Practicing Alone, Playing Together: A Persona-Based Design Approach for Amateur Wind Musicians

Stefan Balke
stefan.balke@audiolabs-erlangen.de
International Audio Laboratories
Erlangen, Germany

Peter Meier
peter.meier@audiolabs-erlangen.de
International Audio Laboratories
Erlangen, Germany

Meinard Müller
meinard.mueller@audiolabs-erlangen.de
International Audio Laboratories
Erlangen, Germany

Abstract

Amateur wind musicians face unique challenges in both individual practice and group rehearsal, often lacking digital tools tailored to their specific needs. This paper presents a persona-based design approach to address these challenges, drawing on extensive experience with amateur wind orchestras. We define four representative personas and develop user stories to capture their diverse requirements. Based on these insights, we propose two interactive design prototypes: a self-guided practice tool for individual musicians and a real-time ensemble intonation system for group settings. Our approach emphasizes playful, feedback-rich, and user-friendly interfaces to lower barriers to entry, foster regular practice habits, and enhance the collective music-making experience. The proposed concepts aim to inspire the development of accessible music technology that supports amateur musicians in both practicing alone and playing together.

CCS Concepts

• **Human-centered computing → User models**; • **Applied computing → Sound and music computing**; • **Information systems → Music retrieval**.

Keywords

User-Centered Design, Wind Music, Amateur Musicians, Music Technology

1 Introduction

Designing effective music technology tools for amateur musicians requires a deep understanding of their needs, abilities, and motivations. In Human-Computer Interaction (HCI), design approaches focussing on the user are well established. In particularly through methods such as personas (fictional characters mimicing real users) and user stories (short examples of persona needs) [4, 9]. However, they are still underrepresented in the domain of music technology and Music Information Retrieval (MIR). In the MIR community, user behavior has traditionally played a central role in applications for music recommendation and playlist generation, often through collaborative filtering methods [3]. However, research that involves direct engagement with users through qualitative or participatory design methods remains limited [6]. In particular, the specific needs of amateur musicians, who represent a large and diverse user group, are rarely the focus of targeted design processes.

In this paper, we present a musician-centered design concept tailored for amateur musicians. Our main contributions are: (1) the definition of four representative personas and associated user stories for amateur wind musicians, (2) the derivation of technical requirements from these user perspectives, and (3) the proposal of two interactive design prototypes: a self-guided practice tool and a real-time ensemble intonation system. These applications are still under development, but they illustrate how user-centered design can inform the creation of accessible and engaging music technology tools for amateur musicians.

2 Personas and User Stories

In this section, we introduce four representative personas. These personas are based on our extensive experience as musicians in various amateur wind orchestras, where we have taken on roles such as conductor, section leader, and ensemble member. In particular, the first author has drawn these observations from long-term involvement in amateur wind orchestras, including ensembles such as the "Weserberglandorchester Bödexen," "Sinfonisches Blasorchester Höxter," and the "Kepler Blasorchester" Linz. As illustrated in Figure 1, we focus on four key personas: Anne, Maria, John, and Lucy. Each persona is paired with a user story that highlights specific musical contexts and expectations, informing the functional requirements and design priorities of the system.

Anne: The Conductor. Anne leads a local wind orchestra and is responsible for coordinating rehearsals and maintaining the ensemble's intonation. She volunteers in this role alongside her full-time job as a teacher, so her preparation time is limited. She values tools that are easy to use and require minimal setup. She is not so much interested in technical perfection but needs a reliable way to ensure the group plays in tune.

User Story: *"As a conductor of a wind orchestra, I want real-time feedback on ensemble intonation during rehearsals, so that I can quickly identify and address tuning issues without wasting time. Especially balancing the intonation in chords with longer duration would make rehearsals more efficient."*

Projected onto MIR tasks, Anne may benefit from a real-time system that can reliably perform multi-pitch estimation and provide feedback on the overall intonation of the ensemble [13]. Furthermore, depending on the acoustic conditions, music source separation can help to stabilize the pitch predictions [1, 11]. Since tuning is closely related to the harmonic context, the system should also assist in analyzing the harmonic structure of the piece and determining the

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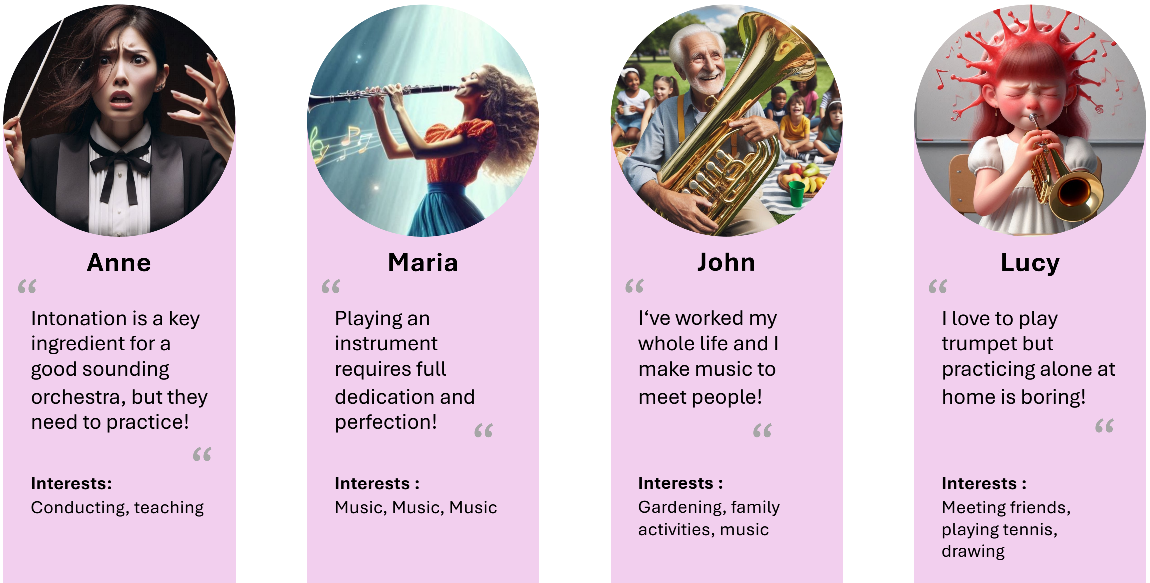

Figure 1: Four examples for typical personas commonly found in amateur orchestras. The illustrations of the personas were generated using OpenAI's DALL·E model via ChatGPT.

harmonic role of individual players—for example, the major third in a triad is often played approximately 14 cents lower than in equal temperament to align with just intonation [10].

Maria: The Section Leader. Maria is an ambitious clarinetist and section leader who takes her musical hobby seriously. She often practices at home and seeks tools that support self-improvement. She wants to play along with other parts, record her performance, mix it with a pre-recorded accompaniment and get objective feedback to track her progress.
User Story: *"As a section leader, I want to practice my part with virtual accompaniment, record myself, and receive quantitative feedback, so that I can prepare confidently and refine my playing."*
Projected onto MIR tasks, Maria could be assisted by a system that provides a precise pitch estimation, however not necessarily in real time [5]. Furthermore, performance analysis should focus on pitch accuracy and timing deviations, allowing her to assess her intonation and rhythmic precision relative to the ensemble.

John: The Older Hobbyist. John enjoys playing in his orchestra primarily for the social interaction. He is aware of his occasional tuning issues and feels insecure during more difficult passages. John would benefit from supportive feedback that helps him improve without highlighting mistakes.
User Story: *"As an older amateur musician, I want gentle, non-intrusive feedback on my intonation during rehearsals, so that I can improve gradually while enjoying the group experience."*
Projected onto MIR tasks, John's need may be accounted by a system providing a simple pitch estimator that can be used in real time to give him feedback on his intonation [7]. However, the feedback should be designed to be non-intrusive and supportive, allowing him to focus on enjoying the music rather than worrying about mistakes.

Lucy: The Young Beginner. Lucy is just starting to learn the trumpet and is motivated by interactive, game-like experiences. She has access to a tablet, which she uses both for school and entertainment. A playful and engaging approach is key to keeping her motivated as she learns to play in tune.
User Story: *"As a young beginner, I want to practice my intonation through fun, game-like exercises on a tablet, so that I stay engaged and can improve at my own pace."*
Projected onto MIR tasks, Lucy may enjoy a simple pitch estimator that gives her feedback on her intonation. The feedback should be designed to be playful and engaging, allowing her to focus on enjoying the music rather than worrying about mistakes. Additionally, the system should provide gamified elements, such as high scores and virtual trophies for tuning consistency or sound quality to keep her motivated [12].

3 Design Prototypes

From the personas and user stories we identify two main types of systems, as shown in Figure 2. (1) a self-guided practice tool for individual musicians, and (2) a real-time system for ensemble intonation.

Self-Guided Practice Tool. Figure 2a illustrates the design prototype of a self-guided practice tool, which is intended to support individual musicians in their practice sessions at home. This tool allows users to play along with pre-recorded pieces, providing a virtual accompaniment that can be customized to suit their needs. The play-along tracks can for instance be sourced from the ChoraleBricks dataset, which offers a selection of isolated multi-track recordings of classical choral music, enabling the flexible creation of various ensemble configurations [2]. The interface is designed to be user-friendly, enabling musicians to focus on their

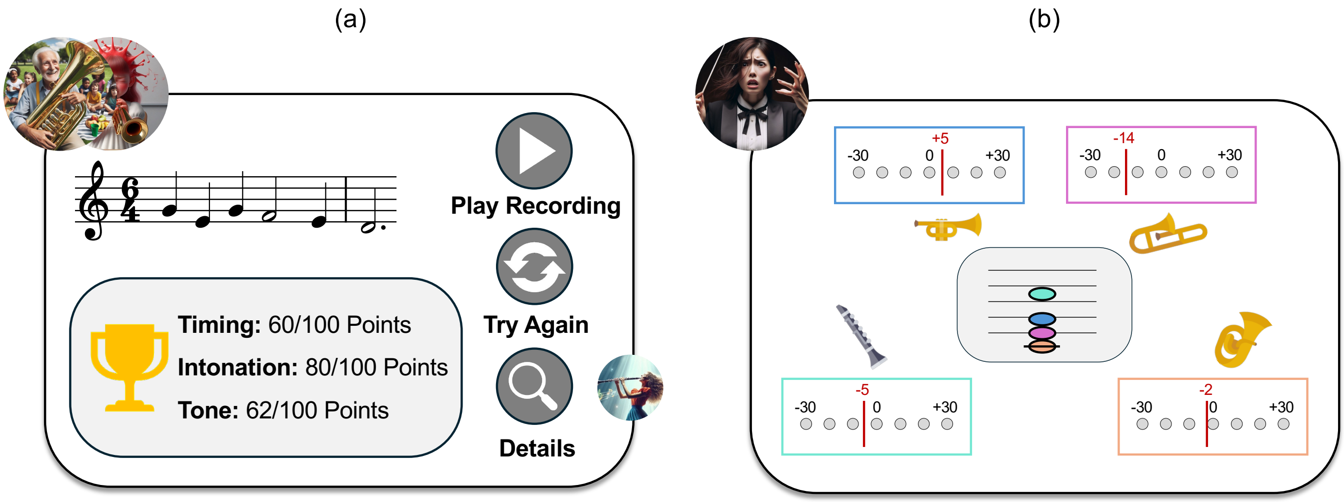

Figure 2: Design prototypes. (a) Interface for individual practice, providing feedback on timing, intonation, and tone quality. (b) Interface for group practice, featuring connected tuners for ensemble intonation support.

playing without being distracted by complex technical features, as requested by John and Lucy. For Lucy, the interface can be gamified further, providing a playful and engaging experience that encourages her to practice regularly, e. g., by reaching 60 points on timing, 80 on intonation, and 62 on her tone quality, she receives a virtual trophy. For Maria, further details of the performance analysis can be provided, such as pitch accuracy and timing deviations, allowing her to assess her intonation and rhythmic precision relative to the ensemble.

Real-Time System for Ensemble Intonation. Figure 2b illustrates the design prototype of a real-time system for ensemble intonation, which is intended to support conductors in group practice sessions. This system allows musicians to connect their instruments to tuners that provide real-time feedback on their current pitch. All tuners are connected to a central interface that displays the tuning status of each player in the ensemble. This setup enables conductors, such as Anne, to ensure that the ensemble maintains a consistent intonation throughout the session. In this example, the interface shows an ensemble consisting of four instruments: clarinet, trumpet, trombone, and tuba. The ensemble plays a C-major chord. The individual tuners display the pitch of each instrument in real time, e. g., the clarinet is 5 cents too low and the trumpets 5 cents too high. The trombone is 14 cents too low, however, since it plays the major third, this is a common practice in wind orchestras to align with just intonation. Instead of showing the absolute pitch deviations, the interface could also display the relative pitch deviations from a section leader, such as Maria, who plays the first clarinet part. This would allow to compensate for pitch drifts in the ensemble, which can occur due to temperature changes or other environmental factors during rehearsals.

4 Conclusion and Future Work

In this paper, we presented a user-centered design approach for developing music technology tools tailored to the needs of amateur wind musicians. By defining four representative personas and associated user stories, we captured the diverse roles and challenges found in amateur ensembles. Drawing on these insights, we proposed two interactive design prototypes: a self-guided practice tool for individual musicians and a real-time ensemble intonation system for group settings. These prototypes demonstrate how personas and user stories can guide the creation of accessible and pedagogically meaningful music technologies. The current implementations of these prototypes are web-based applications, making them easily accessible on a range of devices, including tablets and smartphones. Realizing the systems as client-–server applications also facilitates the integration of machine learning models for music performance analysis, such as pitch and timing estimation. Once development is complete, we plan to conduct user studies with amateur musicians to evaluate the effectiveness of the interfaces in real-world practice scenarios. An initial promising study has already been conducted with a group of four amateur musicians using an early version of the real-time ensemble intonation system [8].

Looking ahead, we aim to use these interfaces not only for evaluation but also to generate additional data for training and assessing machine learning models for music performance analysis. A particular focus will be placed on exploring strategies to motivate younger musicians to engage in regular and effective practice, especially in light of the widespread use of smartphones and digital distractions in our everyday life.

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