[Capstone Category]

Project Name **The Music Assistant**

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Our project, The Music Assistant, is a web app designed to assist students learn sheet music by giving real-time feedback during their practice sessions and generating exercises designed to perfect any areas of weakness. Our target audience is choirs – both directors and choir members. In a typical classroom setting, members of a choir must practice on their own in order to contribute to the choir. Some students lack the technical background, feel self-conscious, or are unconfident when practicing. These situations lead to wasted rehearsal time, where the sheet music must be taught or retaught to those who are struggling. In order to even determine where students are struggling, choir directors must spend time practicing the music to discover which parts need work and which choir members need the most help.

Our solution is a web app that is designed to be an assistant for both the student and the director. For the student, our app displays the sheet music and offers playback features and real-time feedback as the student performs. Students can view their progress towards mastering the sheet music and either get intelligently suggested exercises or generate their own exercises to perfect the areas where they are struggling. Directors can view various summaries of data concerning the progress of their students.

There were several challenges that the group faced. Our first challenge required all team members to learn and use technologies and programming languages with which we were unfamiliar. A few of the tools and technologies that we learned stand out. Our team had to combine several tools together including AlphaTab for rendering the digital sheet music, P5 for drawing the real-time feedback, and ML5 pitch detection for listening to, and recording input from, the user. While these tools exist on their own, we had to combine them in a new and unique way. Our second challenge was designing a performance grader that was strict enough to mark performances as wrong but forgiving enough to ignore imperceptible deviations in their performance. Our third and most complex challenge was determining how to show that our tool worked by testing it on real choirs.

We successfully onboarded two choirs into our tool, but user retention was poor. Due to complications with COVID-19, both choirs came to a halt and, understandably, most users ceased use of our app. The little data that we did gather indicates that some improvements need to be made with our performance grader. Future work includes finishing testing and adding new features such as an integrated communication tool and statistical summaries for both of our user groups.