



Final Report

Music playback based on Emotion Recognition

Fardin Saad (154419)
Ahmed Rafayat (154436)
Alamin Shaheen (154423)
Rahat Anwar Khan (154431)

8 November 2019

Contents

1	Abstract	3
2	Introduction	3
3	Methodology	4
3.1	Requirement Gathering Procedure	4
3.1.1	Affinity Diagram	4
3.1.2	Personas Scenarios	8
3.2	Prototyping	10
3.3	HCI Tools	10
4	Experimental evaluation	11
5	Conclusion	11

1 Abstract

For HCI project, our domain is emotion recognition from speech. After recognizing emotion, we play a music based on the emotion in hopes of making the user feel a better mood. So a happy song will be played if 'Sad' is detected. Our app was geared towards two common but neglected problems of the twenty first century. At first we tried to simply make our users feel happy. And secondly, we wanted to solve the problem of finding an appropriate song to listen to with the help of mood. One of the problems we faced in making this application is the song selection. Choosing the appropriate song according to the mood of the user proved to be a difficult task. Again another problem we faced was using a proper machine learning classifier to detect the emotion. Among the important findings, the most important salient finding was that age group played a significant role in determining the target user of our application. Kids, teenagers and middle aged people showed great interest in using the app while elder aged people showed little interest to it.

2 Introduction

In our HCI project we are going to recognize emotions from the user's speech and play a song based on the detected emotion. The human part of our project is the user's speech whereas the computer portion is the handheld devices such as mobiles, tablets, etc. The goal of our application is music playback after detecting a user's emotions. It identifies emotions after recording an audio sample from the users. Our app will ask the user a question. The user will have to answer the question through speech. After answering a specific question the user will click on a button to get the next question. Therefore after answering the question our system will detect the users emotions and play a song according to the detected emotion. For instance, let us assume that the emotion 'sad' is detected, thus our system will play a happy song to cheer the user. We followed some structured techniques while collecting data from our potential users. The techniques are:

1. Unstructured Interviews
2. Focus Groups
3. Questionnaires
4. Statistics from Internet

The limitations of our requirement gathering process were quite significant in determining our requirements. Firstly, for unstructured interviews we might have missed some key questions that would have been important in requirement identification. Secondly, for focus groups there could be a dominating person in the group who could potentially suppress other's thoughts thus sabotaging the requirement identification process. The benefits to this requirement gathering methods are we can gain an overview of what our user's requirements are as well as we were also able to find our target user audience. These are the well known and established methods for requirement identification and they helped us in gathering vital information about the requirements for our application.

We used Balsamiq to create wireframes for our app. A wireframe is a low-fidelity prototyping tool that shows the basic layout and structural guidelines of an application. We chose Balsamiq as our prototyping tool because of its ease of use and simple drag and drop functionality. Wireframes look very much like actual interfaces and so it helped us plan for responsiveness in the UI design. Thus, we were able to speed up our prototyping and development. We also got potential users involved in our prototyping stage to get valuable insight and improve our app without making major changes.

3 Methodology

We used a user-centered design approach for our application. At first, we focused on established requirements from the users effectively, as this is the most important step. Then we obtained critical data significant to our application. Afterwards we created an initial design from the user's data and developed a wireframe prototype using an HCI tool known as Balsamiq. Evaluation and final product are yet to be done.

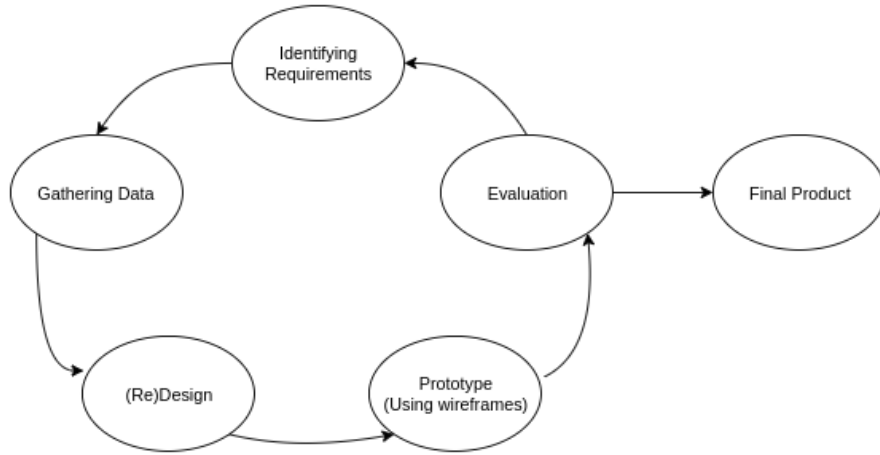


Figure 1: Our design approach

3.1 Requirement Gathering Procedure

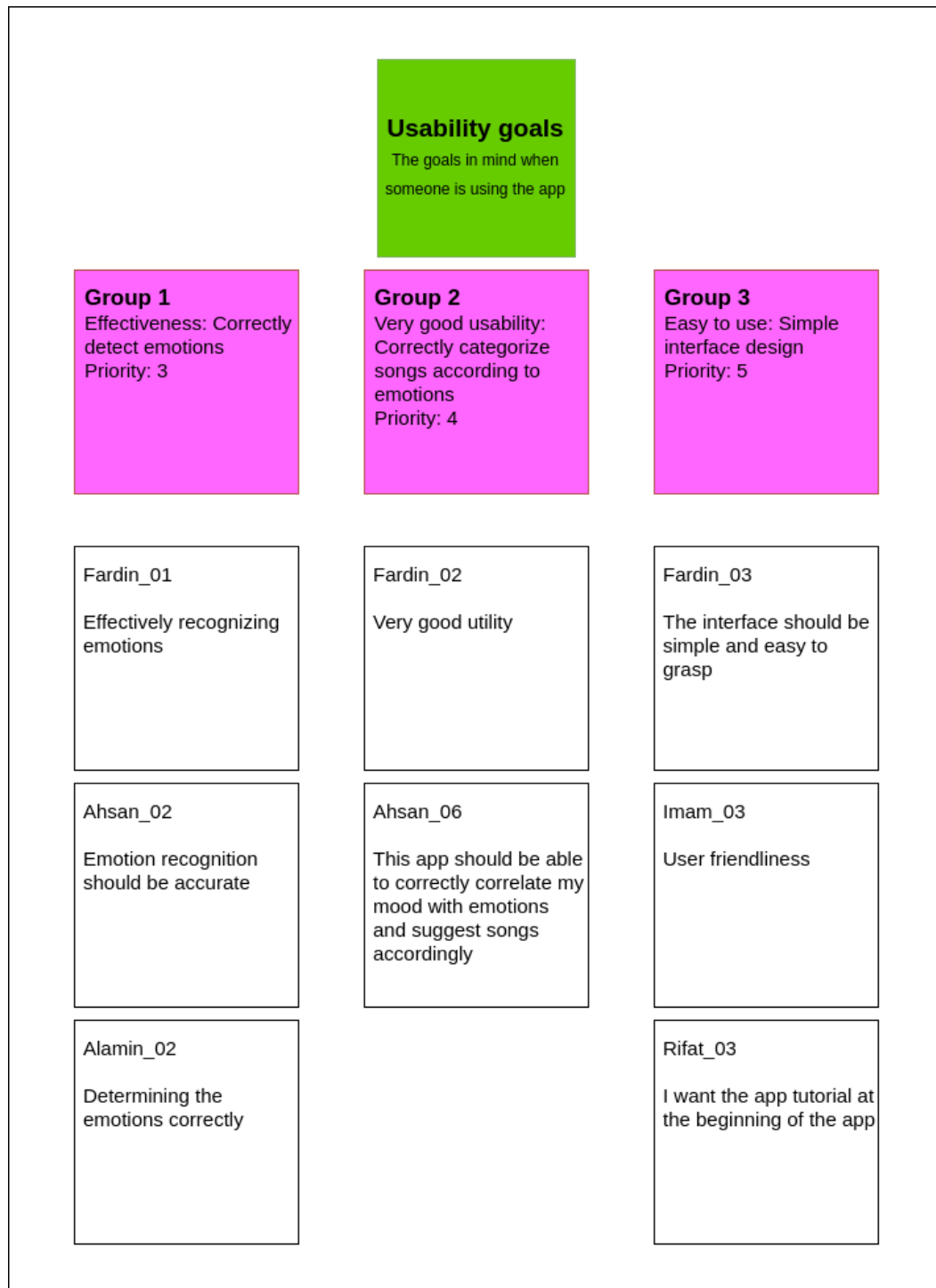
The techniques that we followed for requirement gathering are **Unstructured Interviews**, **Focus Groups**, **Questionnaires** and **Statistics** from Internet Firstly, for collecting data we chose IUT and BRAC University in order to form a view of our potential users i.e. our persona. We conducted unstructured interviews individually regarding our app and gained wonderful insight from our potential users. Secondly, we gathered a group of students in both BRAC and IUT and collected data by letting them participate in a group conversation regarding our app. They could put forward their opinions and views in a supportive environment conducted by us. Thirdly, we also supervised a survey where we handed them a list of questions which contained questions about our app. Such as:

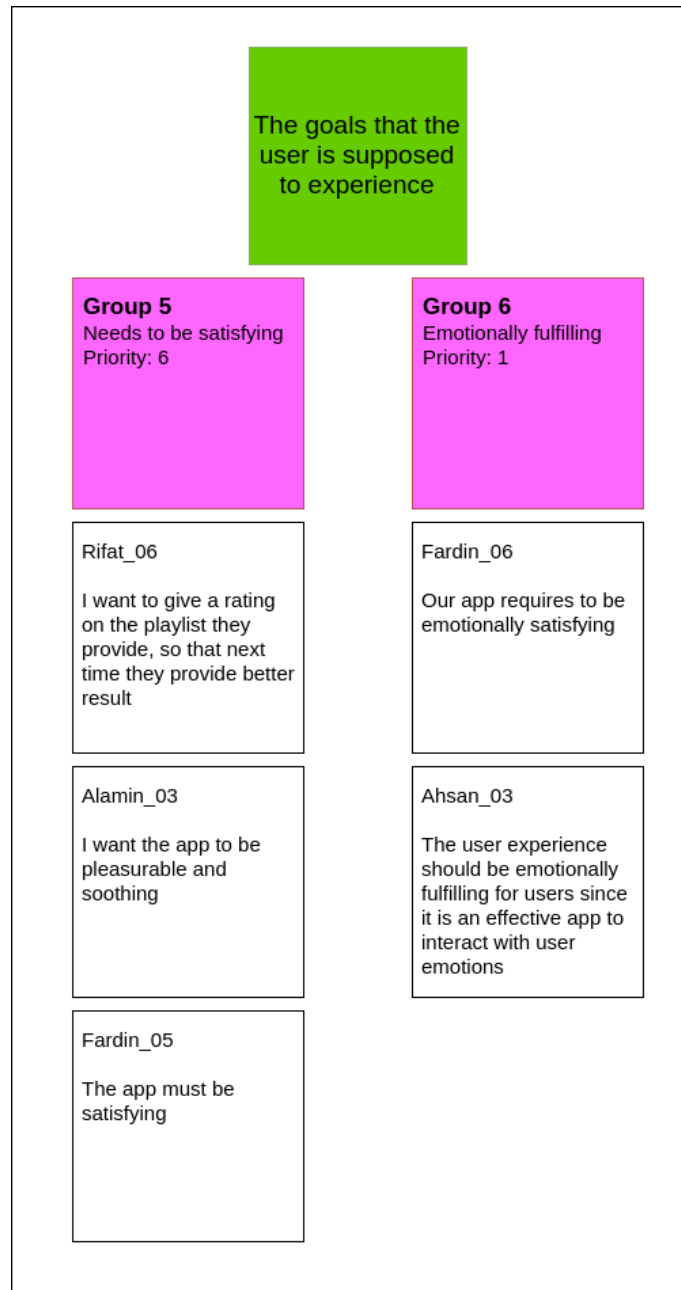
1. Do you listen to music when you are feeling down?
2. What sort music you listen to while you are feeling down?
3. Does it help you feel better?
4. Would you use an app that would recommend you to listen music based on your emotion?

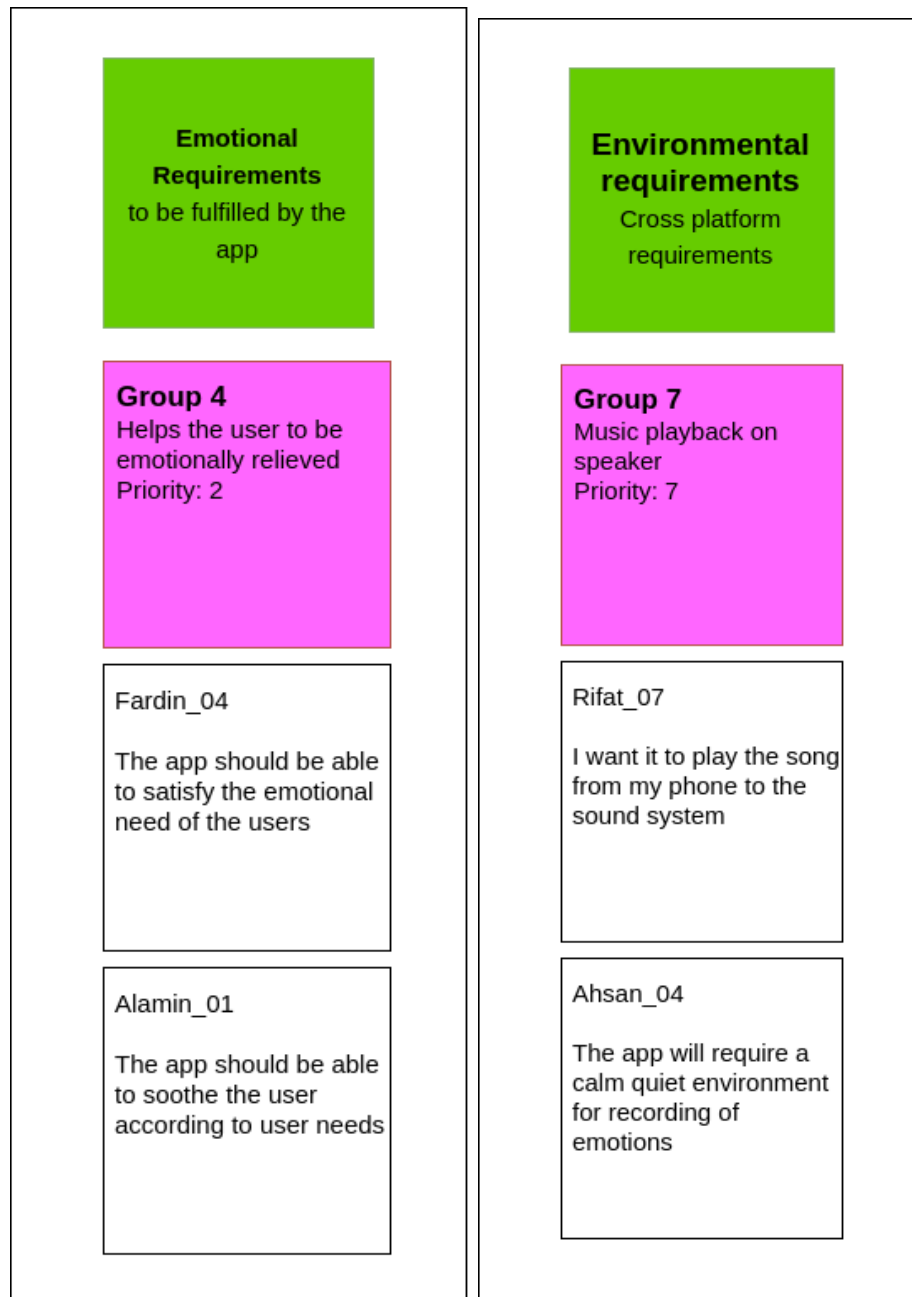
Fourthly, we reviewed several statistics on the internet regarding the users' age group for using different music playback applications. Lastly, we conducted the same methods for adults and children (mostly belonging to our family and relatives). The target audience that we have found for our application are between the age group 13-28 years old. We could only select them after analyzing the data we have collected across all the age groups we have interviewed.

3.1.1 Affinity Diagram

The affinity diagram organizes the individual interpretation session, or affinity, notes into a wall-sized, hierarchical diagram grouping the data into key issues under labels that reveal the customer's needs. The affinity shows in one place the common issues, themes, and scope of the customer problems and needs. The affinity acts as the voice of the customer and the issues it reveals become the basis for user requirements.







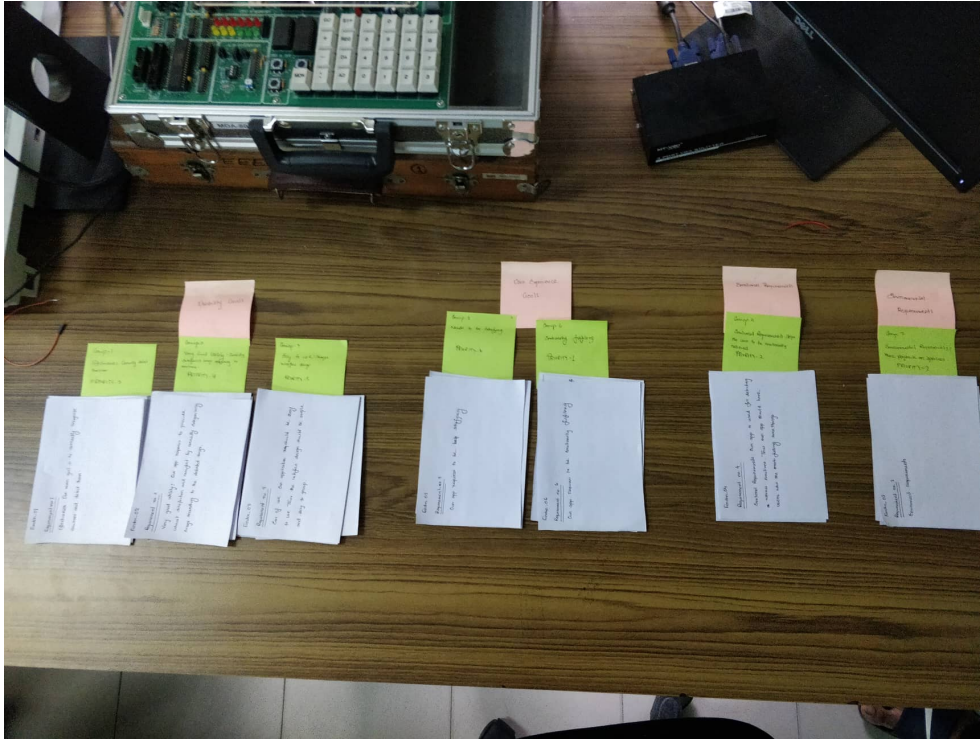


Figure 2: Affinity diagrams

3.1.2 Personas Scenarios

Our system users are of two folds. One based on gender identity while the other is based on an age group ranging from ages of 13 to 28 years old. Our persona is based on both male and female genders. Females being the most emotional gender between the two, they prefer music as a means of relief to emotional stress, emotional fatigue, mood swings and other emotional breakdowns. Males are seen to be less prone to emotional breakdowns. But music is still used as stress reliever for calming the mind and to soothe the mind from the immense pressure the male gender faces in the society. We have categorized our persona between both males and females. But we have to supervise it on the basis of age groups as well. For this the age group between 13 to 20, which mostly comprises of teenagers and kids, listen to music for entertainment purposes as well as to fulfill their emotional needs. The age group between 21 to 28 years old, which consists of young adults, are at a turning point in their life. They pursue new jobs, build their career or tend to their family. This leads to stress and emotional fatigue which can be easily solved by music.

User Persona 1



Goals

- To listen music based on his current emotions.
- To calm himself when he is angry.
- To de-stress or relieve his tension.
- To stop feeling anxious.
- To feel motivated.

Frustrations

- The user wants the application to correctly detect his emotional state.
- This app is required to be used in a quiet environment.
- Incorrect detection of emotion may lead to playing a inaccurate song which may alter one's mood.
- The emotion detection process may be burdensome for this user.

Bio


This individual's name is Farshid Saad. He is currently studying in BRAC University and is majoring in Computer Science and Engineering. He maintains a 3.6 GPA and appears to be a nonchalant human being. He excels in sports and video games and tries to enjoy life to the fullest. He is also a goal oriented person and likes to achieve anything he sets his eyes at. He loves to travel, meet new people and is all in all a very amiable person.

Age: 23
Work: Student
University: BRAC
Location: Dhaka, Cantonment
Character:

Personality

Introvert	Extrovert
Thinking	Feeling
Sensing	Intuition
Judging	Perceiving

User Persona 2



Goals

- To relieve mental stress
- Listen to music to uplift herself
- Deal with mood swings
- Calm herself during panic attacks

Frustrations

- The user wants music to relieve the mental stress she goes through
- The user has to talk to the app each time she wants it to detect her emotion
- The user has frequent panic attacks in stressful situations

Bio

This is Kaynat Bint Shaheen. She is currently a student of BRAC university studying in the CSE department. She is an open individual and very friendly to people. Her hobbies include reading books and cooking. She is an avid listener to music and enjoys watching movies.

Age: 20
Work: Student
University: BRAC
Location: Mirpur, Dhaka

Personality

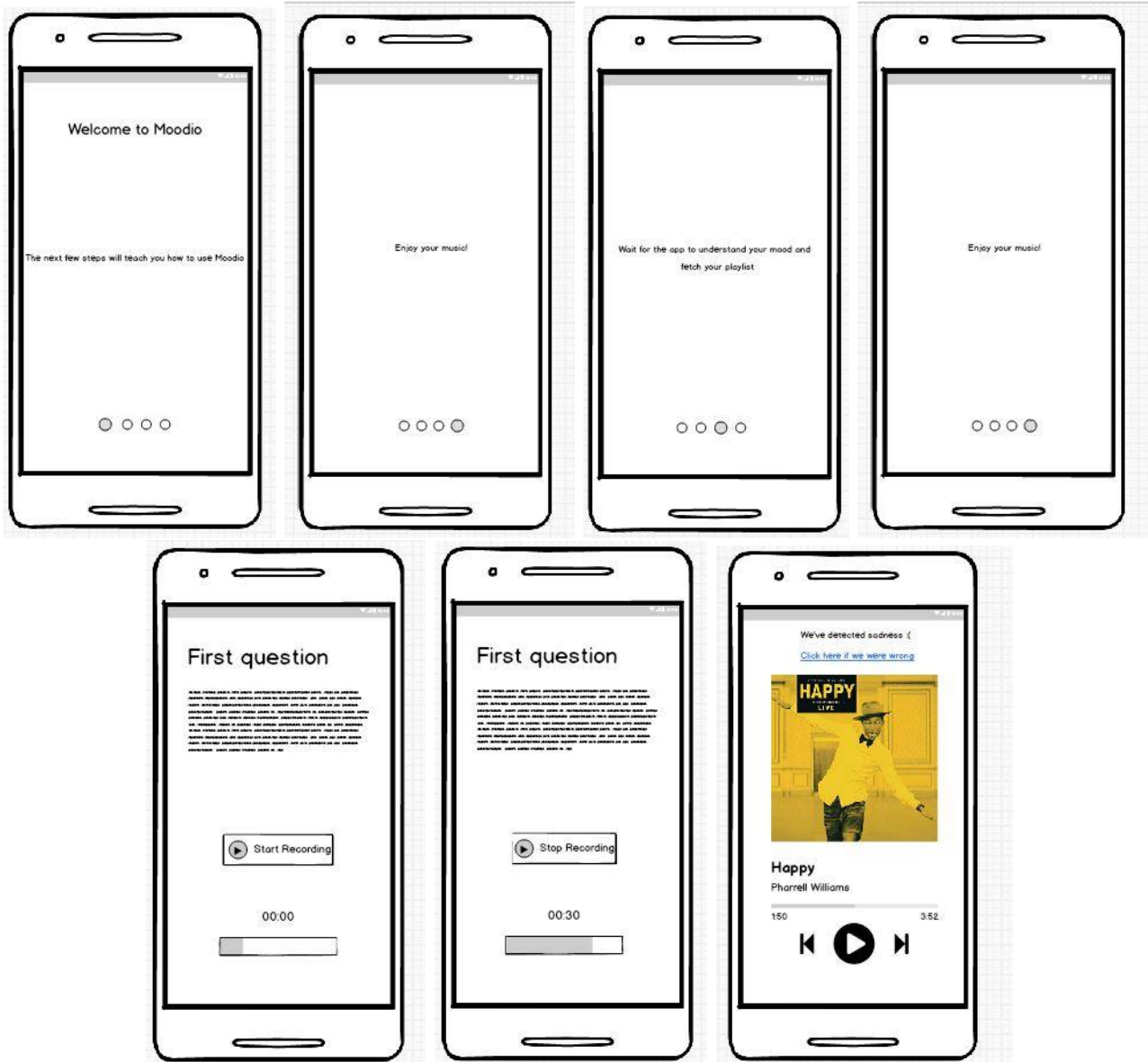
Introvert	Extrovert
Thinking	Feeling
Sensing	Intuition
Judging	Perceiving

Below we represent 2 scenarios where our app can be used:

- Farshid is a student of Computer Science and Engineering. School tests, exams, evaluations don't necessarily go according to his expectations and desires. In such moments he needs some form of emotional assistance or some time alone. This is where our app comes to use. Our app can detect his emotions and play soothing music to relieve stress, tension and anxiety.
- Kaynat is a student studying in the CSE department. She has been experiencing panic attacks and mood swings quite frequently. In such moments she should calm herself down to fight against the panic attack. Our app can be her solution as it will calm her down and help her focus

3.2 Prototyping

We used low fidelity prototyping. Low-fidelity (lo-fi) prototyping is a quick and easy way to translate high-level design concepts into tangible and testable artifacts. The first and most important role of lo-fi prototypes is to check and test functionality rather than the visual appearance of the product. Balsamiq Mockups is a user interface design tool for creating wireframes (also called mockups or low-fidelity prototypes). You can use it to generate digital sketches of your product ideas to facilitate discussion and understanding before any code is written.



The prototype which we have constructed is named as Moodio. In these software designed sketches we can see that the user is asked a question. The user is required to answer the question within a minute. After the user clicks on stop recording the system processes the recorded audio sample of the user to detect his/her emotions. After detecting an emotion the system plays an appropriate song to corroborate the users feelings. In this interface we have shown that we detected sadness. Thus the upbeat song of Pharell Williams was playing to cheer the user.

3.3 HCI Tools

The HCI tools that we have used for our project are Xtensio and Balsamiq. We used Xtensio for creating our two personas and used Balsamiq for prototyping.

4 Experimental evaluation

We have collected our data across various age groups and gender. For children the age group defined was from 7-12 years old. The idea of this application seemed outlandish to them and they had very few idea about what we were talking since technology is still very new to them. Then for our age group between 13-28 years, (our representative user) showed much interest in the product that we were offering and gave us a comprehensive about what they were looking to achieve from such a product. The most important thing that we found was that male and female for that category of age group had varied taste in music. So in our application we have to implement the selection of different songs based on the gender and emotions. We also found out that the age group above 28 years found this idea of emotion music playback not appealing since they are not dependent on technology to handle their emotional needs. The Evaluation of our application and the final product is yet to be done and made respectively.

5 Conclusion

For our future works, we plan on making the whole process of choosing a song to listen to a lot easier and more appropriate. We believe music is best enjoyed in the appropriate mood and so, our main goal is finding a better way to make the process of detecting the mood faster. We also plan on including better functionalities as a music listening app like creating playlists, saving music clips and showing lyrics.