

The DIY MidiMbira: Bridging Traditional Playability and MIDI Technology for Pedagogy, Innovation, and Performative Practice

Guillermo de Llera Blanes

guillermodellera@fcsh.unl.pt

Instituto de Etnomusicologia - Centro de Estudos em Música e Dança, Faculdade de Ciências
Sociais e Humanas, Universidade Nova de Lisboa, Av. de Berna 26C, 1069-061
Lisbon, Portugal

Abstract

This work delves into the design and construction of a DIY MidiMbira, a hybrid instrument that merges the traditional mbira with MIDI technology, developed through the lens of an insider-researcher and performer-scientist. Grounded in Playability Theory, this project explores how instrument playability can bridge cultural heritage and contemporary innovation, addressing the lack of tools for studying and performing traditional microtonal tunings while expanding the instrument's relevance in modern contexts. The MidiMbira functions both as a pedagogical interface for preserving mbira microtuning layouts and as a versatile platform that integrates the traditional playability of an African lamellophone into contemporary digital workflows. It enables musicians to control software, virtual instruments, and external hardware through MIDI mapping, extending its applicability to modern production and performance practices. Embracing a DIY ethos, this work offers a customizable solution currently absent from the commercial market, fostering innovation and accessibility while making a case for DIY action-based research. The project also underscores the potential of liminal musical cultures to inspire new tools and technologies, encouraging tech-oriented scientific communities to engage with heritage-informed design.

Keywords

NIME, DMI, Playability Theory, MIDI, Mbira, DIY, Hybrid Instruments

1 Introduction

The research presented in this paper addresses the question: How can digital technology serve as a bridge to enhance and preserve the playability of traditional musical instruments, specifically the mbira, while expanding their relevance within contemporary musical contexts? The MidiMbira project emerges in response to this question, aiming to innovate by integrating traditional African lamellophone design and microtonal tuning systems with MIDI technology.

The significance of combining traditional mbira heritage with MIDI technology lies in MIDI's potential for enabling communication between the MidiMbira and software environments, thus opening new avenues for educational exploration, creative innovation, and enhanced performative possibilities. The MIDI interface transforms the mbira into a versatile tool, allowing musicians and educators to map traditional playing techniques onto digital sound manipulation, virtual instruments, and interactive multimedia systems.

Therefore, the MidiMbira is also intended as a pedagogical tool and a decolonial gesture. By embedding African sonic logics into digital music contexts, it challenges the dominance of piano-roll interfaces and Western-centric design in music technology. In workshops and educational settings, it becomes a means to introduce students to alternative mappings, non-linear tuning, and cross-cultural creativity, grounded in an ethos of respect, collaboration, and situated knowledge.

In relation to commercial MIDI lamellophones, the contribution of this work is not simply to propose a MIDI-enabled lamellophone, but to demonstrate culturally situated playabilities grounded in mbira ergonomics: (1) microtonal pedagogy for exploring and preserving tuning layouts and ear-training, and (2) performance and installation mappings that translate non-Western layout logics into contemporary digital workflows (e.g., DAW control, live looping, and audiovisual triggering).

The structure of this paper unfolds as follows: Section 2 provides a theoretical grounding in Playability Theory and Controllerism; Section 3 contextualizes the mbira culturally and technologically; Section 4 details the DIY design and construction process of the MidiMbira; Section 5 illustrates its pedagogical and performative applications; Section 6 critically discusses implications for innovation and traditional playability; Section 7 proposes avenues for future research; and Section 8 offers concluding remarks.

2 Theoretical Foundation

2.1 Playability Theory and Instrument Interaction

Within this context, playability theory can be understood as a theory of material performativity[1]; of interaction: an inquiry into how human agents interact with the material bodies of digital and acoustic instruments to express themselves through sound, gesture, and feedback.

Research into playability must, therefore, move beyond the constraints of the representational idiom[1]. While the performative



This work is licensed under a Creative Commons 4.0 International License.

NIME '26, June 23–26, 2026, London, UK

© Copyright held by the owner/author(s).

idiom does not exclude representational concerns, it offers a rebalanced perspective that foregrounds science’s practical engagements - what is being done, how it is being done, and what material powers - including sonic, haptic, and technological - are at play - over a narrow focus on knowledge as representation.

Building on this performative perspective, Playability Theory as a performative idiom contributes a framework for understanding musical instruments—especially hybrid ones—as sites of interaction where traditional and digital playabilities converge[1]. Through the development of Playability Theory, this paper proposes that instruments are not static objects to be represented but dynamic interfaces through which agency is expressed and extended. This theoretical model offers interaction-based categories that account for how performers engage with acoustic, digital, and hybrid instruments in real-time, acknowledging the shifting nature of these relationships as technologies evolve. The MidiMbira, a hybrid mbira-based controller[1], serves as a proof-of-concept: a materially grounded intervention into the field of performance and interface design that highlights the symbiotic possibilities between cultural heritage and technological affordances[2].

2.2 Controllerism and Remix Practice

In this light, controllerism becomes more than a subculture or performance style—it is a performative modality grounded in material agency[3],[4]. Rooted in remix culture and emerging from early practices like dub-mixing and live-looping and DJing at a later stage, controllerism emphasizes the embodied manipulation of sound through customizable digital tools, interfaces, and sensor-based systems.

By incorporating traditional instruments into this logic, my work reframes controllerism as a method for negotiating new forms of musical authorship and interactivity[3],[5]. The MidiMbira is emblematic of this: a controller not designed around Western notions of keys and grids, but instead shaped by the ergonomic, acoustic, and sonic logic of the mbira, allowing for a culturally meaningful and performatively rich experience.

This approach aligns with broader remix and DIY methodologies[4],[5], which reject the myth of the lone innovator in favor of collective, iterative practices of transformation. My collaboration with Mozambican Mbira makers exemplifies a remix ethic rooted in situated knowledge acoustic experimentation, and co-creation. The resulting instrument is not a copy or simulation but a remix—a reconfiguration that retains the mbira’s symbolic and tactile essence while experimenting with its acoustic voicings and expanding its expressive capacity. In this sense, remixing is not only a sonic strategy[3],[5] but also an epistemological one: it becomes a way of doing research that is performative, inclusive, and reflexively aware of its own processes of reconfiguration.

2.3 Embodied Music Cognition and Human–Instrument Interaction

At the core of Playability Theory is an expanded understanding of musical instrument interaction that moves beyond technical proficiency or ergonomic affordance[1]. Instead, playability is theorized as the dynamic relationship between a musician and their instrument, shaped by physical, cognitive, acoustic, and expressive dimensions. Drawing on Flow Theory[6], Game Studies[7], Play

Theory[8], player-experience approaches[9],[10], and Embodied Music Cognition[11], this framework conceptualizes musical interaction as a performative and affective event—an enactive dialogue between agent and material, responsive to sonic and gestural feedback. Human–Instrument Interaction (HII) emerges as a central concern[12], emphasizing the embodied, reflexive, and often improvisatory nature of musicking. Playability is thus the expressive and gestural “play-ability” that arises not only from what the instrument allows, but from how musicians inhabit and manipulate its constraints. This theory posits that instruments are never neutral; their design, cultural encoding, and technological augmentation shape—and are shaped by—the playabilities enacted through them. By bridging traditional and digital playabilities[1],[2],[3], this work resists the representational trap of isolating tradition as either fixed or obsolete. Instead, it affirms tradition as a performative resource—a set of practices that can be extended, adapted, and recontextualized without erasure. The MidiMbira, then, is not simply an instrument but an argument in physical form: it asserts that cultural specificity and technological innovation are not mutually exclusive[1],[3],[4]. As a site of experimental play, it offers insight into how embodied engagement with material agency—whether wooden lamellae or MIDI signals—can generate new modes of expression and knowledge-making beyond the confines of representation. Hence, at the core of Playability Theory is a redefinition[1] of musical instrument interaction as a performative and dynamic exchange, rather than a static tool for reproduction.

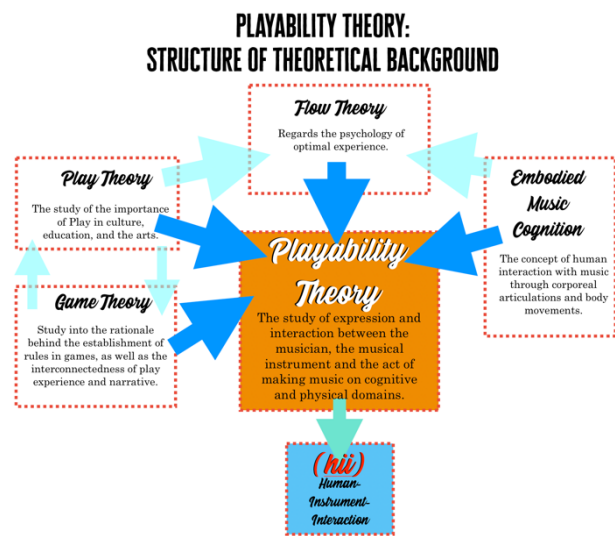


Figure 1: Structure of Theoretical Background for Playability Theory [1].

3 Contextualizing the mbira and the midimbira

3.1 Historical and Cultural Background

The Mbira is a traditional African lamellophone widely distributed throughout Sub-Saharan Africa[13],[14],[15], particularly in Central and South-Eastern Africa[15], where it serves as a prominent symbol of cultural identity and musical heritage. Traditionally, Mbiras consist of metal keys (tines) fixed onto a wooden board and are typically amplified acoustically through gourds or wooden resonators[16]. Its characteristic sound includes buzzing produced by attachments like shells or metal pieces, integral to its sonic identity. Mbiras exhibit diverse regional tuning systems[15], often microtonal[15],[16], and deviate significantly from the Western equal-tempered scale, relying heavily on oral traditions for accurate tuning and performance practices[18].

3.2 Technological Context

The MidiMbira builds upon the rich historical trajectory of MIDI controllers and digital innovation in music. MIDI (Musical Instrument Digital Interface), standardized in 1981, revolutionized musical performance and production by enabling digital controllers to communicate with computers and synthesizers. Bernd Enders highlights the significance of MIDI as part of the broader evolution from mechanical automation and electronification towards digitalization and virtualization, providing musicians unprecedented creative flexibility and interaction[17]. The MidiMbira represents a specific application of this technology, where traditional playability is captured and digitally repurposed through MIDI, enhancing the instrument’s relevance for contemporary pedagogical, innovative, and performative contexts.

3.3 Rationale for a DIY Approach

The DIY methodology in developing the MidiMbira aligns with principles of participatory action research (PAR), crucial for culturally respectful technological innovation. PAR emphasizes collaboration with local communities, involving musicians and artisans in the iterative design process[19]. This participatory approach fosters shared ownership, democratizes knowledge production, and ensures the technology respects local conceptualizations of musical heritage and innovation. Such methodology not only supports ethical engagement but also empowers communities by allowing localized adaptation of the MidiMbira, thus subverting dominant commercial paradigms and Eurocentric standards often prevalent in MIDI instrument design.

4 Design and construction of the MidiMbira

The technical development of the MidiMbira series began in 2021 and evolved through a series of iterative models—MM1 through MM4 and the MR1 and MR2 resonator versions. These iterations were guided by both ethnographic collaboration and technical experimentation, reflecting a commitment to functional design and cultural integrity.

MM1, the first prototype, was developed during fieldwork in Maputo and Inhambane, Mozambique with key input from a master builder May Mbira. It combined electro-acoustic pickups and MIDI capabilities to function as both a traditional mbira and a class-compliant MIDI controller. Technically, it included a triple piezo transducer for acoustic signal capture, eight momentary push switches for software control, two Sanwa arcade buttons, and an RGB

LED for visual feedback. MM1 was presented at the International Council for Traditional Music (ICTM) World Conference, Lisbon (2022) along with a video demonstration of its use with Ableton Live[20], showcasing the use of ClyphX Pro scripting for complex

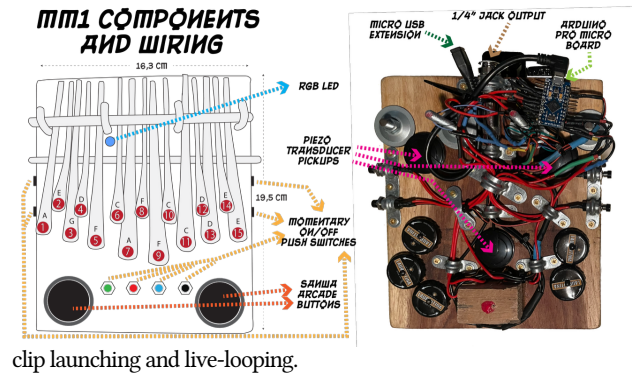


Figure 2: MM1 components.

clip launching and live-looping. MM2 built upon this by adding Open Sound Control (OSC) integration via smartphone apps, expanding its interactive capacity and wireless performance potential. Custom mappings allowed control over volume, pan, muting, and audio routing within a DAW environment. Notably, MM2 introduced a modular touchscreen interface for expanded functionality.

MM3 shifted the focus toward minimalism and modularity. This iteration emphasized non-acoustic operation for MIDI-only applications and introduced microtonal pitch control.

MM4 introduced the concept of “mixed playability,” integrating tines for tactile feedback with a suite of digital features including sonic replacement, video triggering, and live light control. Together, MM4 and MR2 explored the boundaries of comprovisation, allowing interaction with light, sound, and visuals simultaneously: see Fig. 6.



Figure 3: MM2, MM3 and MM4 Prototypes.

4.1 Customization and Playability

A central design philosophy of the MidiMbira project was to blend traditional mbira ergonomics with the expressive flexibility of MIDI controllers. To do this, each model preserved the familiar tactile and structural aspects of the mbira while embedding digital control surfaces that remain unobtrusive to the traditional form.

Customizability was a core concern from the beginning. The instruments allow for real-time parameter mapping, triggering DAW clips, and controlling external devices through MIDI or OSC. In MM2 and MM3, this adaptability extended to microtuning: musicians can adjust pitch at the cent level, emulate historical tunings, or create new temperaments altogether. This enables a level of tuning flexibility essential to the expression of many traditional African musical forms. The capacitive touch and sensor-based layouts were developed with performance ergonomics in mind. In the MM3, components were re-engineered to minimize weight and maximize tactile feedback, ensuring that the physical feel of the mbira was preserved despite the digital augmentation. Meanwhile, MR1 and MR2 added acoustic resonance chambers to amplify traditional sound while doubling as MIDI interfaces.

Through this hybrid design logic, the MidiMbira stands not only as an expressive tool for live-looping and electronic music performance but also as a culturally sensitive intervention in instrument design. It respects the historical identity of the mbira while creating pathways for its reinvention in digital music culture.

5 Practical Applications and Performance Demonstrations

5.1 Educational & Pedagogical Uses

Use case 1 (microtonal pedagogy): The MidiMbira serves as an effective educational tool, allowing learners to visually and aurally explore traditional mbira tunings and microtonal scales, otherwise challenging to grasp with conventional instruments due to their equal-tempered limitations. By integrating software applications such as Max4Live devices and dedicated virtual instruments, learners can experiment with authentic mbira sounds and tunings in real-time, facilitating deeper engagement with microtonal music theory. In ethnomusicological research contexts, the MidiMbira enables precise documentation and interactive exploration of regional tuning systems, thus contributing to more nuanced understandings of musical traditions and facilitating practical ethnomusicological inquiry.

5.1.1 Micro-Tuning and ear training

Musical tuning is never just an acoustic phenomenon; it is also a cognitive and cultural one. How one hears—and more importantly, how one learns to hear—is shaped by culturally specific listening practices, established from early childhood onward. As a result, the measurement of scale intervals in hertz or cents, while useful, tells us little about the conceptual frameworks musicians themselves operate within. Pitch perception functions within what might be called a culturally conditioned margin of tolerance—an inherited sensibility rather than a fixed biological given.

In some musical systems, the ability to distinguish between intervals around 300 and 400 cents—minor and major thirds—is meaningful. Yet this distinction, though perceptible to most human ears, does not carry the same musical relevance across cultures. In parts of Angola and Mozambique, for instance, so-called neutral thirds—hovering

between 340 and 360 cents—are not anomalies but preferred tones. In vocal traditions from eastern Angola, singers often weave three or four individual lines together using ad libitum variations of interval size. What Western theory might treat as inconsistent, these communities hear as equivalent and fully functional. This kind of perceptual elasticity finds expression in instrument tunings as well, where compromises—temperaments, equidistant divisions of the octave—reflect the embodied logic of culturally specific hearing. Here, the octave, often considered a near-universal interval, is subdivided not with mechanical precision but according to what the ears, bodies, and traditions of a given culture find meaningful and playable[15].

For instance, Paul Berliner's recording of 5 Zimbabwean musicians reveal 5 different tuning systems which could all be played on a single MidiMbira prototype, to which the author comments "among players of mbira dzavadzimu, the choice is largely a matter of personal taste"[18].

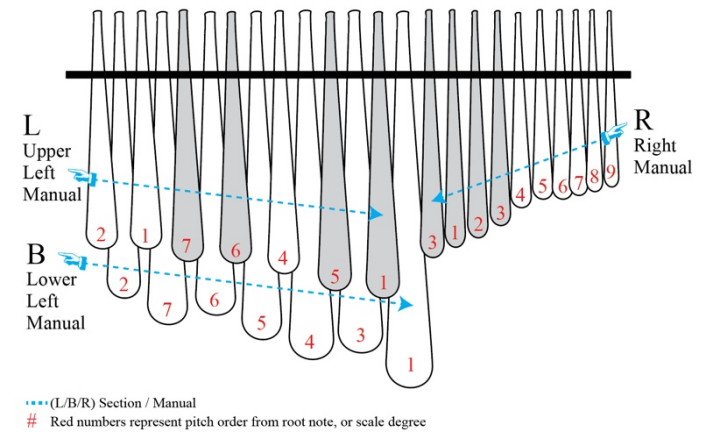


Figure 4: Mbira dzavadzimu tine layout and manuals.

Table 1. Side by side comparison in Cents (±) of the chromatic scale and chuning[18] systems employed by 2 mbira players: Kunaka (1) and Bandamira (2).

	=		<		<		>		>		<	=	
1	R2		R3		R4	R5		R6		R7		R8	R9
	Root		204		386	498		702		906		1088	1200
±	0	100	200	300	400	500	600	700	800	900	1000	1100	1200
	C	C#	D	D#	E	F	F#	G	G#	A	A#	B	C
2	Root		-15		-11		-7	56		14		-49	102
	R2		185		389		593	756		914		1051	1302
	=		<		<		>		>		<	>	

Taking two of the tunings into consideration we encounter an interesting difference. Whereas Kunaka - in western terms - could be said to tune to the Ionian mode, Bandambira tunes to the Lydian mode, as his R5 manuals is sharpened (F#) see Fig. 4. Another interesting fact is the shared tendency to generally tune flat except for the 6th and 7th degrees of the scale which are tuned sharp (see Tables 1 and 2).

Table 2. Side by side comparison in Cents of the Major Scale in Just Intonation¹ for the chuning [18] systems employed by the same musicians.

Note	Western Major Scale Interval in Cents (Just Intonation)	Kunaka's Tuning Intervals in Cents	Deviation of Mbira Tuning with Respect to Major Scale	Bandambira's Tuning Intervals in Cents	Deviation of Mbira Tuning with Respect to Major Scale
C					
B	112	98	-14	251	139
A	182	173	-9	137	-35
G	204	201	-3	158	-46
F	204	170	-34	163	-41
E	112	129	17	204	92
D	182	181	-1	204	22
C	204	196	-8	185	-19
	0	0	0	0	0

5.2 Creative and Performance Applications

The MidiMbira is not merely a digital reinterpretation of a traditional instrument—it is a platform for creative expression, experimental performance, and technologically mediated cultural dialogue. By bridging tactile mbira performance with the extended control possibilities of MIDI and OSC (Open Sound Control), it opens a wide array of applications in live performance, composition, improvisation, and audiovisual interaction.

5.2.1 Live Looping and Controllerism

Use case 2 (non-Western mappings in performance): One of the most prominent applications of the MidiMbira so far has been in live looping, where it has acted as a central interface for building layered compositions in real time. Integrated with Ableton Live, the instrument can launch clips, trigger effects, modulate parameters, and switch between scenes—making it an ideal tool when aiming for a controllerist performance without having to abdicate of the playability of the mbira. Unlike conventional MIDI controllers, the MidiMbira’s layout draws from the ergonomic and mnemonic logic of traditional mbira tunings, offering a more embodied and culturally resonant form of interface design. Performers can thus engage with digital tools without abandoning tactile, gestural play.

As a MIDI plug-and-play device, it can be configured to operate with hardware such as the Boss RC-505 mkii: see Fig. 5. One of the early goals we intended to achieve with the MidiMbira was integration

with hardware aimed at streamlining May Mbira’s² live looping performances.

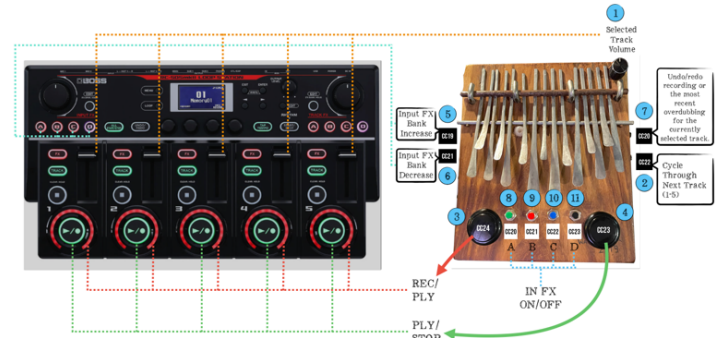


Figure 5: MM1 MIDI Mappings for using the MidiMbira as a Controller to be used with the Boss Rc-505 mkii.

5.2.2 Audiovisual and Interactive Installations

Beyond the concert stage, the MidiMbira has also played a vital role in interactive art installations. Its integration with DMX lighting, Ableton Live and video projection, enabled it to trigger complex cross-modal narratives.

An interactive art installation featuring a series of MidiMbira prototypes was premiered at Maputo Fast Forward (MFF), a public media-arts festival in Mozambique in 2024³, integrating the MidiMbiras into a responsive audiovisual environment. The installation invited visitors to engage physically with the instruments, triggering layered soundscapes, reactive lighting, and video projections. Each MidiMbira was configured to allow the instruments to respond not only to direct play but also to each other, provoking engagement from the public. This embodied interaction activated shifting textures of mbira-derived timbres—blending sampled acoustic materials with electronic processing—and influenced real-time changes in projected imagery. Designed as both an artistic and ethnographic intervention, the installation explored the hybrid space between tradition and digital experimentation, foregrounding African sonic epistemologies within contemporary media art. Children and adults interacted freely, revealing diverse modes of engagement, from contemplative listening to spontaneous collaboration. The work exemplified the performative logic of Playability Theory in action, where instruments are not simply played but inhabited—co-constructing meaning through gesture, technology, and cultural memory.

¹ Just Intonation derives intervals from simple whole-number ratios, emphasizing harmonic consonance rather than equal spacing.

² Master mbira builder and player. May Mbira is also a live performer and mixes traditional Mozambican instruments with electronic sounds in live looping performances.

³ Video recording of an improvised performance with graphical transcription at Maputo Fast Forward, 2024. <https://www.youtube.com/watch?v=q8IPHs9qNpU>. Accessed 20 Jan 2026.



Figure 6: MM4 and MR2 at Maputo Fast Forward, Mozambique (2024).

6 Discussion, Bridging Tradition and Innovation

The MidiMbira embodies digital hybridity, effectively bridging tradition and innovation. While traditional instruments carry culturally specific playabilities, their integration with MIDI technology challenges established narratives about authenticity and cultural representation. This hybrid approach resonates with discussions in ethnomusicology regarding cultural fluidity and innovation, highlighting that traditional forms need not remain static to retain authenticity. The MidiMbira's DIY ethos counters commercial constraints by democratizing technology creation and enabling musicians to redefine their cultural heritage creatively and autonomously.

However, the process has not been without challenges. Reflexive insights as an insider-researcher reveal ethical tensions inherent in innovation, including potential for cultural appropriation and the complexities involved in ethically representing and sharing traditional musical knowledge. These challenges underscore the importance of continuous dialogue and ethical vigilance in DIY music-technological practices, ensuring they benefit and respect their cultural origins.

Therefore, the MidiMbira is also intended as a pedagogical tool and a decolonial gesture. By embedding African sonic logics into digital music contexts, it challenges the dominance of piano-roll interfaces and Western-centric design in music technology. In workshops and educational settings, it becomes a means to introduce students to alternative mappings, non-linear tuning, and cross-cultural creativity, grounded in an ethos of respect, collaboration, and situated knowledge.

7 Future Directions

Future iterations of the MidiMbira could involve technical enhancements such as expanded microtonal capabilities, more intuitive MIDI mappings, and increased integration with virtual and augmented reality environments for immersive learning and performance experiences. Collaborative efforts could also be expanded internationally, creating networks of DIY researchers, educators, and musicians dedicated to adapting traditional instruments into digital hybrids.

Building on the experience of the media-arts festival, one promising possible direction involves the deployment of interactive MidiMbira prototypes in museum contexts. These museum-ready versions would serve both educational and preservationist roles, allowing the public to explore mbira tunings, gestures, and sonic textures without

compromising the integrity of fragile heritage instruments. Equipped with capacitive touch sensors, microtonal tuning presets, and real-time sound synthesis engines, such prototypes could offer hands-on experiences for visitors while embedding African musical heritage within digital museological practice. This strategy would further extend the theoretical framework of Playability Theory into curatorial and pedagogical environments, enabling ethnomusicologically informed, multisensory engagement that bridges tactile tradition and interactive technology.

Extending the DIY modification approach to other traditional instruments could catalyze broader ethnomusicological and technological dialogues. Instruments like the kora, sitar, or didgeridoo could similarly benefit from digitally-enhanced playabilities, potentially informing future research and practice across disciplines. Ultimately, the MidiMbira exemplifies the potential for interdisciplinary research, bridging ethnomusicology, music technology, and DIY practices, encouraging a holistic approach to musical innovation that respects and enhances cultural traditions.

8 Conclusion

The development of the MidiMbira demonstrates how a culturally rooted, DIY approach to instrument design can contribute to both musical innovation and decolonial practice. Grounded in Playability Theory and realized through ethnographic collaboration, the project offers a new model for how traditional instruments can be extended rather than displaced by digital technologies. As a hybrid interface, the MidiMbira fosters new modes of interaction—sonic, gestural, and visual—without abandoning the symbolic and tactile logic of the original mbira. In doing so, it challenges prevailing design paradigms that privilege Eurocentric musical norms, while offering an inclusive framework that allows musicians from diverse backgrounds to engage with tradition in dynamic and performative ways.

The MidiMbira is more than a technological artifact—it proposes a new model of instrument design shaped by reciprocal learning and situated knowledge. As a proof of concept, it bridges material heritage and emerging media in practical and performative ways, highlighting the potential of open-source and participatory approaches in tradition-aware musical innovation.

Ethical Standards

Funding: This work was financed by national funds through FCT – Fundação para a Ciência e a Tecnologia, I.P., under the PhD Scholarship reference PD/BD/150612/2020, and the project INET-md – Institute of Ethnomusicology Centre for Studies in Music and Dance, reference UIDB/00472/2020, DOI: 10.54499/UIDB/00472/2020.

Conflicts of interest: The author declares no financial conflicts of interest.

Informed consent: This paper discusses practice-based research and publicly presented artistic work by the author, and May Mbira, a collaborator/artist. Both are public-facing artists and are referenced in relation to their individual professional practices and collaboration with each other. No sensitive personal data are reported.

Animals: No research involving animals was conducted.

Acknowledgments

The author thanks May Mbira, other collaborators and interlocutors who contributed to the development and testing of the instrument and performance workflow.

References

- [1] Guillermo de Llera Blanes. On Playability Theory and Remixing: Exploring Controllerism through the creation of the MidiMbira in Mozambique. (2025). Doctoral dissertation. <http://hdl.handle.net/10362/191727>
- [2] Patricio de la Cuadra, Antoine Ernoult, Cassandre Balosso-Bardin, and Benoît Fabre. 2017. Playability in flute-like instruments: Investigating the relation between flute making and instrumental control. *The Journal of the Acoustical Society of America* 141, 5 (2017), 3874. <https://doi.org/10.1121/1.4988664>
- [3] Eduardo Navas. 2012. *Remix Theory: The Aesthetics of Sampling*. Springer, Vienna, Austria. <https://doi.org/10.1007/978-3-7091-1263-2>
- [4] Eduardo Navas, Owen Gallagher, and xtine burrough (Eds.). 2021. *The Routledge Handbook of Remix Studies and Digital Humanities*. Routledge, New York, NY, USA. <https://doi.org/10.4324/9780429355875>
- [5] Cory Doctorow. 2008. *Content: Selected Essays on Technology, Creativity, Copyright, and the Future of the Future*. Tachyon Publications. URL: https://web2.mpl.cz/koweb/00/04/24/15/75/content_selected_esays_on_technology_creativity_copyright.pdf
- [6] Mihaly Csikszentmihalyi. 1990. *Flow: The Psychology of Optimal Experience*. Harper & Row, New York, NY, USA.
- [7] Robert Keith Sawyer. 2014. Group creativity: Musical performance and collaboration. In *The Improvisation Studies Reader*. Routledge, 87–100
- [8] Mary Jane Reichling. 1997. Music, imagination, and play. *Journal of Aesthetic Education* 31, 1 (1997), 41–55. <https://doi.org/10.2307/3333470>
- [9] José Luis González Sánchez, Natalia Padilla Zea, and Francisco Luis Gutiérrez. 2009. Playability: How to Identify the Player Experience in a Video Game. In *Human-Computer Interaction – INTERACT 2009*, Lecture Notes in Computer Science, Vol. 5726. Springer, Berlin, Germany, 356–359. https://doi.org/10.1007/978-3-642-03655-2_39
- [10] Alessandro Rienzo and Andrés Cubillos. 2020. Playability and player experience in digital games for elderly: A systematic literature review. *Sensors* (2020), Jul 16;20(14):3958. <https://doi.org/10.3390/s20143958>.
- [11] Marc Leman. 2007. *Embodied music cognition and mediation technology*. MIT Press.
- [12] Marcelo M. Wanderley and Philippe Depalle. 2004. Gestural control of sound synthesis. *Proceedings of the IEEE* 92, no. 4: 632–644.
- [13] Gerhard Kubik. 1964-1965. Generic names for the mbira. *African Music* 3, 4 (1965), 72. <https://doi.org/10.21504/amj.v3i3.1033>
- [14] Hugh Tracey. 1961. A case for the name mbira. *African Music: Journal of the International Library of African Music* 2, 4 (1961), 17–25. <https://doi.org/10.21504/amj.v2i4.703>
- [15] Gerhard Kubik. 2002. *Lamelofones do Museu Nacional de Etnologia*. Instituto Português de Museus – Museu Nacional de Etnologia, Lisbon, Portugal. ISBN 972-776-116-X.
- [16] Andrew Tracey. 1972. The original African mbira? *African Music* 5, 2 (1972), 85–104. <https://doi.org/10.21504/amj.v5i2.1421>
- [17] Bernd Enders. 2017. From Idiophone to Touchpad: The Technological Development to the Virtual Musical Instrument. In *Musical Instruments in the 21st Century: Identities, Configurations, Practices*. Springer, Singapore, 45–58. https://doi.org/10.1007/978-981-10-2951-6_4
- [18] Paul Franklin Berliner. 1978. *The Soul of Mbira: Music and Traditions of the Shona People of Zimbabwe*. University of California Press, Berkeley, CA, USA.
- [19] Stephen Kemmis, Robin McTaggart, and Rhonda Nixon. 2014. *The Action Research Planner: Doing Critical Participatory Action Research*. Springer, Singapore. <https://doi.org/10.1007/978-981-4560-67-2>
- [20] Guillermo de Llera Blanes. 2022. MidiMbira 1.01 Short Performance. <https://www.youtube.com/watch?v=xuvq9FTVEcM>.