

Prototyping Interactive Systems (DES206)

Final Endsem Project

Air Piano

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Chosen Age Group:
Kid (5-8 years)

Holding an object to play the notes requires strong gross-motor and fine-motor skills, coordination, and also a strong hand-eye coordination. The level of these required is not present in children younger than 6 years, thus 5-8 is the best age group for this

The Air Piano needs a strong sense of left and right. This is present in children above the age of 5. Additionally, playing the piano needs an intuitive sense of counting till the number 4. This is present in kids above the age of 5.

An Air Piano needs a decent amount of concentration, motivation, the capacity to sit for a decent duration of time, and the ability to follow instructions. This is not present in children under the age of 5 in the same way it is present in the older children.

Children who are above the age of 9 may find the Air Piano to be boring and may prefer a real piano. While older children can use the Air Piano, the Air Piano is rather geared towards the younger kids.

The Concept

The Air Piano is similar to a regular piano, but yet different. Much like a regular piano, you can play the keys to generate sound. But the difference here is that instead of pressing on the keys, you just have to put your hand on the key to play it.

Functionality

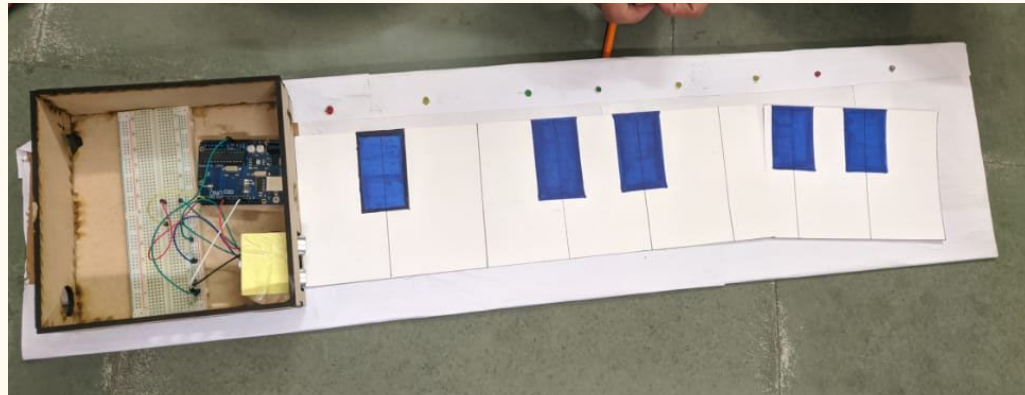
By placing the mallet on the keys, the sensor will sense the distance between the sensor and the mallet, and based on that, the speaker will play a specific frequency corresponding to the note. Additionally, there are some pre-recorded songs, that can be played by pressing one of the corresponding buttons on the box.

Components of the Air Piano

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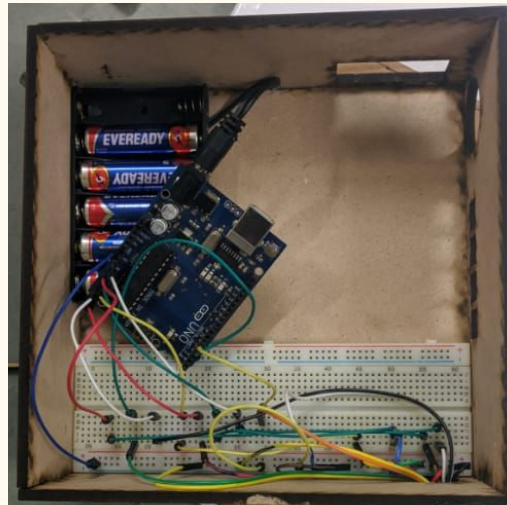
Base Cardboard

We have taken a piece of cardboard. We have wrapped it around with sheets of paper. 8 LED Lights are embedded into the cardboard. A sheet on which the notes are drawn is pasted on the cardboard. The box is also put on the cardboard. We have also pasted pictures of notes and other pictures to make it even more appealing to children.



The Box

The Box contains the backend of the project. It was assembled from pieces obtained by laser cutting. It houses the Arduino Uno, the Breadboard, the wiring, the sensors, and the speakers.



The Mallet

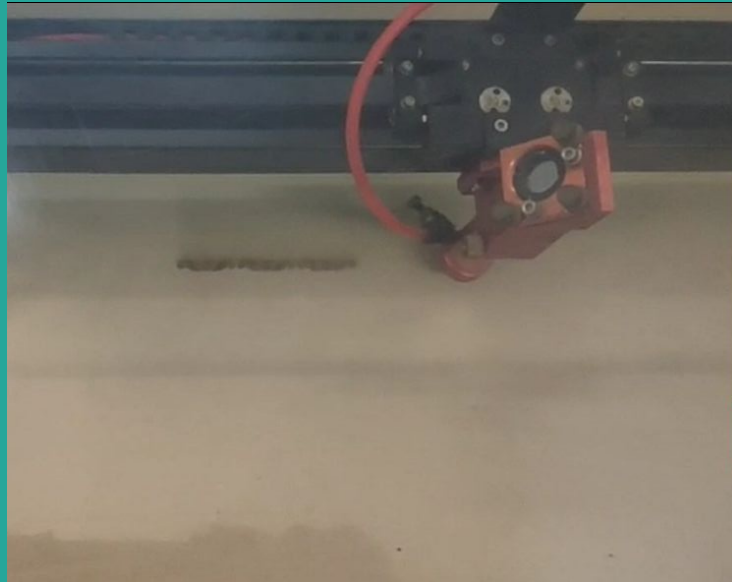
The Mallet is used to play the Air Piano. The user holds the mallet and puts it over the note they want to play. The Mallet was modelled with Epoxy Clay.

Processes to create the Air Piano

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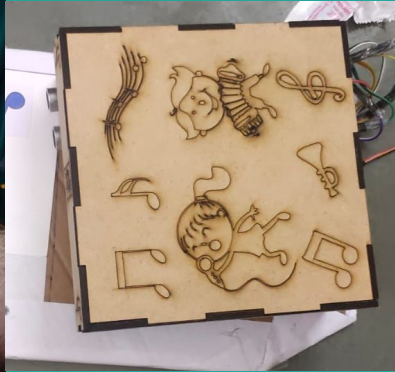
Laser Cutting

A sheet of cardboard was cut into pieces by using the Laser Cutting machine in the DI Lab.



Cardboard Assembly

The pieces we obtained from laser cutting were assembled by glue to form the box that holds the Arduino and the “backend” of the model.



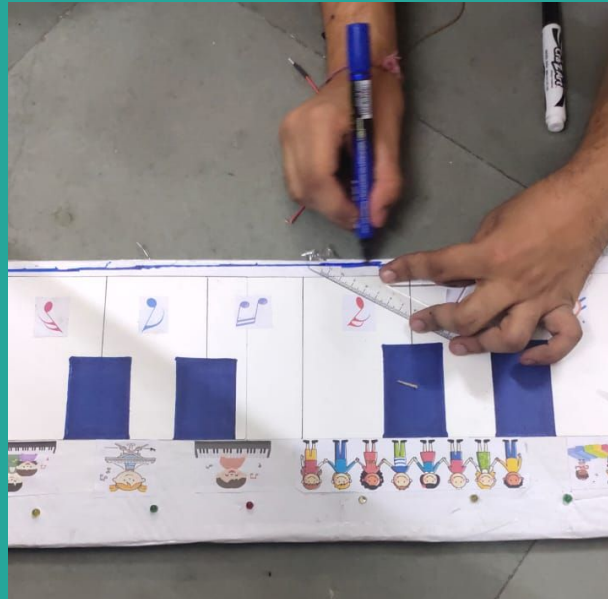
Clay Modelling

We used Fevicryl Mouldit Epoxy Compound to mould the mallet. We use a similar process as we used in Assignment 2



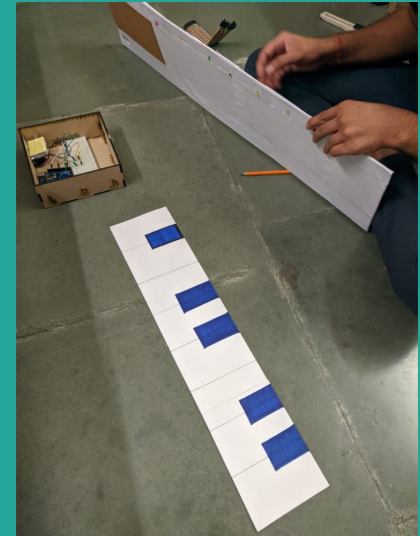
Painting and Sketching

We used Paints to paint the mallet. We used sketchpens to create the notes of the piano.



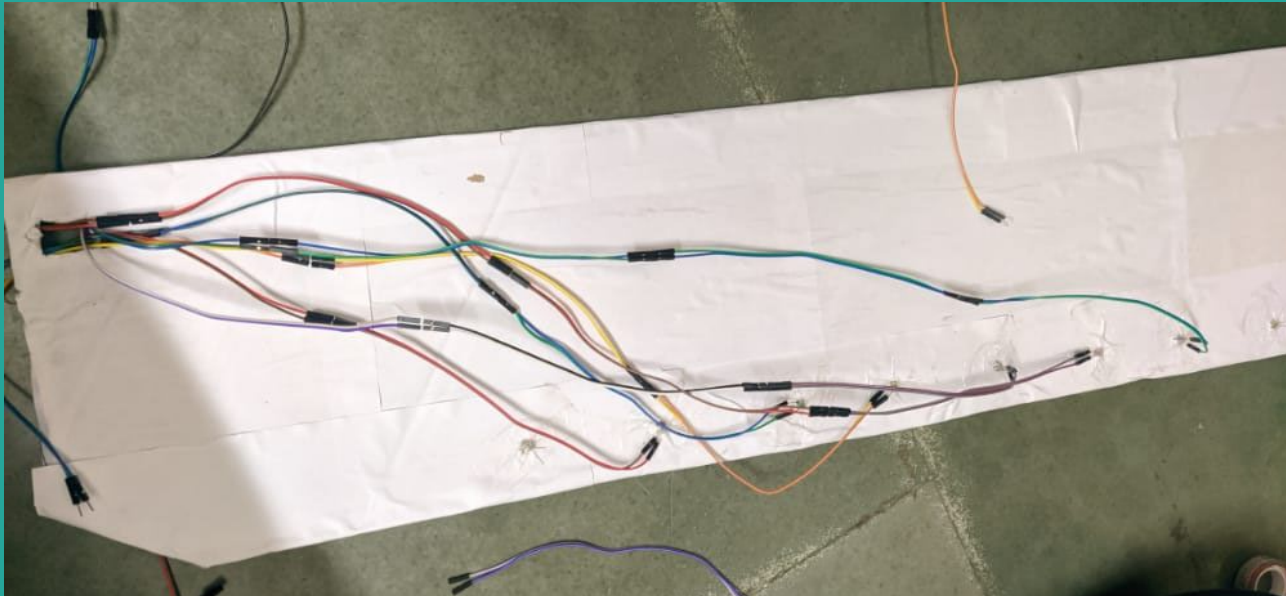
Pasting

We've pasted sheets on sheets and on cardboard using glue



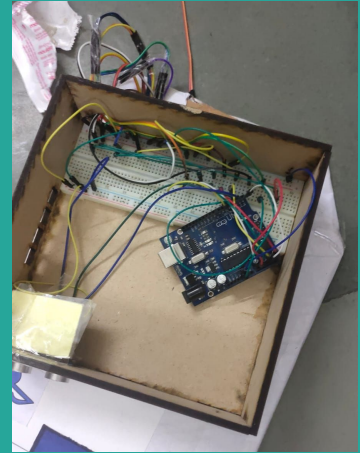
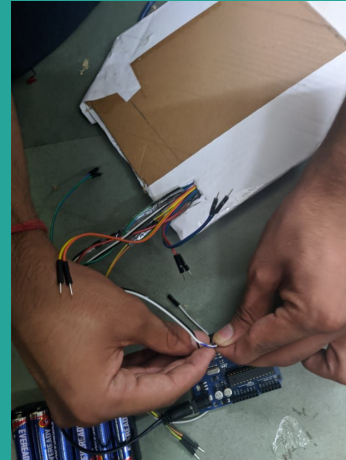
Embedding LEDs

We have taken 8 LED lights, and we have embedded them into the base cardboard, corresponding to the 8 notes.



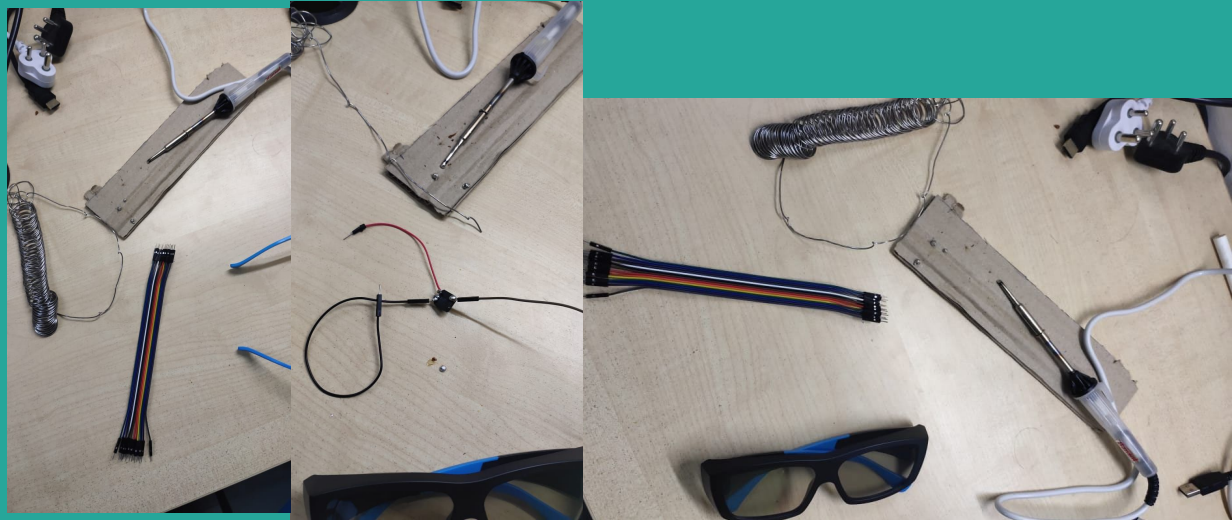
Wire Connection

The wires have been connected between the Arduino, Breadboard, Battery, Sensor and Speaker, keeping into mind the positive and negative polarities.



Soldering

The wires were soldered onto the buttons and the buzzer using a soldering machine and a soldering wire

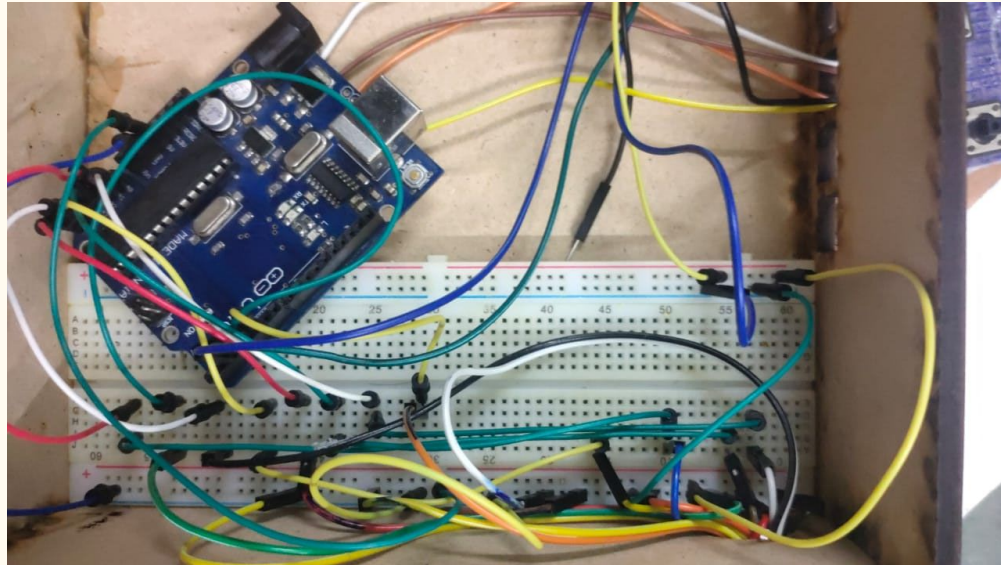


Arduino Logic

We have made use of Ultrasonic sensor to measure the distance between the sensor and the mallet. This sensor is connected to the Arduino board, and the Arduino board is connected to a buzzer. Now, based on the distance, the Speaker emits a specific frequency that corresponds to the note that was played. The distance is divided by 7 cm to determine which note to play.

The Arduino Uno is also connected to the LED lights, which light up when the corresponding note is played.

There are buttons on the Air Piano, each associated with a song. When they are pressed, the Arduino lets the Speaker play the pre-recorded song associated with the button.



THANK
YOU!