



# Gesture Controlled Music App

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# Objective:

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To build a music app which can also be controlled by gestures.



This app is intended to provide an alternative way for users to interact with a music player app.

# Why did we choose this ???

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Users often find it annoying and difficult to change the songs in a music app in a phone or a smart watch while exercising because of the smaller buttons in smaller devices.



This alternative way provides a less disruptive way for users to interact with the music player while exercising or performing intense physical activity without interruptions or losing rhythm

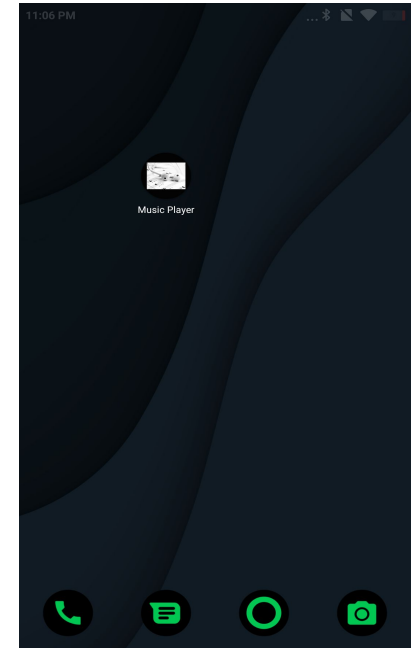
# Key Features

- Sign-up functionality
- User login to the music app
- Bypass login and go to song list with a swipe.
- Song List View with the ability to choose a song from the list
- Music player interface to play, pause a song, previous song, next song
- The following gestures can be used to interact with the music player:
  - Right Tilt to play next song
  - Left Tilt to play previous
  - Shake to pause n play
- App with a Custom Music Icon

# Behind the scenes

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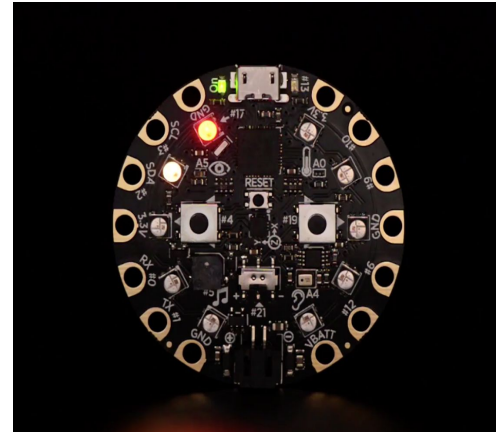
- Android
  - Activities
    - Main Activity
    - SignUp Activity
    - Song List Activity
    - Music Player Activity
    - Explicit Intent to navigate between activities
  - Sign-up/Login functionality using Firebase Authentication
  - Touch events handling
  - Animation for background
  - Basic Swipe events.

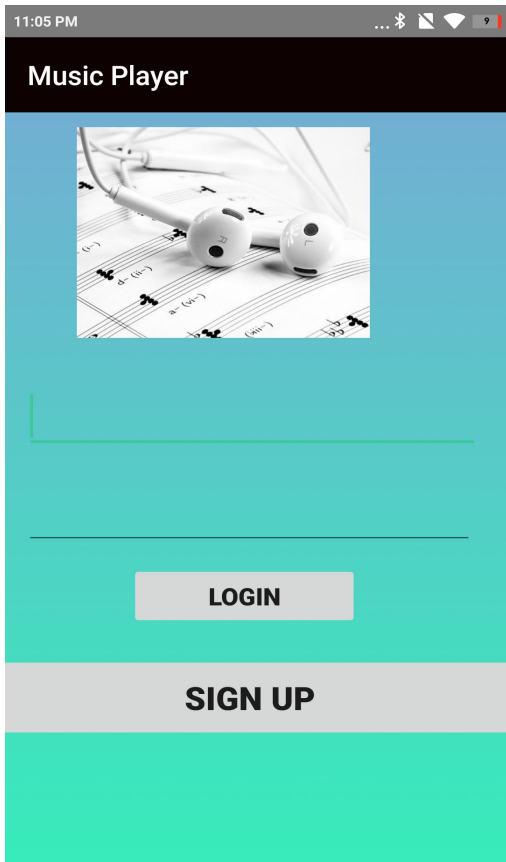


# Behind the scenes (Cont...)

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- Arduino
  - Gesture detection
  - Sensors used:
    - accelerometer
- Communication
  - BLE interface for Android<->Arduino communication
  - Choose bluetooth as a user typically is close to the mobile device.





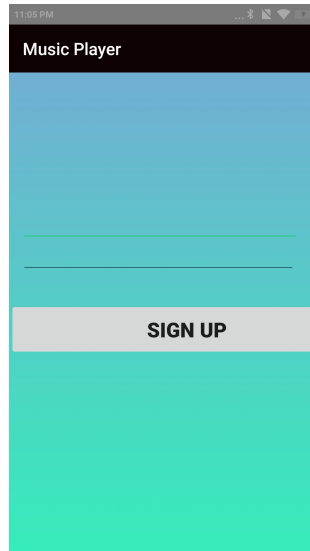
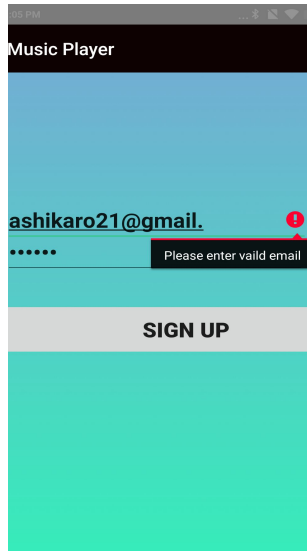
# Main Activity

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- Responsible for managing the login and sign up functionality and the swipe events.
- Users can bypass the login and go directly to a song list view with a right or left swipe.

# Sign-Up Activity

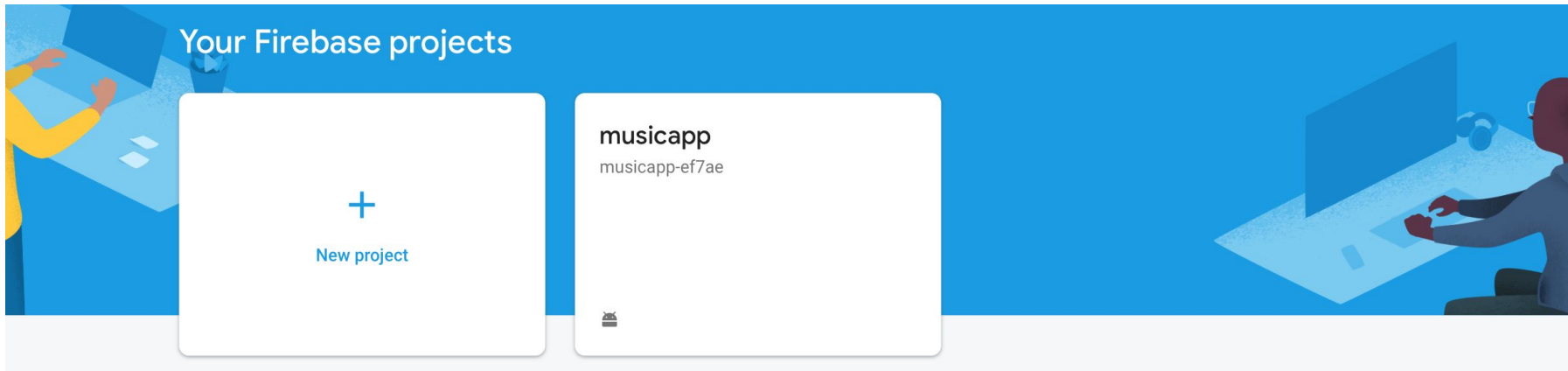
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- Enter email and password
- Takes you to login page
- If you enter wrong email id it shows the pop-up to enter the valid email id.
- These info are stored in the firebase.



# Firebase





- SDK used to keep the login functionality standard without having to reinvent the wheel.
- Removes the need for us to use a database to track user credentials.


 **Firebase**


Project Overview


Develop


 Authentication

 Database


 Storage


 Hosting


 Functions

 ML Kit

Quality

 Crashlytics

 Performance

 Test Lab

Analytics

Dashboard, Events, Conversions, A...

Grow

Spark

Free \$0/month

Upgrade

musicapp

Authentication

Go












Users

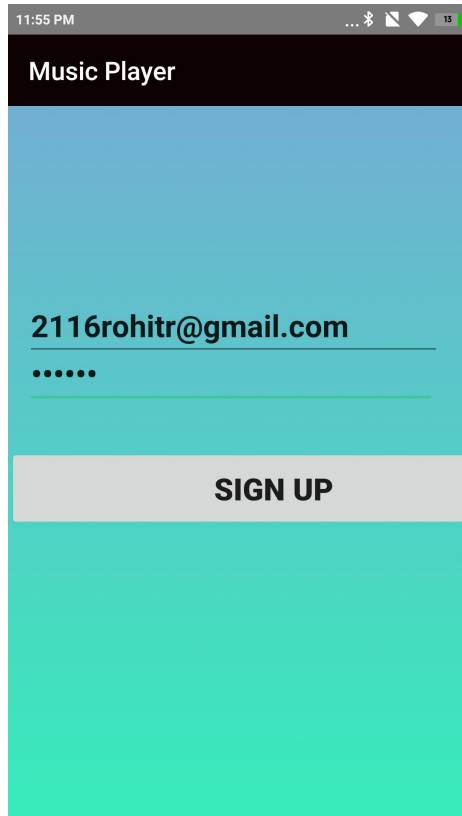
Sign-in method

Templates

Usage

Sign-in providers

Provider	Status
 Email/Password	Enabled
 Phone	Disabled
 Google	Disabled
 Play Games	Disabled
 Game Center <div>Beta</div>	Disabled
 Facebook	Disabled
 Twitter	Disabled
 GitHub	Disabled
 Yahoo	Disabled
 Microsoft	Disabled
 Anonymous	Disabled



## Authentication

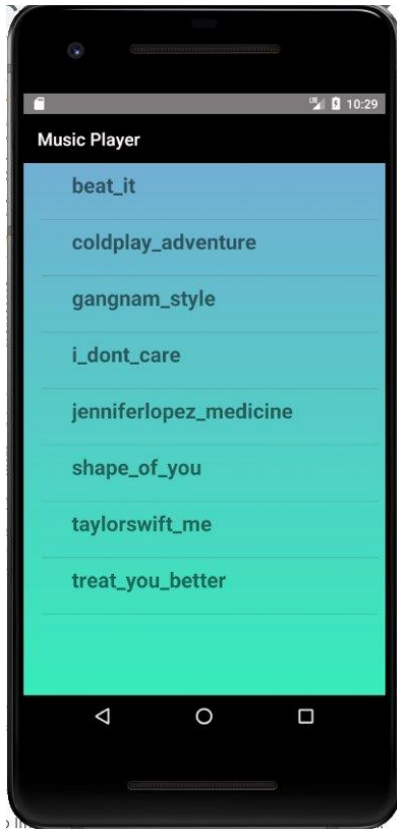
Users Sign-in method Templates Usage

Search by email address, phone number, or user UID

[Add user](#)

Identifier	Providers	Created	Signed In	User UID ↑
2116rohit@gmail.com		Jun 11, 2019	Jun 11, 2019	8Pk2SQCok6bUTRQSUAlre3Mqx...
ashikaro21@gmail.com		Jun 6, 2019	Jun 11, 2019	c0xQpTCLsaMCWuE2mU8CEZipb...

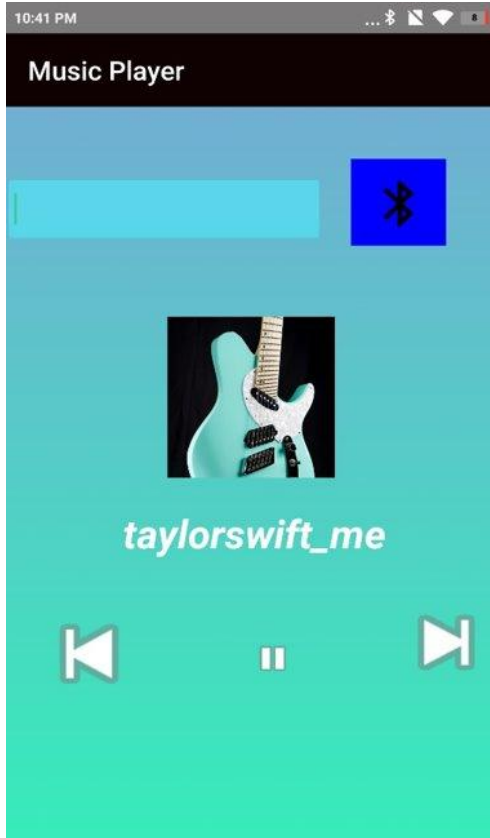
Rows per page: 50 1-2 of 2



# Song List

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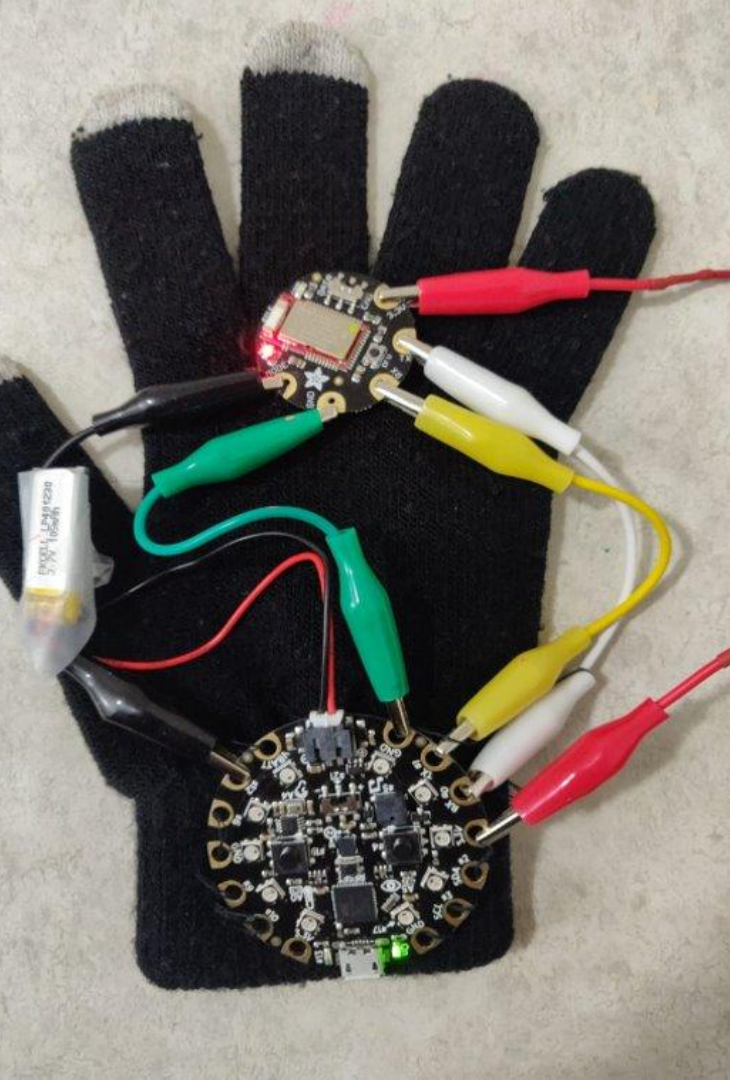
- Displays all the songs as a List
- Includes 2 xml Layouts, one for the List page and other for the design of each item in list.
- On click of any item, it moves to the next activity, passing the song as intent.



# Music Player- Features

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- Connect Disconnect to the wearable Device
- Pause or Play the song
- Go to next/previous song
- The Bluetooth Icon turns Yellow while establishing connection and Green once it is connected.
- Connection Details are displayed in the text box



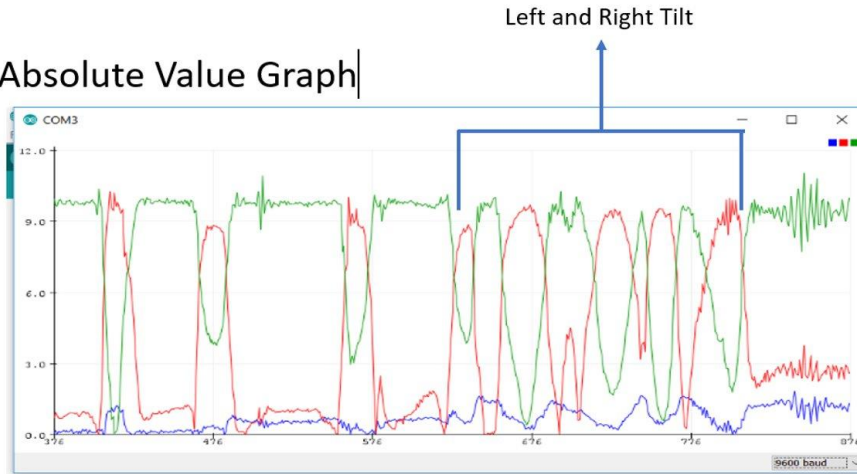
# Arduino – Wearable

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- We used Arduino Circuit Playground as it is light and easily mountable to be a wearable Device.
- The Gestures detection happens in Arduino itself and it sends data over to the Android Smartphone if any gesture is detected.

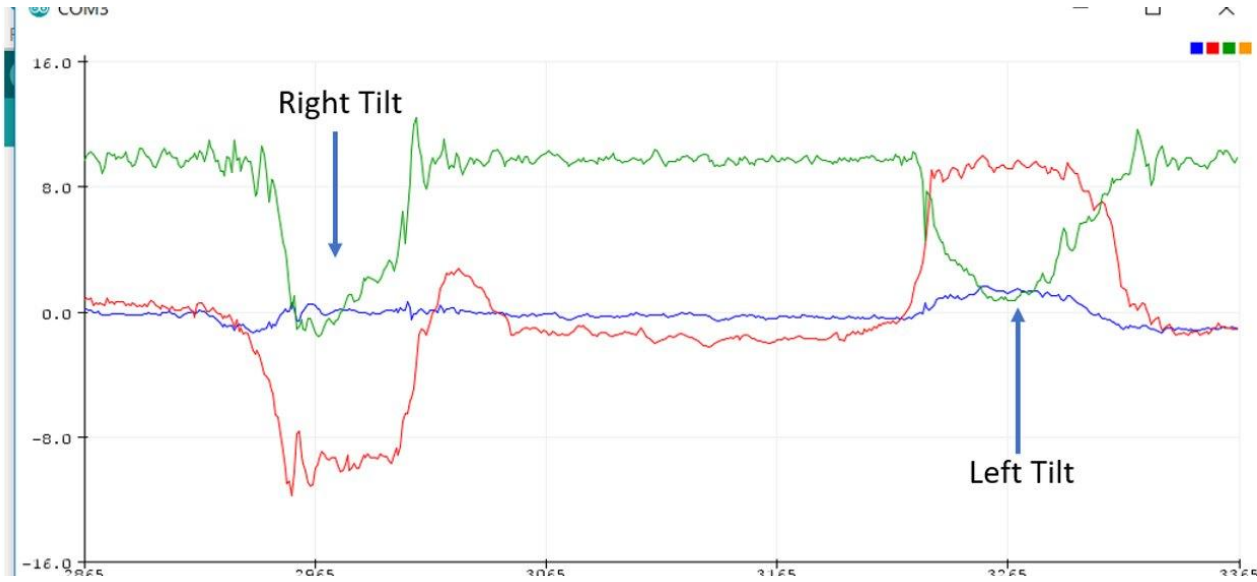
# Accelerometer-Gesture Detection

Absolute Value Graph



X  
Y  
Z

- We plotted the Readings of X, Y and Z coordinates and observed the values to find threshold and detect tilt vs shake.



# Fetching the threshold Values


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# Gesture Detection Logic

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Shake  $\text{square\_root}(X^2 + Y^2 + X^2) > \text{Threshold}$



Tilt From Graph 1 we observed, absolute values of Y and Z change when tilt is detect



Left/Right Tilt From Graph 2, we fetched the actual values as follows:

- Left  $Y > 8$  and  $X < 2$
- Right  $Y < -8$  and  $X < 2$

# Challenges

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- Finding the right resources
- Choosing the right project which encompasses all the concepts learned.
- Implementing touch listeners
- Finding bugs causing the integration between Android and Arduino to work incorrectly.

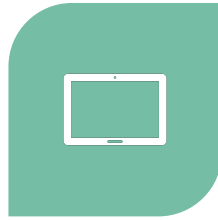


# Future Work

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THIS APP COULD BE  
RELEASED TO THE GOOGLE  
PLAY STORES FOR  
COMPATIBLE WITH  
WEARABLE DEVICES.



AN IOS VERSION OF THE APP  
COULD BE RELEASED  
COMPATIBLE WITH APPLE  
WATCH.



IMPROVING GESTURE  
RECOGNITION USING  
MACHINE LEARNING.



ADDITIONAL USABILITY  
FEATURE LIKE, CREATE YOUR  
OWN PLAYLIST, PROVIDE  
OPTION TO DOWNLOAD  
SONGS FROM MULTIPLE  
SOURCE.



# Thank You

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