FLORIDA TECH
FLORIDA'S STEM UNIVERSITY™

The Music Assistant

Milestone 1 • September 30, 2019

Requirements Document

Scope

- Development will consist of a web and mobile application which will be accessed by students and teachers
- Students will be able to interact with sheet music by playing back the sheet music and singing along with their part
- Teachers will be able to view their students' statistics on both individual and group performance
- Students and teachers will have access to a communication (chat) tool

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Requirements Document

External Interfaces

- Log In & Sign Up
  - Firebase Authentication

- Musical Analysis (Core Functionality)
  - Input from microphone and machine learning algorithm computes pitch, duration, dynamics, phrasing, rhythm, and tempo
  - TensorFlow

- Communication
  - Real-time chat interface
  - Firebase real-time database

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Design Document

System Architecture

- User class: Teacher and Student subclasses
- Choir class: Linked to 1 or more teachers and 1 or more students
- MusicPiece class: Linked to exactly 1 choir (for copyright purposes)
- Conversation class: Linked to 1 student and 1 teacher
- Message class: Linked to user that sent message

Design Document

Human Interface Design

- Sign Up & Log In
- Home Screen
  - Students: Display last piece of music, statistics, and conversations
  - Teachers: Display last piece of music uploaded, student statistics, and conversations
- Student Practice Screen: Allows student to practice a chosen sheet of music with real-time feedback

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Test Plan

- We were able to write test cases for the general use of the program as the users will experience it.
  - Given an audio stream, we can test how often and how quickly feedback is given
  - We have test cases to ensure that users have access to major components (exercises, playback, sheet music)
- We need to figure out how the analysis of singing will happen so we can write the test cases for that part of the program

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alphaTab Demo

Music Representation and Playback

- A cross platform music notation and guitar tablature rendering library.

- Can load music sheets from files like Guitar Pro or use the built in markup named alphaTex.

- Includes cursor and can generate a midi file for itself which provides playback feature

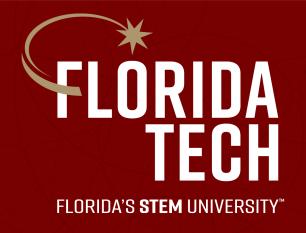- Demo: Dgriessler.github.io/TestHost

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Aubio Demo

Real-Time Pitch Recognition

- Aubio is a tool for extracting musical information from audio signals.

- Written in C with a Pthon interface

- When combined with PyAudio it can produce real-time pitch tracking

- Demo: on computer

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