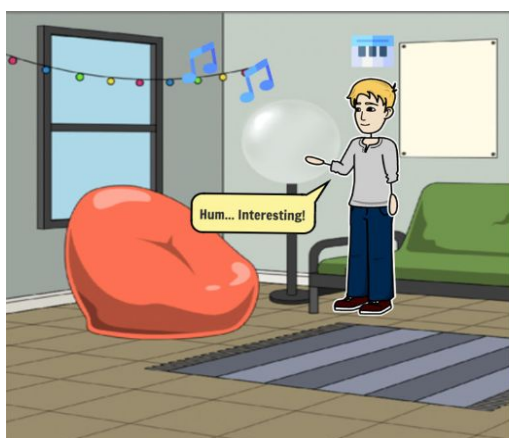
Each person represents a type of instrument.

The more people join in the activity, the more colorful the ball and the richer the music will be.

The ball can reflect each individual's mood.

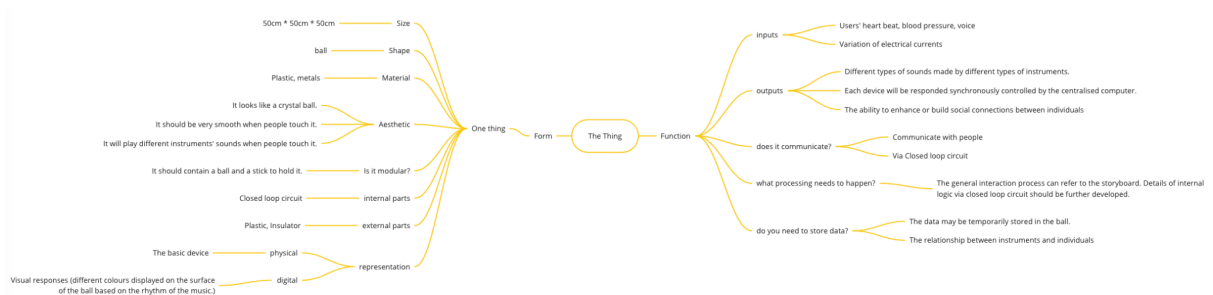If a person is negatively responding to the other, his/her instrument will perform poorly.

Each ball in a different location will respond synchronously in terms of visual and auditory feedback

Storyboard (Figure 1)

The diagram below displays the basic form and function of the device. The diagram should be further developed along with the project.


Mindmap (Figure 2)

By interacting with these devices, it hopes that people can happily strengthen or build the social connection with others in a joyful environment. To demonstrate the scenario, our team conducted a survey. The result indicated that listening to music can exert positive effects on participants' mood and they are willing to use music which conveys their feelings and moods as a good way of sharing.
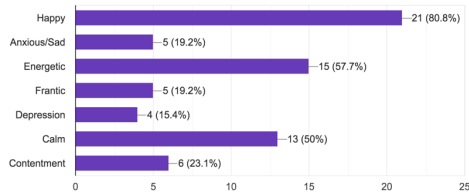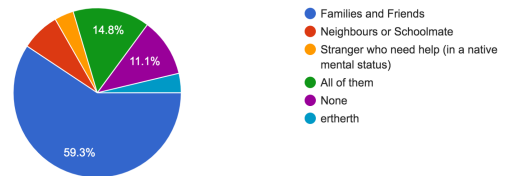
9. Why do you want to share music with them?

18 responses

share good things and feelings

because I want to share my happiness

There is a moving story behind it or its lyrics is what I want to say

Hope them can enjoy the same music

music is art

Share mood

I do not like share music with others

Sometimes, they want me to share music since they feel good.

don't - music ia already easily accessed by most

Online Survey (Figure 3)

DESCRIPTION OF THE CONTEXT/DOMAIN

LOCATION:

Our installation is suitable for use all over the world, as it is essentially a musical interactive device. Music knows no borders and it can communicate to people across languages and cultures.

The installation will be placed in specific areas, such as schools, student apartments and homes. These places have some common characteristics, firstly they have a certain amount

of traffic and secondly the people present in these areas are all connected to each other in some way and are not really strangers.

The installation is fixed. It will be placed in a conspicuous place where people often pass by, for example in a school playground or a residential square. This will make it relatively easy to attract more users.

As the design includes interaction with remote users, the installation will be placed in multiple locations. Users can share songs through the device, or they can get to know each other's moods through the device. As the user's mood is fed back to the device through the heart rate, it will play music with different melodies depending on the heart rate.
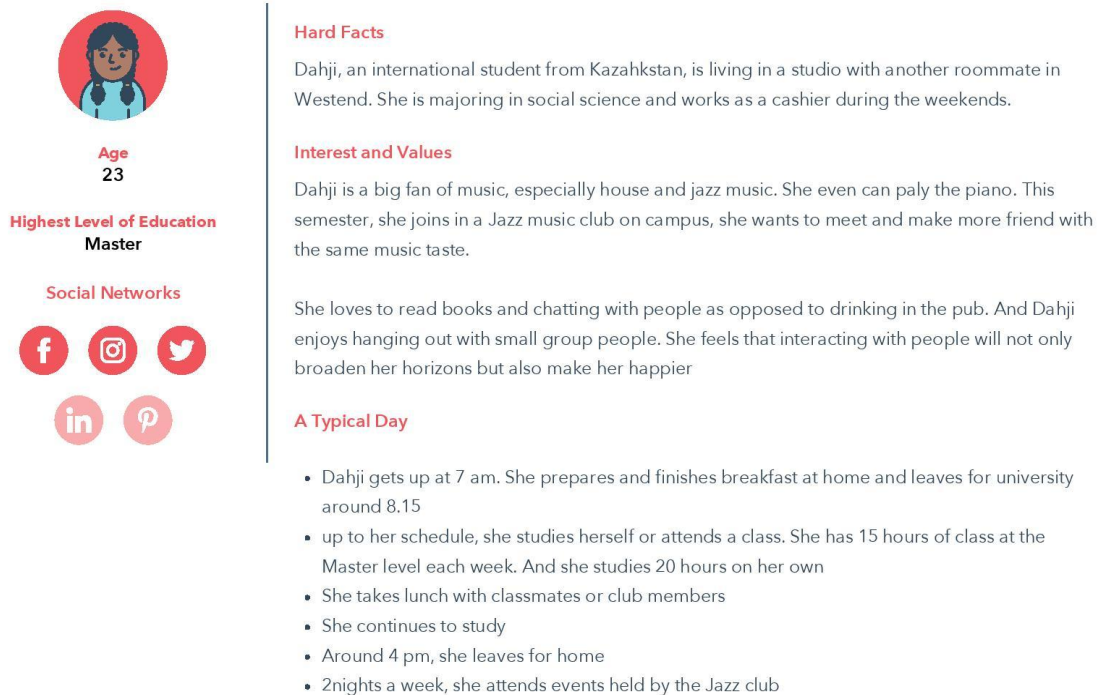
AUDIENCES:

This device encourages multi-user participation and interaction. The number of participants has a direct impact on the performance of the installation. Also, it is important to note that the performance described above only occurs when users are interacting with the device at the same time.

The users of the device can be those who know each other, like music and want to share their moods with each other. For example, good friends who go to the same school together, neighbours who live in the same neighbourhood. Because the device is designed for multiple users and will require users to touch each other. Asking strangers to do this would make the user look awkward and strangers would be more likely to refuse to share their emotions as it would involve their privacy. Also, after last year's epidemic, people were very uncomfortable interacting with strangers.

The following persona will give a more concrete picture of the target audiences

Dahji

Age
23

Highest Level of Education
Master

Social Networks

Hard Facts

Dahji, an international student from Kazahkstan, is living in a studio with another roommate in Westend. She is majoring in social science and works as a cashier during the weekends.

Interest and Values

Dahji is a big fan of music, especially house and jazz music. She even can paly the piano. This semester, she joins in a Jazz music club on campus, she wants to meet and make more friend with the same music taste.

She loves to read books and chatting with people as opposed to drinking in the pub. And Dahji enjoys hanging out with small group people. She feels that interacting with people will not only broaden her horizons but also make her happier

A Typical Day

- Dahji gets up at 7 am. She prepares and finishes breakfast at home and leaves for university around 8.15
- up to her schedule, she studies herself or attends a class. She has 15 hours of class at the Master level each week. And she studies 20 hours on her own
- She takes lunch with classmates or club members
- She continues to study
- Around 4 pm, she leaves for home
- 2nights a week, she attends events held by the Jazz club

Persona (Figure 4)

TIME:

Generally, the time of use of the device is summarised in the following two points.

Firstly, when people want to check their mood; secondly, when friends want to share each other's moods and music in a novel way.

Outside of the first time, the device does not set a dedicated time of use. The only factor that determines when it can be used is where it is placed. However, the device performs better overall when it is darker, for example in the evening, as the light effect is more visible.

The unit is currently intended to be made of glass and alloy material components, so it is said to have a longer lifespan and is not a disposable product.

RELATED WORK

CONCEPT

Concept Prototype T of Sony creates interactive space on a table or the surfaces of real objects. Users can intuitively and naturally experiment manipulating images and information projected onto the space (Sony's Developer, n.d.). In the demo application 03 of the Concept Prototype T, each small dot on the table represents a melody, and users can generate different sounds by touching them (Sony, 2017, Jul 14). This demo inspires us to let each user represent the melody of an instrument rather than a single note, so that they can play more beautiful music together.

Future Experience Program T – Demo Application 03 (Figure 5)

Playloop Interactive (Figure 6)

Touchme and Playtron are all controllers created by Playtronica (Future of human touch, n.d.). The former turns human skin into a musical instrument. Music can change with different intensities of touch. The latter allows people to play electronic music by touching the fruit. These interesting and creative products give us the idea of making sounds by touching something. In order to strengthen the communication between people, we choose to let users directly touch other users' skin to generate music.

PLAYLOOP is an interactive installation that allows participants to physically create a distinct sound using multiple audio loops in an interactive soundscape, which is created using over one thousand light-emitting diodes and motion-activated sensors by mixed-media artist Natalie Wong (Papersneaker, n.d.).

When participants place their hands over each stem, the silent stem will be activated to change its color and play different music constantly until another movement is detected. The change of light based on music inspired us a lot. The concept of 'Group Creation' within the work indicates the meaning well of multi-player interactive installation, as Wong explains that "The installation is designed to accommodate multiple participants. The more people interact with the installation, the richer and more complex the sound will be. It encourages people to work together, whether to find harmony or dissonance; rhythmic or irregular beats; minimal or complex sound structures." (Papersneaker, n.d.).

LITERATURE REVIEW

To deeply analyze our domain problem and insight, we conducted a variety of literature reviews in the early design and idea generation process. The following three papers play a vital role in exploring the theme and concept of our project.

Music Communicates Affects, Not Basic Emotions – A Constructionist Account of Attribution of Emotional Meanings to Music

This paper indicates that music not merely communicates basic emotions, but related to constructivist account (Cespedes-Guevara, 2018). According to the Basic Emotion theory, music can greatly influence the affects, particularly in psychology. Several researchers have proposed that music communicating basic emotions is extremely limited, while others believe that sharing acoustic code is the explanation of expressing emotions and affective through music (Cespedes-Guevara, 2018). This article presents an approach focusing on a constructionist account, which indicates the perception of emotions in the music perspectives from the interaction of modulation music. It also demonstrates the connection between cross-culture and music, making the conclusion that there are consistencies in music and emotions among different cultural backgrounds. It provides strong academic support in our project, inspiring us to further explore how music expresses core affects, and how to influence listeners' mental status from negative to positive. We start by reviewing the problems with the domain and concept of our devices.

Automatic Mood Detection and Tracking of Music Audio Signals

This paper interpreted a novel technology with respect to the music mood tracking and detecting (Lie Lu, 2006). In the beginning, researchers explored the inherent affectives communication and expression of a music clip, which helps us understand the relationship between the music and emotions. Then, it illustrates a hierarchical framework, which helps to track emotions from acoustic music data, according to the music psychological theory. From the research section of this article, we learned that the hierarchical frameworks separate several features in different tracking tasks, in particular intensity, timbre and rhythm (Lie Lu, 2006). These three features can be regarded as the main characteristics of a music clip. Intensity stands for the energy in each subband, timbre includes the spectral shape and spectral contrast features, while rhythm has a close relationship with emotion response, including rhythm strength, rhythm regularity, and tempo (Lie Lu, 2006). While emotion is variational even in one piece of music, emotion detection should be combined with music and divided into several independent segments according to the music features, which communicates different affactives. This paper also provides several

techniques to support our project in building the emotion detection functions and evaluations.

A Typo-morphological Approach to Human – Machine Interaction Analysis in Music

This paper proposes an approach to human–machine interaction analysis in music areas. According to the Pierre Schaeffer's musical thinking (Maestri, 2017), it puts emphasis on the perception of music produced by human computer interaction. This human based interaction represents musical perception and communicating emotion. This paper defines 'allure' as the analysis of the sound as mechanical, living, or natural (Maestri, 2017), which can be regarded as an approach to analyzing human–computer interaction (HCI) in musical perspectives. Inspired by this approach, we intend to further develop our concept in the human based perspectives of musical expression and emotion detection, combined with HCI analysis and usability evaluation. In the next process, we may focus on investigate the interaction between human and electronic sound sources.

RESPONSE TO FEEDBACK

We summarized the feedback we got through the pitch and made improvements to our project based on this. There are mainly the following points.

Firstly, one of the feedback states that it would be more sensible to change the using context from a public to a smaller and shareable place like the home and the class. Based on this feedback, we made changes to the initial concept in terms of the form. The appearance has been changed to a smaller version that is more suitable for indoor use, just like a crystal ball.

Secondly, the installation should be able to share participants' feelings through music. Based on this feedback, we made changes to the concept in terms of functions. In particular, the installation is able to constantly reflect each participant's mood through the quality and the rhythm of music performed by each musical instrument. When people who have good moods join in the activity, the rhythm of the music can be more cheerful and the lights in the ball can respond accordingly. When people who have bad moods join in the activity, the rhythm of the music will slow down and deepen, and the flashing pace of lights will also be slower.

Finally, remote people can also enjoy the activity synchronously. If everyone has a device at home, it would be similar to the rise of these new types of clubs or random online chat rooms. Based on this feedback, we improved our initial concept. For remote interaction, we changed the interaction from touching the wall to touching the ball. Participants from different places can touch the ball and get music feedback at the same time.

INTRODUCTION TO THE TEAM

Our team is named Pop5 with 5 members majoring in interaction design. How do we come up with this? It is because our team project is related to modulated music. Our domain focuses on creating an approach to music sharing through a musical instrument called CONNECTION. We intend to POP out a novel technology of music sharing. We focus on building a platform of sharing feelings and moods remotely and simultaneously for every person in everyday life. Each of our team members plays their part in this project. We combine our strengths and skills and strive to achieve the best results in the project. Here is the introduction of our members:

Liqian You was a graphic and web designer with over five years of working experience specializing in creating interesting illustrations and unique websites to shift various digital data into a more enjoyable and achievable visualisation. She works as a half designer and a half programmer, responsible for the graphic design of the prototype and providing technical support of the remote control system in our team project. She is a task planner and performs well by following the schedule. As an early riser, she may complete difficult tasks and achieve the best results before 10 am.

Strength: focus on setting and achieving goals; good at time management; commit a high value of work with high efficiency; fond of exploring novel, usable and interesting technologies. Weakness: sensible, perfectionism, taking too much detail on work, easily bored, not good at science. Aims for the course: make new friends, practice strong graphic and web design skills, improve skills on Hardware and Microcontroller Programming, Sensors and Basic Electronics, make interesting and novel installations to help others in some way. Approaches to the project delivery: digital prototype of a crystal ball (remote control system) with Arduino or Raspberry Pi that can interact with the device in campus; video prototype or demo of a crystal ball; design and develop a website of concept introduction by using figma and HTML, CSS, JS, etc… Make use of and support the team: the experience of presentation, documentation, video shooting and editing, UI design, research, evaluation and web front-end development, Raspberry Pi development may contribute to the team project in the process of design and development stage. Responsible for the construction of the remote control system, cooperating with other team members (designers, hardware and software researcher and developer) to build virtual interaction and make a remote interaction demo video, cooperate with others to generate ideas, research and review, design and develop prototype.

Zhutianyu Yu plays the role of a half hardware researcher and a half programmer who is responsible for the local development. He will try his best to support the team during the middle and later stages in which he is responsible for building the initial MVP and the final product. He works best when a detailed prototype and a consistent design documentation is available. He likes working during the day time and not to stay up late.

Strength: work hard and like doing research into techniques, brainstorming and coming up with ideas; willing to help with others. Weaknesses: not good at finding others' pain points, but like to follow other designers to collaboratively conduct user research and understand the domain. Aims for the course: to create a novel and playful interaction device that can be used in daily life. Approaches to the project delivery: utilise and synthesise knowledge learned from other courses; being strategic to make a feasible plan. Make use of and support the team: He will utilise resources gained from initial user research and literature review to generate and refine ideas. He plays a critical role during the middle and later design cycle by developing the device and conducting user testing.

Xiaodan Liu is a designer of graphic and web design, and also plays a part in the role of programmers. She can provide some sketch support to the team in the early stage of the project. In the middle of the project, she can contribute code to the remote part. At the end of the project, she can make a web page for the team to display the project. She can plan the progress of the project well and tends to work hard to complete the task early. From 6 pm to 12 am is when she can concentrate on completing the work, during this time she can not be disturbed by other things.

Strength: good at planning; working hard, able to complete tasks in high efficiency; good at listening and summarizing; like to learn new and interesting knowledge. Weaknesses: difficult to choose, hesitant, not decisive enough. Aims for the course: improve teamwork skills; improve programming skills; make interesting designs that can improve people's

quality of life. Approaches to the project delivery: digital prototype of the remote part of the project using Arduino; the web page of the project demonstration. Make use of and support the team: provide ideas and theoretical support for the project through literature review and discovery. Can provide technical support for graphic design, web design, and programming for the project. Be able to contribute prototype testing and evaluation to the project. Can cooperate with team members to complete presentation, report and video recording.

Ziyi Xu is an interaction designer who is good at user research, graphic design, web design, user evaluation, prototyping and making presentations. She can always come up with creative ideas and cooperate well with other teammates. As one of the flexible deliverable students, she can communicate with Lorna and tutors timely to get enough feedback. She is also a quick learner who can master techniques quickly, so she will try her best to build the idea.

Strength: good at making schedules and completing tasks on time; can cooperate well with others. Weaknesses: the ability of programming needs to be improved; sensible; think too much sometimes. Aims for the course: to improve programming skills; to create an enchanting and playful device which can improve people's lives in the near future. Approaches to the project delivery: paper prototype for the early stage; digital prototype of the touch ball device with Arduino or other controllers; remote control system; video prototype and demo.

Zhiyuan Zhang is mainly responsible for software programming and some hardware production in the team. With a 4-year undergraduate background in electrical engineering, I believe I can provide electrical support in this collaboration. During the team project, I will keep up with the project schedule and collaborate with the team designer to create a product that meets the concept. As an early riser, his prime working hours are 7am to 3pm, during which time he is always available where he is needed.

Strength: good at communication with team; coming up with various ideas; punctuality. Weaknesses: bad drawing; not good to explore user experiences. Aims for the course: combine what you have learned in the first three semesters (graphic design, user-centered design, programming) to create a piece of work that satisfies your target audience, which will also enhance your future competitiveness in the workplace. Approaches to the project delivery: medium-fidelity prototype, study tech and skills from related works. Make use of and support the team: He will conduct user testing later to gain valued feedback. He will update the concept and product itself according to the feedback.

DISCOVERY AND CONSTRAINTS

In the early design stage, we were confused about who will be our target audience and how to connect modulation music with the future mundane. To comprehensively understand this theme, we conducted several research approaches including brainstorming and mind map in the previous weeks, which provides fundamental support for the later investigations.

The second question emphasizes identifying domain places. To further explore this topic, we intend to go through quantitative and qualitative research, including an online survey and semistructured interview. The online survey was conducted in week 4, and we plan to perform an interview next week. The objective problems in this research stage are emerging. It is a bit harder to find participants from different groups, age and background to attend our research activities on the campus. We consider inviting participants through an online social platform, such as Facebook groups. However, we have only received 27 responses from the online survey in 2 days. Therefore, in the later interview process, we

may extend our research period and find more participants from friends, families, school mates, colleagues, etc.

Third, the key concern is related to the manifestation of physical interaction. We hold three group meetings to discuss how to share and communicate feelings and moods through music. We consensus on the main technologies and physical interactions. However, we are worried about emotion tracking, which is one of the toughest tasks in our project. To solve these problems, we may try 2 or more techniques of prototype such as heart rate tracking and pulse rate tracking.

Finally, the most crucial concern regards the construction of the devices, particularly the remote interaction system. We may find more tutorial materials online, such as video and Arduino blogs, asking tutor or learning from teammates. To ensure our construction succeeds, we may try to build a demo or video prototype and conduct user evaluation activities for getting more feedback.

PLAN OF WORK

We have made the following work plan according to our concept and course timetable, which includes the main work content, resources and work assignments.
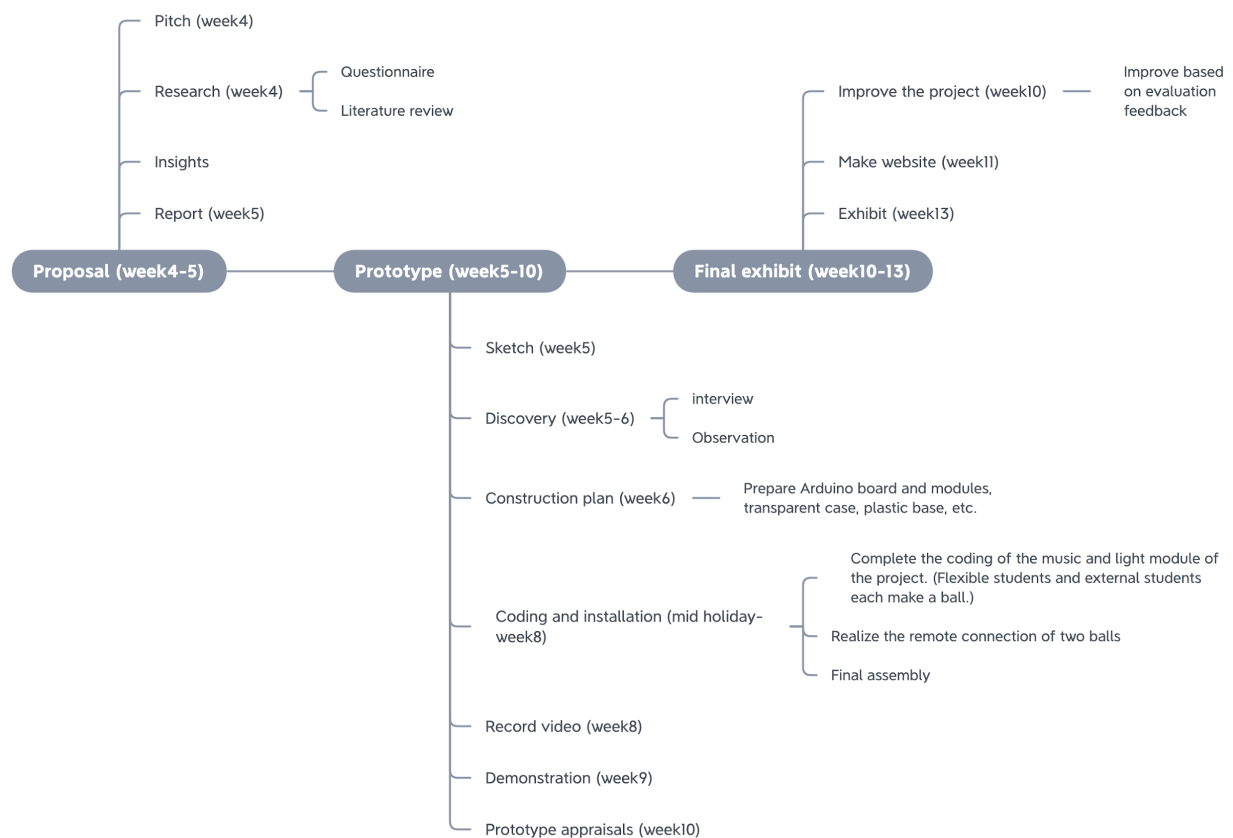
Timetable (Figure 7)

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