

MUSIC LEARNING APPLICATION
SOFTWARE REQUIREMENTS SPECIFICATION

RHYTHM READER

CTRL ALT ELITE
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1. Introduction

Purpose

The purpose of this project is to expand music literacy by creating a musical app that helps users learn to read sheet music and play the piano through interactive lessons and real-time feedback. In the United States, only about 11% of the population can read music proficiently, and millions of students are losing access to musical arts programs due to budget cuts. This app addresses these obstacles by making music education affordable and accessible anytime, anywhere. By focusing on music literacy and instrumental skills, users are prepared for real-world experiences, creating an impactful platform for individuals of all ages. Learning music provides educational, cognitive, social, emotional, and physical benefits, highlighting the importance of bridging the gap in music education.

Sources: [Millions of U.S. Students Denied Access to Music Education, According to First-Ever National Study, The Tragic Decline of Music Literacy \(and Quality\)](#)

2. Stakeholders

Primary stakeholders:

- Aspiring Musicians or students: Beginners who want to learn how to play an instrument and read sheet music.
- Music teachers: Educators who could use the app to enhance lessons, assign practice tasks, or track students' progress.
- Music hobbyist: People with some musical experience looking to expand their skills or learn additional instruments.

Other Stakeholders:

- Parents of young users: Parents who may purchase or supervise the app for their children's music education.
- Schools that could use the app as part of their music curriculum.
- Musicians/Performers who want to refine their skills or access sheet music.
- App stores: Apple App Store, Google Play Store, or other distribution platforms that host the app.

- Content creators: Musicians, composers, and influencers who might collaborate with or promote the app.

Personas



Chris Rodriguez

Music Hobbyists

"I've always loved playing music, but I want to push myself further —learn new instruments, improve my skills, and really understand the music I play."

Gender: Male
Age: 28
Education: Bachelor's degree in Business
Lifestyle: Chris is a self-taught guitarist who plays casually with friends and occasionally performs at local events. They are passionate about music and want to branch out into other instruments like keyboard or saxophone, while also improving their music theory and sheet-reading skills.

Motivation:
Chris wants to break out of their comfort zone by learning new instruments and improving their music theory knowledge. They're motivated by the joy of creating music, the challenge of mastering new skills, and the dream of performing with confidence across multiple instruments.

Goals:

- Explore and learn new instruments at their own pace
- Improve their understanding of music theory and sheet music
- Access advanced lessons and exercises tailored to their current skills

Challenges:

- Finds it difficult to access quality, self-directed learning resources.
- Frustrated by apps that are too basic or focused solely on beginner.

Hobbies:

- Jamming with friends and playing at open mic nights.
- Experimenting with music production and recording at home.
- Attending live concerts and discovering new artists

TECHNOLOGY SAVVINESS

Beginner Advanced

Scenario:
Chris, a self-taught guitarist, uses the app to explore piano as a new instrument. Starting with beginner lessons, the app's interactive sheet music and tailored practice plans help Chris learn key positioning, chord progressions, and intermediate pieces. Delving into integrated music theory lessons, Chris improves not only their piano skills but also their guitar playing. The app's performance mode lets Chris track their accuracy and dynamics, while cross-instrument features allow them to adapt favorite guitar melodies to piano. Motivated by progress trackers and social sharing, Chris stays engaged and grows into a confident multi-instrumentalist.





Janice Bennett

The Innovative Music Educator

"This app should make teaching more interactive and efficient for my students."

Gender: Female

Age: 42

Education: Master's Degree in Music Performance

Lifestyle: Sarah Bennett is a seasoned music educator who divides her time between teaching at a local high school and offering private lessons to aspiring musicians. She values organization and efficiency in her daily routine, often spending evenings preparing materials for her students. Sarah also enjoys attending local concerts and exploring new teaching techniques to inspire her students.

Motivation: Driven by a deep love for music, Janice's goal is to help students discover their potential and develop a lifelong appreciation for music. She believes in using modern tools to enhance the learning experience and make music education more accessible. Her dedication to her students motivates her to find ways to simplify lesson preparation and improve student engagement.

Goals:

- Make music lessons more interactive and engaging for her students.
- Provide students with instant access to digital sheet music and personalized annotations.
- Foster a deeper understanding and love for music among her students.

Challenges:

- Managing and organizing large amounts of sheet music for multiple classes and students.
- Ensuring all students have the tools they need to practice effectively at home.
- Balancing traditional teaching methods with modern technological solutions.

Hobbies:

- Attending live concerts and musical performances to stay inspired and connected to the music community.
- Playing the piano and composing short pieces in her free time for relaxation and creativity.
- Exploring new teaching techniques and music education resources to enhance her lessons.

TECHNOLOGY SAVVINESS

Beginner

Advanced

Janice is comfortable with technology and uses digital tools for lesson planning, communication, and tracking student progress. While not a tech expert, she quickly adopts user-friendly tools to improve teaching efficiency and is open to exploring new music-related apps.

Scenario: Janice uses the app during her lessons to provide students with instant access to sheet music, eliminating the need for physical copies. She relies on its annotation tools to highlight important sections and add personalized notes for her students. Additionally, she tracks each student's progress through the app, making it an essential part of her teaching process.





Sasha Parker

The Beginner Music Student

"I'm so excited to finally learn how to play the piano and make music!"

Gender: Female

Age: 14

Education: 9th-grade Student

Lifestyle:

Sasha enjoys a balance of school, spending time with friends, and expressing herself creatively. She often listens to music while doing homework or relaxing. Her family supports her, however she never had access to lessons.

Motivation:

Sasha has always been inspired by her favorite artists and dreams of playing the piano to recreate those songs. She sees music as a way to express herself and build confidence. Her main goal is to attend an arts-focused high school or college to develop her musical talents further and turn her dreams into reality.

Goals:

- Master the basics of reading sheet music and playing the piano
- Learn to play songs from her favorite artists and create her own covers
- Build a strong foundation to prepare for art school auditions
- Gain confidence in her musical abilities by performing in front of her peers

Challenges:

- Feels pressured to excel and meet the high standards of art school auditions
- Starting piano as a beginner and needs clear, structured guidance
- Balancing schoolwork and preparing for art school leaves limited time for practice

Hobbies:

- Watching piano tutorials from her favorite artists
- Writing lyrics and journaling
- Spending time with her sister, who shares the same love for music
- Creating short musical clips on TikTok, experimenting with covers and audios.

TECHNOLOGY SAVVINESS

Beginner

Advanced

Sasha is very tech-savvy and uses apps like YouTube, TikTok, and Instagram daily. She looks up music tutorials often, however is in search for an app to track her progress as she builds new skills.

Scenario:

Sasha dreams of learning how to play piano so she can recreate the music of her favorite artists and eventually compose her own songs. She hopes that music will not only help her express herself but also build her confidence, especially for art school auditions. Sasha wishes she could afford private lessons but faces limited resources for tutoring and a lack of funding for music programs at her school. She wants to learn at her own pace in a way that is fun, engaging, and catered to her interests.



3. Constraints

Time Constraints

- This project is to be completed within a time span of an academic semester

Monetary Constraints

- This project's development has been allocated to the budget of \$0 dollars

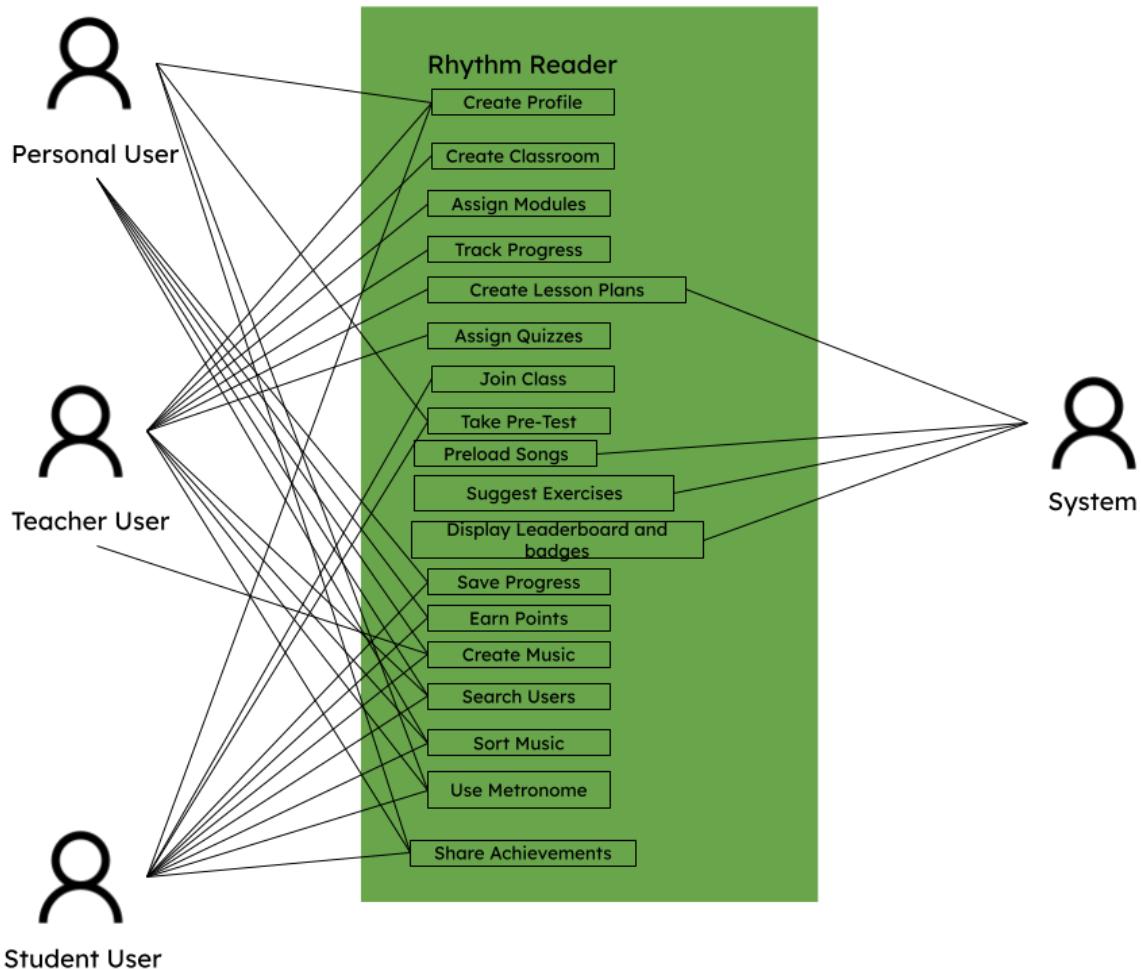
Technical Constraints

- The code must be done in Java

4. Overall Description

Rhythm Reader's goal is to expand music literacy by providing accessible, affordable, and engaging music education. The app allows users to learn how to play the piano. The app will be available for download on mobile platforms via app stores. It operates on a cloud-based platform, allowing users to save their progress, manage their accounts, and synchronize data across multiple devices. Upon opening the app, users will be prompted to create an account with a valid email address or sign in. They will then select their role-teacher, student, or personal use- before completing a pre-test to record their skill level. Based on the pre-test results, the app will customize interactive lessons that include step-by-step instructions, animations, and engaging challenges customized to the user's needs. To encourage friendly competition, Rhythm Reader implements a scoring system that allows users to compete for rewards. The app also includes a library where users can upload sheet music, share it with peers, and create playlists for better organization.

5. Business Use Cases



6. Functional Requirements

[Functional Requirements Spreadsheet](#)

7. Non-Functional Requirements

(Go to bottom of attached spreadsheet under functional requirements)

8. Definitions and Acronyms

BPM - Beats per minute.

Metronome - A device that produces an audible click, typically used to help musicians with timing and maintaining a steady tempo.

Time Signature - A written indicator that shows the number of beats per measure and the type of note that carries the beat in a piece of music.

Key Signature - A set of sharp or flat symbols that indicate the key, or pitch, of a piece of music

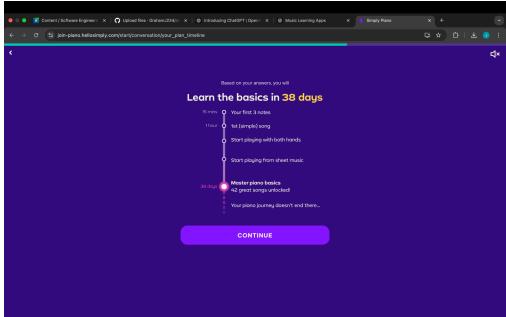
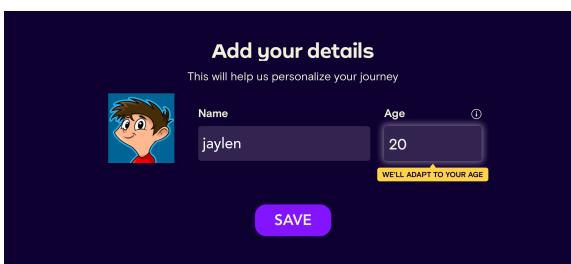
Music Theory - The study and terminology of the fundamental elements of music, such as notes, scales, and composition.

Annotations - Markings/notes that musicians add to their music to help aid them on how a specific piece should be played.

Key Positioning - The placement of the key signature throughout music. It is traditionally placed at the beginning of the piece, and can sometimes be placed throughout the piece when signalling a key change.

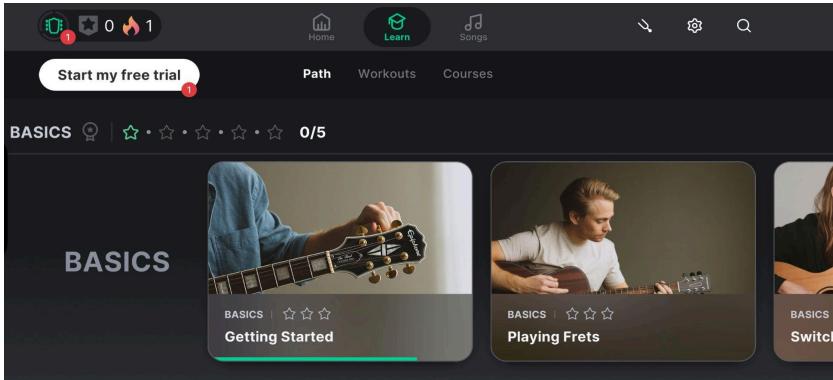
Chord Progression - A series of chords played after one another in a piece, usually demonstrating the harmonic structure of the piece.

9. Competitive Analysis

| | Simply Piano |
|---------------|---|
| Meaningful SS |   |

| Simply Piano | |
|-----------------------------|---|
| | <p>The screenshot shows the Simply Piano app's main interface. It features two main sections: 'Classical I' and 'Pop Chords II'. Each section has a play button and a 'Skills Mastered' summary. In 'Classical I', the mastered skills are C & F Position, Flats & Sharps, and C Major Scale. In 'Pop Chords II', the mastered skills are 5 first chords and 3 Soft Rock Stylings. The background is dark purple with blue and white text.</p> |
| Inventory Features | <ul style="list-style-type: none"> - beginning questionnaire - gives a schedule and timeline for how long it will take to complete and learn - progress tracking and interactive sheet music - recognizes notes played through devices microphone - Real time feedback - sheet music reading practice - songs library - practice mode that gives the ability to slow down the tempo of songs and focus on accuracy - offline mode - video tutorials |
| Strengths | <ul style="list-style-type: none"> - very personalized for the user - very beginner friendly - compatibility with all keyboards - large library of songs to choose from - ability to create multiple profiles - offline mode - step by step learning path - suitable for all ages |
| Weaknesses | <ul style="list-style-type: none"> - Paid subscription required - Is limited to drawing, singing, guitar, and piano. - Dependency on devices microphone(problems can come from background noise or depending on how good devices microphone is) - No personalized feedback |
| Recommendations for our app | <ul style="list-style-type: none"> - start off with a beginning questionnaire that assesses what level the user is starting at and how they want to use the app. - create a practice schedule for users |

| | Simply Piano |
|--|---|
| | <ul style="list-style-type: none"> - create a wider variety of instruments to choose from - give users a step by step learning path - make sure app can be used by anyone old or young - have a large variety of song to choose from - make sure we also include lessons on how to read sheet music - make it so that the user can create their profile and customize it how they would like. |

| | Yousician |
|--------------------|---|
| Meaningful SS |  |
| Inventory Features | <ul style="list-style-type: none"> - Lengthy questionnaire to cater to user's needs - Lesson videos to help beginner musicians - Uses microphone to hear user's playing - Makes you play along with exercises - Forces beginners to go through workouts and lessons before being able to play songs - Tests users on knowledge of instrument their learning |
| Strengths | <ul style="list-style-type: none"> - Multiple instrument options - Beginner friendly, lets you choose your current ability level from five different options - Lets user choose what type of music they enjoy and recommends songs based off their choices - Different levels and activities to help beginners strengthen their skills |

| Yousician | |
|-----------------------------|---|
| Weaknesses | <ul style="list-style-type: none"> - You have to pay for most songs - Most of the practice requires a fee, making the app very expensive and not affordable for most people, \$30 monthly fee - Can only access the free version for a limited time before they make you pay for premium membership, making the app not usable for most people. - Cannot read in sheet music - Reviews say that beginner level lessons jump too quickly without pausing and truly learning - Need headphones to use |
| Recommendations for our app | <ul style="list-style-type: none"> - Very personalized for the user and their needs - Asks user lots of questions about what they want to get out of using the app - Includes videos of professionals giving lessons on their instrument |

| Learn Music Notes Sight Read | |
|------------------------------|---|
| Meaningful SS |  <p>The screenshot shows the configuration screen for the "Learn Music Notes Sight Read" app. It includes the following settings:</p> <ul style="list-style-type: none"> NOTES SELECTION: Options include "Notes on lines", "Notes on spaces", "Custom range: C4 – F4", and "Melody Rush (New!!!)". SCORING SYSTEM: Set to "+1 / 0". PRACTICE MODES: Set to "Time". SCORE GOAL: Set to 25. INPUT: Set to "Keyboard". HAND: Set to "Right". STAFF: Set to "Treble". KEY: Set to "C". Play button: A large blue "Play" button at the bottom. Bottom navigation bar: Includes tabs for "Learn", "Practice" (selected), "Melodies", and "Settings". |

| Learn Music Notes Sight Read | |
|------------------------------|---|
| Inventory Features | <ul style="list-style-type: none"> - Only has 13 songs available - List format without playlists |
| Strengths | <ul style="list-style-type: none"> - Easy navigation throughout app - Explains the notes on the staffs well - Allows the user to customize their practice section by allowing them to choose the key, staff, input (keyboard or buttons), practice modes (timed or score), a scoring system (easy, medium, hard), and notes selection (line, above staff, etc.) - Provides simple songs for beginners - User can change the background, keyboard, and note colors - User can also choose the size of the keys and if they want them labeled - Auto scrolls keyboard if note is in a different octave - Keeps score so stickers can be bought (premium) - Tells the user the correct answer if the note is wrong. |
| Weaknesses | <ul style="list-style-type: none"> - Cannot upload sheet music - Must buy premium to learn bass clef and unlock additional features like music. - Cannot view entire sheet music at once. A new section is displayed once the last note is played from the previous. - Assumes user already understands rhythms and can count them (somewhat beginner friendly) - Library is beginner friendly, however isn't challenging for music expertise - User's don't have option to connect their own keyboard if available |
| Recommendations for our app | <ul style="list-style-type: none"> - Simple, yet easy navigation - Personalized to each user - Include a learning and practice section and allow the user to navigate between each other depending on their needs. - Practice Reminder |

Summary

| | Strengths | Weaknesses | Focus |
|---------------------------------|--|--|-------------------------------|
| Simply Piano | <ul style="list-style-type: none"> Personalized Learning Extensive Song Library Beginner-Friendly | <ul style="list-style-type: none"> Subscription Cost Instrument Limitations Microphone Dependency | Provide structured lessons |
| Learn Music Notes Sight Read | <ul style="list-style-type: none"> Customizable Appearance Auto-scrolling Keyboard Real-time Feedback | <ul style="list-style-type: none"> Limited Song Selection Premium Features Rhythm Assumptions | Learning/practice flexibility |
| Yousician | <ul style="list-style-type: none"> Multiple Instruments Beginner Friendly Music Personalization | <ul style="list-style-type: none"> Pay-to-Play Expensive Subscription Limited Free Access | Professional lesson videos |

The competitive analysis reveals that successful music learning apps focus on personalization, simplicity, and a broad range of content. However, common issues such as high subscription fees, limited instrument options, and difficulty in accessing sheet music remain significant drawbacks. Our product should prioritize accessibility, offering both free and premium options to cater to different user needs. Additionally, providing a wider selection of instruments and customizable practice modes will ensure broader appeal. The analysis also highlights the importance of beginner-friendly features, such as tutorials and real-time feedback, which will be crucial in engaging users. Incorporating features like lesson videos and progress tracking will enhance user experience and support skill development. Our app should aim for a simple, intuitive interface that is easy to navigate, especially for younger and older users alike. Ultimately, the goal is to offer an affordable, flexible, and engaging learning tool that balances customization with ease of use.