# Milestone Progress Evaluation

1. The Music Assistant

Daniel Griessler, dgriessler2016@my.fit.edu

Dan Levy, dlevy2016@my.fit.edu

Javier Munoz, jmunoz2014@my.fit.edu

2. Faculty Sponsor: Dr. Thomas Eskridge, teskridge@fit.edu

3. Client: Professor Elizabeth Dopira, Director of Choral and String Studies at FIT

4. Progress of current Milestone (progress matrix)

| Task | Completion % | Daniel Griessler | Daniel Levy | Javier Muñoz | Todo |
|---|---|---|---|---|---|
| 1. Investigate tools | 100% | 33% | 33% | 33% | None |
| 2. Hello World demos | 75% | 33% | 9% | 33% | Web Integration Demo: Pushed to milestone 2 |
| 3. Requirement Document | 100% | 70% | 15% | 15% | None |
| 4. Design Document | 100% | 0% | 100% | 0% | |
| 5. Test Plan | 75% | 0% | 0% | 75% | We need to create the sample input for test cases |

5. Discussion (at least a few sentences, ie a paragraph) of each accomplished task (and obstacles) for the current Milestone:

- Investigate tools:
    - Tools for software development
        - Jira (Agile development)
        - Confluence (documentation)
        - Slack
        - Google Calendar
        - GitHub (distributed version control system)
        - Firebase (authentication and real-time database)
        - Server (TBD)
        - Server-side language (Node.JS)
        - SQL server (TBD)
        - Web Development (SCSS, React)
    - We decided to use alphaTab for the music representation and playback because of its built-in cursor and playback features, its easy-to-understand music notation called AlphaTex, and its web interface. Several other tools were considered such as abcweb, EasyScore, Open Sheet Music Display, Guide Engine Library, Vexflow, Verovio, abcjs, and flat. With the exception of abcweb, the other considered tools either didn't seem to have a playback feature or didn't seem to have a cursor during playback. abcweb was the closest contender, but it has some dependencies and was not as appealing as alphaTab. It remains a back-up choice if alphaTab has any major issues.
    - We decided to use aubio for the singing recognition because it is open source, has many available demos, and allows for real-time analysis. However, for real time analysis an additional library, pyaudio is necessary. Pyaudio also required the use of a "wheel" to install it which caused some initial struggles.

- Hello World Demos:
    - AlphaTab has documentation but the setup documentation was lacking. After some communication with the main developer and lots of trail and error, we were able to get a demo version working and understand the basics of interacting with the representation and playback.
    - Web Integration: Demo pushed to milestone 2
    - Aubio already has a demo for real-time pitch analysis when using pyaudio, our addition to that demo was a simple graphical representation of the pitch.

- Requirement Document: We described the requirements of the software in terms of the user experience for teachers and students. After outlining all of the requirements, we received feedback from both our client and our faculty advisor. Our client's main comments were that she didn't need as much detail of the student's performance as we had anticipated and she wanted to be sure that we could interface with some sort of grading software. Our faculty advisor's main feedback was to focus on the MVP (Minimum Viable Product) and to focus on the dynamic exercises we are trying to generate. These exercises make our product unique. The other features, such as a communication tool, are good to have, but use already established methods such as automatic emails to communicate results instead of investing a month into setting up a server. We incorporated this feedback into our Requirements document and it influenced our Design Document and Test Plan.
- Design Document: We created the system architecture UML diagram and designed a human interface design wireframe. The system architecture diagram is rather basic because we have yet to determine exactly how we plan to store student statistics and the sheet music itself. The wireframe is quite extensive and provides a general overview of the user interface. A wireframe is an excellent way to show a user interface without getting into the details. In keeping with our agile approach to the project, the domain model will be constantly updated as we begin to detail exactly what we need.
- Test Plan: We wrote test cases for user interactions with the program (i.e. selecting pieces to play, viewing exercises, etc). However, we will need to expand on test cases when we have solidified the methods that we will be using so we know exactly what sort of input each

will have. Additionally, we need to design how to analyze singing and generate exercises so that we can write test cases for those crucial parts of the program.

6. Discussion (at least a few sentences, ie a paragraph) of contribution of each team member to the current Milestone:

- Daniel Griessler: Wrote most of the Requirements Document and did most of the User Interface mock-up drawing in wireframe. Got through 32 hours of course material about the basics of HTML, CSS, and JavaScript to be able to understand how to work with AlphaTab. Worked with Daniel Levy to build the demo of AlphaTab and understand how it works. Used Javier Muñoz's research into aubio to create a visual representation of aubio's output.

- Daniel Levy: Helped Daniel Griessler with web integration of AlphaTab. Worked on the requirements document. Helped create the user interface wireframe. Wrote the entire design document (including the UML system architecture diagram). Began learning React. Started to research server-side technologies and SQL servers. Designed and coded the "Milestones" page of our project information website.

- Javier Muñoz: Wrote the Test Plan, and contributed to the Requirments Document. Researched different audio analysis tools to determine that aubio would be the best tool for our program due to its real-time pitch analysis function. Additionally, began the process of researching machine learning to see what tools we could use and the differences between those tools.

7. Plan for the next Milestone (task matrix)

| Task | Daniel Griessler | Daniel Levy | Javier Muñoz |
|---|---|---|---|
| UI Design for AlphaTab and Aubio | Continue to explore AlphaTex API to see extent of UI integration. | Begin UI design of web application | Assist with UI design as needed. |
| Working Code for AlphaTab and Aubio | Use AlphaTex to import a few selections of sheet music from client's current class. | Begin coding web application | Investigate and produce a demo to extract beat and/or tempo from audio streams using Aubio. |
| Web integration of sheet music representation and playback and singing recognition | Assist with the implementing, testing, and demoing of AlphaTab integration. | Implement, test, and demo the web integration of AlphaTab and Aubio. | Assist with the implementing, testing, and demoing of Aubio integration. |

8. Discussion (at least a few sentences, ie a paragraph) of each planned task for the next Milestone or
"Lessons Learned" if this is for Milestone 6

- UI Design: The UI design of the web application will be created in Sketch. While the wireframe is a very basic design of the UI, the UI design itself is what the finished product will look like. For milestone 2, we need to have a design for the web integration of AlphaTab and Aubio.
- Code Web App: Once the UI design is created, we can begin to implement the code for the web app. The web application must closely match the UI design. We must complete the below task, but it would be good if we could begin to code other aspects of the website, as seen in the wireframe.
- Web Integration of Sheet Music Representation and Playback and Singing Recognition: This is the most important aspect of the task "Code Web App." We will need to implement the code for the web integration of AlphaTab and Aubio.

9. Date(s) of meeting(s) with Client during the current milestone:

9/19/2019: went over Requirements Document and UI-Mock up

10. Client feedback on the current milestone

- Requirements Document
    - Asked for interface with grading software
    - Pointed out that the teacher and student both need to be proficient with basic computer skills
    - Gave input for quantifiers such as having 20 students, about 8-10 pieces of sheet music each about 3.5-4 minutes long.
    - Recommended gamification system for students to feel motivated to practice
    - Doesn't actually use static exercises so don't need to focus on those as much
- UI Design
    - Would like lyrics to display along with the notes when sheet music is represented
    - Show performance of students against other students like a leader board for motivation
    - Include a settings or baseline calibration page if needed for different microphones or environments
    - Include count off for students before singing

11. Date(s) of meeting(s) with Faculty Sponsor during the current milestone:

9/20/2019: Went over Requirements and UI-Mock up

12. Faculty Sponsor feedback on each task for the current Milestone

- Complications: Dr. Eskridge was at a conference during the week of the 9th of September and the week of the 23rd of September. We have yet to be able to contact him while he has been gone on these conferences. The Hello World Demos, Design Document, and Test Plan were developed these past two weeks. He is only available Monday, the 30th of September, for a half hour window before the team has class. For these reasons, full feedback for the Hello World Demos, Design Document, and Test Plan are delayed until his evaluation when he returns or communicates via email.
- Task 1: Investigate tools
    - He likes our selected communication tools. We added him to Jira and Confluence so he could see our progress in real-time. He

didn't have experience with the music representation and playback or vocal input tools that we selected so he left that judgement to us.
- Task 2: Hello World Demos
  - As mentioned above, due to Dr. Eskridge's schedule we have not yet received feedback on the demos. Pending his return, we will update this section with feedback.
- Task 3: Requirements Document
  - Recommends focusing on MVP (Minimum Viable Product) and not waste time developing some aspects such as the communication tool when we could use something simple like an automatic email. Focus on what makes us unique which is the dynamically generated exercises.
  - Gave guidance on areas of the Requirements document where we weren't sure what level of detail to provide
- Task 4: Design Document
  - As mentioned above, due to Dr. Eskridge's schedule we have not yet received feedback on the Design Document. Pending his return, we will update this section with feedback.
- Task 5: Test Plan
  - As mentioned above, due to Dr. Eskridge's schedule we have not yet received feedback on the Test Plan. Pending his return, we will update this section with feedback.

Faculty Sponsor Signature: _____ Date: _____