

Giromin Residency Report: Creative Exploration by Musicians and Dancers from Frevo and Afro-Brazilian Traditions

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Figure 1: Orun Santana holding his Berimbau with a Giromin attached to it (photo by Junior Teles)

Abstract

This paper reports on a two-month artistic residency at the Paço do Frevo in Recife, Brazil, in which musicians and dancers rooted in frevo and Afro-Brazilian traditions explored the Giromin—a wearable Digital Dance and Music Instrument (DDMI) developed over fourteen years. Rather than a technical evaluation, the study documents the contradictions, confluences, frictions, and openings that emerged when this interface entered embodied practices that precede and exceed the usual NIME ecosystem. Using Reflexive Thematic Analysis of six in-depth interviews, we identify six themes: the body as interface, tension between programming and creation, tradition as resource rather than barrier, simplicity as strategy for mastery, technical limitations as experience shapers, and adoption and future imaginaries. The discussion unfolds three further contributions: two incompatible ontologies of instrumentality surfaced by the encounter; an architecture that carries ideological assumptions its performers did not share; and the finding that dual proficiency in music and dance constitutes structural access to this DDMI—a condition that Afro-diasporic Brazilian traditions, where music and body are inseparable, are structurally positioned to meet. The residency did not resolve the distance between the Giromin and frevo. It made that distance productive.

CCS Concepts

• **Applied computing** → **Sound and music computing**; Performing arts; • **Human-centered computing** → *Interactive systems and tools*.

Keywords

Digital Dance and Music Instruments, Wearable Instruments, Embodied Interaction, Artistic Residency, Community-Centered Design

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1 Introduction

We write this paper from Recife, Pernambuco, Brazil, home of frevo and many other Afro-Brazilian musical traditions. It is difficult to convey the aliveness and force of these cultural practices to a NIME audience that has, for the most part, not had the opportunity to experience them. We believe they cannot be fully understood without having lived them—particularly for readers who lack a reference point for living musical traditions that have actively resisted globalized cultural homogenization. When we speak of popular culture here, we mean neither pop stardom nor folk preservation: we mean a third dimension of artistic life, one that is communal, street-level, multigenerational, and stubbornly rooted in the territory. We will try to make that dimension as legible as possible.



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In 2006, Frevo was recognized as an intangible cultural heritage of Brazil by IPHAN [16]; in 2012, it received UNESCO World Heritage status¹. It exists in three forms: *frevo de bloco*, *frevo-canção*, and *frevo de rua*, the fast-paced instrumental street frevo performed by marching brass-and-percussion orchestras and danced by *passistas*—the acrobatic frevo dancers whose vocabulary of spins, kicks, and low-to-the-ground sequences constitutes one of the most technically demanding solo dance forms in Brazilian popular culture. *Frevo de rua* is the form at the center of this study².

What these designations can be misleading is that frevo is not a heritage to be preserved—it is a living practice in continuous transformation. It is performed year-round in schools, rehearsal studios, street processions, and concert stages. New compositions and arrangements are written and played every year, and the tradition is multigenerational: children and elderly people play, sing and dance it. It is a tradition deeply tied to the past, while being made now, while being constantly reinvented.

This vitality is inseparable from frevo's origin. Between 1905 and 1915, military *dobrados*, polkas, maxixes, and popular song forms were reprocessed in the streets of Recife until they became frevo [11]³. Dance and music are inseparable in the history of frevo. It was iteratively developed in a body-sound feedback loop: capoeiristas, workers, and freedpeople would leap in front of the brass bands during Carnival processions; the exciting brass chords resonated in their muscles and these would inspire new arrangements and compositions. The capoeira fight moves—adapted to the march rhythm and disguised from police as dance steps—evolved into the vocabulary of frevo dance. The capoeira *ginga*, its floor-low acrobatic sequences, and the Afro-diasporic rhythmic groove were not grafted onto frevo later: they are its constitutive material.

The word Frevo is a variation from “fervo”, which means boiling, and it is the result of this friction. Frevo is not a tradition that was once pure and later became mixed. Its impurity—or better, its *confluência*⁴ [12]—is the condition of its existence.

This matters for reading this paper. A NIME audience trained in experimental Western music aesthetics might approach “tradition” as something static, bounded, and fragile. Frevo and most Latin American traditions refuse that frame. It is a practice shaped by centuries of collision, appropriation, and reinvention—one that has already metabolized many forms of cultural contact. The question is not whether it can absorb new technologies, but on whose terms that contact occurs.

The Giromin residency was organized within this embodied cultural environment. Instead of testing a digital instrument in a controlled laboratory setting, we invited musicians and dancers rooted in frevo and Afro-Brazilian traditions to experiment with the Giromin (Figure 1 and 3) over a two-month residency, experimenting and performing with it. The objective was not to measure efficiency or task completion, but to observe how a wearable gestural instrument would be interpreted, appropriated,

resisted, or transformed by artists whose practices precede and exceed digital musical interface culture.

The Giromin was previously conceptualized within the framework of Digital Dance and Music Instruments (DDMI) [45, 47], instruments explicitly designed to bridge dance expressivity and musical instrumentality. Earlier work positioned the Giromin within the intersection of Digital Musical Instruments (DMI) and Interactive Dance Systems (IDS), arguing that both paradigms leave gaps: DMIs often prioritize sonic control over corporeal expressiveness, while IDS frequently privilege movement analysis without instrumental musical agency. The DDMI framework proposed a conceptual architecture combining gestural sensing, multi-layer gesture processing, mapping strategies, and feedback loops between body and sound.

However, while previous publications focused on conceptual and technical design, this study shifts the center of gravity toward lived experience: what happens when such an instrument enters the bodies of artists whose practices precede and exceed the NIME ecosystem? What does the instrument do to frevo—and what does frevo do to the instrument? What values are inscribed in the instrument's architecture, and how do those values shape—or collide with—the musicians' and dancers' ways of moving, sounding, and knowing?

This paper contributes to NIME 2026's Communities theme by presenting an artistic process report from a residency involving musicians and dancers who are not part of the NIME academic community, nor affiliated with the experimental Western art music traditions that are often represented in NIME research. Rather than positioning cultural tradition as a site of technological resistance, we document the appropriations, limits, frictions, and openings that emerged when this sonic interface entered the practices of musicians and dancers rooted in frevo and Afro-Brazilian traditions—what it made possible, where it fell short, and what it could not yet become in their hands.

2 Background: From DDMI to Situated Practice

The Giromin originated from research on body expressivity in Northeastern Brazilian music scenes [2]. Earlier interviews with musicians from Recife indicated dissatisfaction with the invisibility of gestures in electronic performance contexts. The DDMI framework [48] provided the conceptual grounding: a wearable gestural interface capable of capturing full-body movement and mapping it to sound, explicitly considering both musical instrumentality and bodily expressivity.

Development began in 2014 and has gone through multiple iterations (Figure 2), always under material constraints and without sustained institutional funding. Prototypes were built in personal workshops, Fab Labs, and partner spaces using locally available components. The first prototype (v0.1) used Arduino and XBee modules as a MIDI sequencer triggered by torso angular positions. Subsequent versions adopted a *gambiarra* approach [46]: v0.2 repurposed smartphones as motion sensors; v0.3 and v0.4 adopted mass-produced ESP32 and M5Stick development kits after custom PCB manufacturing proved economically unfeasible.

Early performances, such as *Gira* (NIME 2019) [47], explored continuous rotational gestures: spinning movement modulated arpeggiator tempo and lighting speed. These contexts were close to experimental music aesthetics — continuous, latency-tolerant, primarily involving the instrument's creators.

¹A video produced by UNESCO and NHK is available at <https://www.unesco.org/archives/multimedia/document-3917>

²While reading this paper, please open this playlist <https://open.spotify.com/playlist/4Dj96xekQ3s8OnOCHkyMR9?si=45ccf340093f42dc> to listen to some *Frevo de Rua*

³The emergence of frevo from military brass and Afro-diasporic street culture resembles in several respects the formation of jazz in New Orleans.

⁴*Confluência*, literally “confluence,” is a concept developed by the Afro-Brazilian thinker Antônio Bispo dos Santos to describe the encounter between different worlds that preserves the distinctness of each, as opposed to synthesis or assimilation. It is discussed further in Section 7.



Figure 2: Giromin prototypes, clockwise: v0.1, v0.2, v0.3 in the Gira performance (NIME 2019) and v0.4 in the performance "Now and Wait do not Confabulate" by Iara Izidoro.

A decisive shift came through an installation commissioned for Lia de Itamaracá, a master ciranda artist from Pernambuco, in 2022. To map aerial percussive gestures to discrete sample triggers, a peak detection module was developed – identifying local maxima in the gyroscope signal and firing a MIDI event at the moment of highest angular velocity. Transplanted into the residency version of Giromin the day before the first session, this module proved essential in the frevo and Afro-Brazilian dance context: foot strikes and percussive body gestures could now trigger discrete sounds rather than modulate continuous parameters, making the instrument significantly more expressive for performers whose tradition is built on struck rhythm.

Technically, Giromin v0.5 is a wireless wearable IMU device running Madgwick’s sensor fusion algorithm [23] on an ESP32 microcontroller. It extracts continuous orientation data alongside discrete peak detections in raw accelerometer (linear) and gyroscope (angular) signals, using a noise-gate threshold and a configurable debounce window. Gestural descriptors are transmitted via Wi-Fi/OSC and mapped to Ableton Live parameters through a custom Max patch.

2.1 Gambiarra and Time

It is important to point out to foreign readers that *gambiarra* [46] is not hacking in the engineering sense, nor the ideological frugality of free software culture [35]: it is the everyday creative practice of making things work under real constraints of time and material resources. In Global South academic and cultural contexts, time to learn or develop the best or most efficient solution is not always available. In this sense, *gambiarra* is also an epistemological standpoint that allows us to overcome perfectionism and embrace unstable but good-enough solutions.

The Giromin software reflects this honestly: Wi-Fi transmission ran without latency or jitter optimisation because it felt responsive enough for artistic creation; a standalone Max patch communicated with Live via MIDI rather than Max for Live because it already worked and avoided an additional learning curve. The logic is simple – if it resolves the problem, the pressure to replace it never builds – and the patch carried twelve years of accumulated decisions that were easier to inherit than to rewrite.

This architecture carries a cost in collaborative contexts. Any change to the sensing logic requires stopping the creative process – entering MIDI Map mode, retransmitting the target CC, selecting a new destination parameter – a sequence built for a solo

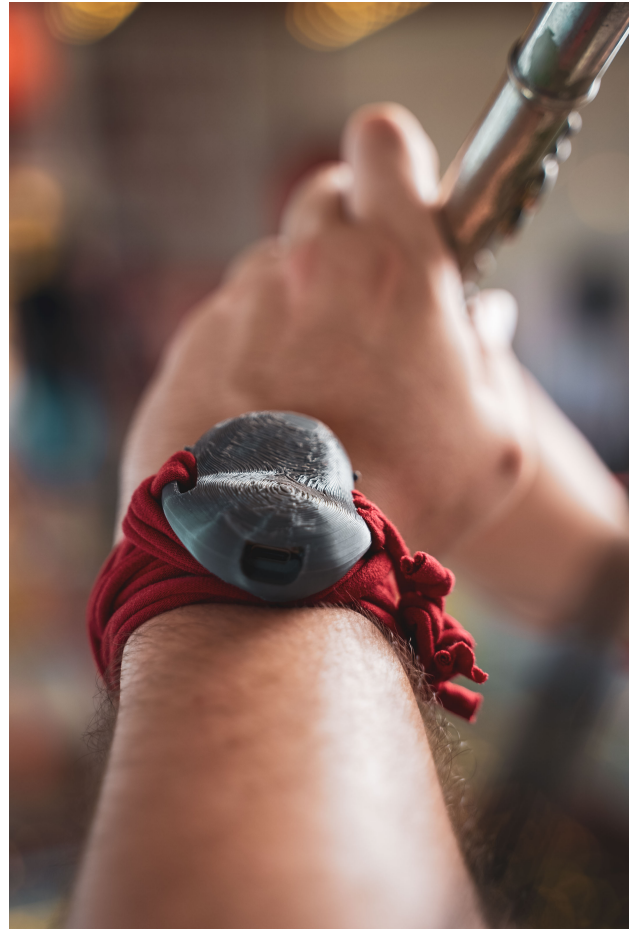


Figure 3: Giromin v0.5

researcher that, when used by the resident artists, repeatedly interrupts the shared embodied states that take time to rebuild. The *gambiarra* logic – if it works well enough, there is no pressure to improve it – meant this friction accumulated invisibly until it had to be absorbed by others. A more fluid reconfiguration interface is a precondition for genuine collaborative experimentation.

3 Related Work

3.1 Wearable Sensor-Based Instruments for Dance and Music

Body-worn inertial sensors for musical and dance performance have been explored for nearly three decades [1, 13, 18, 19, 31, 36]. Todoroff and colleagues [43, 44] are particularly relevant, addressing IMU-based wearables in joint dance and music contexts – a framing closely aligned with Giromin’s. It is also interesting to point out that accelerometers and gyroscopes are among the most widely adopted sensing components in NIME literature for some time [30].

3.2 Mapping Strategies and Gesture–Sound Relationships

Existing frameworks conceptualize gesture-to-sound mapping through taxonomies of activation and modulation [42], embodied cognition [49], and body-space-time dimensions [5]. McPherson et al. [28] further argue that mapping is not a neutral technical

operation but a technoscientific practice embedding ideological assumptions: a preference for high-dimensional parameter spaces, representational stability, and unidirectional signal flow from body to sound. These assumptions were visible in Giromin’s architecture, yet in practice, the residency revealed that they were secondary concerns. Performers’ priorities shifted toward scenic and performative strategies—the beauty of a gesture, its lightness or weight, the freedom to move without anticipating sonic consequences—rather than toward optimizing the mapping itself. Mapping provided a technical vocabulary; the residency showed that this vocabulary was insufficient to capture what performers were actually negotiating.

3.3 Digital Instruments in Cultural and Traditional Contexts

A smaller but growing body of work examines digital instruments within specific cultural traditions — including Korean dance [18], Indian classical music [19, 37], and Argentine Tango [38] — showing that situating instruments within living practices reveals important aspects about the social life of musical instruments beyond their technical engineering. The present study extends this line of inquiry into Northeastern Brazilian traditions, responding to calls for culturally diverse NIME research [26, 32].



Figure 4: Session on November 15, 2022, with Aishá Lourenço and Orun Santana, coordinated by João Tragtenberg and Miguel Mendes (photo by João Tragtenberg).

3.4 Socio-Cultural Dimensions of Digital Instrument Design

Recent NIME studies have increasingly recognized that digital musical instruments are not purely technical artifacts but socio-cultural ones. Tahiroğlu and Magnusson [40] frame this as a disciplinary turn, arguing that DMI research must account for the social, cultural, and political conditions in which instruments emerge and circulate. Waters [50] develops this perspective theoretically, proposing that instruments become musical through “entanglements” with communities, traditions, and shared expectations, not through technical specifications alone. Magnusson [25] extends this argument historically, showing that instruments “migrate” across socio-technological conditions, evolving through cultural negotiation rather than engineering optimization. Hayes and Marquez-Borbon [14] sharpen the political dimension, calling on the NIME community to confront its own epistemological assumptions and examine whose knowledge, aesthetics, and bodily practices are validated within the field. However, these critical frameworks remain largely anchored in European and North American institutional contexts.

A complementary body of work has begun to articulate perspectives from the Global South. Wong-Villacres et al. [51], writing from HCI, propose “horizontality” as a design principle grounded in Latin American practices, arguing that Southern epistemologies constitute generative design frameworks rather than mere sites of technological application. Within NIME, the concept of *gambiarra* and Technovernacular Creativity was defended not simply as improvisation under constraint, but as an alternative cosmotechnics [46]. Rather than understanding technology as the linear application of universal engineering principles, this perspective frames *gambiarra* as a situated mode of technological world-making, where industrial artifacts are repurposed, reinterpreted, and reassembled according to local material conditions, cultural logics, and collective needs. In this sense, *gambiarra* operates as a Southern cosmotechnics: it reconfigures the relationship between knowledge, materiality, and instrumentality by foregrounding adaptability, relationality, and resourcefulness over optimization and standardization.

As described in the instrument’s development history (Section 2), the Giromin itself was built under *gambiarra* conditions—not as an aesthetic choice, but as a structural consequence of limited funding, fragmented time, and institutional precarity. We do not wish to romanticize this: *gambiarra* is not always freely chosen. It is often the only available path, and the constraints it imposes carry real costs that are unevenly distributed across practitioners.

The present study extends this trajectory by examining not the design process itself—because that process is not finished and has already lasted 14 years—but the moment of encounter: how an instrument with a satisfactory degree of completeness, itself epistemologically grounded in *gambiarra* practice and Southern cosmotechnical conditions, is negotiated by artists rooted in Afro-diasporic Brazilian traditions. Rather than treating adoption as a question of usability alone, we investigate how embodied cultural vocabularies, local performance practices, and situated technological imaginaries actively mediate the instrument’s meaning and potential futures.

4 Residency Context

The residency took place from November 7 to 26, 2022, at the Paço do Frevo⁵ in Recife—a cultural institution dedicated to the preservation and diffusion of frevo, housing a museum, classrooms, studios, and an auditorium. This was not Giromin’s first appearance at the Paço: the instrument had been presented there in earlier public contexts by the first and second authors together with the two sound designers of the residency in 2016⁶ and 2017, giving the residency a character of return and continuity rather than first encounter. Following the 2017 presentation, the first two authors and the sound designers were invited to perform at the official opening of the Recife Carnival in 2018—the main stage at Marco Zero—alongside Quinteto Violado, one of the most celebrated musical groups in Brazilian northeastern culture. In that performance, alongside the Giromin, the Pandivá [2] and other instruments developed in the research group were also featured⁷. This invitation was not a gesture of institutional hospitality toward outside researchers; it was a recognition that this work belonged, in some form, to frevo’s ongoing process of self-renewal. Frevo is a tradition so permeable, alive, and in

⁵<https://pacodofrevo.org.br/>

⁶A video of the full performance is available at <https://youtu.be/RHjODYCaLjU>

⁷A description of the instruments used is available at <https://youtu.be/FDaQaRtYl2I>; a recording of the full performance at <https://youtu.be/NGQXttTvZLo>

continuous creation that the encounter with the technical culture of NIME is not perceived as a corruption or a distancing from its principles, but as nourishment—new references digested and transformed by its artists in a recurring effort to reinvent and sustain the tradition's life. We are not seen as strangers to frevo. We are seen as one possible frevo for the future.

Sessions ran Monday through Friday across two consecutive weeks, closing with a public presentation on November 26 at the Paço do Frevo's auditorium. The first week consisted of individual and paired sessions; the second opened with a full-group planning meeting and continued in pairs, deepening individual mappings toward the presentation. Eight replicas of the Giromin v0.5 were built for the residency.



Figure 5: Photos of the artists who participated in the residency. Clockwise from top left: Aishá Lourenço, Henrique Albino, Mestre Wilson, and Orun Santana (photos by Junior Teles).

The four invited resident artists are among the most significant contemporary figures in the music and dance scene of Recife — working with them was a privilege that shaped the research at every level, bringing artistic weight and cultural depth that would be impossible to replicate with performers less embedded in the living traditions the residency sought to engage:

- **Aishá Lourenço**, born in Olinda, trained at the Escola de Música do Estado de São Paulo and the Manchester MIDI School, has performed internationally with artists including Naná Vasconcelos and Amadou & Mariam. She came to the residency with an already-developed practice she calls *eletropercuteria*—a concept she coined after watching Marco Suzano and Felipe perform with Naná Vasconcelos, combining acoustic and electronic percussion, feet and hands, in a single integrated setup: “I call it *eletropercuteria* because you already use your feet, your hands—it is electronic, digital, acoustic.”⁸ This framework shaped how she approached the Giromin from the first session.
- **Henrique Albino**, a multi-instrumentalist (winds), composer and arranger whose musical formation was largely outside formal institutions—his principal school was frevo street orchestras, which he has written for since 2009. His practice gravitates toward what he calls *música tronxa* (roughly: jagged music), a sensibility close to free jazz and

free improvisation. The depth of his musical ear and erudition within frevo is illustrated by an episode during the residency in which, upon hearing a sampled orchestra hit, he immediately identified which specific frevo orchestra it came from: “only that orchestra had five flutes.” He has collaborated with Lia de Itamaracá, Amaro Freitas, Liniker and so many others.

- **Orun Santana**, a dancer and capoeirista raised at Centro Daruê Malungo (one of the most important centers for Afro-Brazilian music and dance), whose solo show *Meia Noite* has toured Brazil and internationally (France, Macau).
- **Mestre Wilson** (Wilson Aguiar de Souza), a professional *passista*⁹ and leader of the *Brincantes das Ladeiras* collective, which teaches and dances frevo on the streets of Olinda through what he calls a “pedagogy of the street.”¹⁰

Two sound designers assisted the residency facilitator (the first author):

- **Miguel Mendes**, a bassist, producer and music technology professor at the Conservatório Pernambucano de Música.
- **Tomás Brandão**, a producer and researcher of popular electronic music (Brega Funk).

Table 1 summarizes key background dimensions.

Each working session followed a process of proposal and negotiation: the residency facilitator or sound designers would present a mapping proposition coded in Max and Ableton Live, performers would experiment with it, and the group would collectively assess what had emerged, often reprogramming the patch in real time. Sessions were not structured as user tests of a finished instrument but as participatory design episodes in which the categories of the mapping were themselves under negotiation.

Sessions also incorporated somatic dynamics inspired by some design practice [15]: structured body-awareness exercises in unfamiliar movement configurations—lying on the floor, moving on different height levels (low, medium and standing up)—were used to produce an estrangement from habitual movement patterns and heighten sensory attention to the relationship between gesture and sound. A paired practice was also introduced in which one participant guided another's improvised movement through vocal sounds alone. In several cases, this evolved into musically guided improvisation: Henrique Albino led Mestre Wilson's movement with his flute, and Wilson subsequently inverted the exercise, conducting Albino's flute improvisation through his own body. This exchange generated a set of gesture-sound correspondences—particular arm sweeps, weight shifts, and directional accelerations—that were later proposed as candidate mappings for the Giromin.

Albino was the only resident who engaged directly with the instrument's programming environment. Already familiar with music production, he took four Giromin units home and, following a day of instruction in his studio on the mapping interface, developed an original mapping patch.

Following the residency, six semi-structured interviews were conducted with all participants, covering prior experience with digital instruments, creative process during the sessions, technical assessment of the Giromin, the tradition-technology relationship, and future use perspectives.

⁹ *Passista* is a term that refers to traditional Frevo dancers

¹⁰ A poorly recorded video of a good example of how Wilson's improvised dance is directly connected to music and how democratic the dance is: https://youtu.be/vm5_q0q5EbI

⁸ *Eletropercuteria* blends the Portuguese words for *eletro* (electronic), *percussão* (percussion), and *bateria* (drum kit), capturing a practice that integrates acoustic percussion, electronic pads, and digital instruments into a single embodied setup.

Table 1: Participant profiles in the Giromin artistic residency.

ID	Gender	Primary Profile	Traditions	Digital Exp.	Embodied Exp.
Aishá Lourenço	F	Percussionist	Capoeira, maracatu, afoxé	SPD30, Hand Sonic	Capoeira, Alexander technique
Henrique Albino	M	Saxophonist / Flutist	Frevo, jazz, baião	Ableton Live (5 yrs)	Limited prior to residency
Miguel Mendes	M	Bassist / Sound Designer	Frevo, jazz, film scoring	Ableton, Max/MSP	Dance group experience
Orun Santana	M	Dancer / Capoeirista	Capoeira, Afro dance, maracatu, coco	None	Dance degree, capoeira
Tomás Brandão	M	Guitarist / Producer	Pop, rock, electronic	Ableton (8 yrs), Logic	Limited experience
Mestre Wilson	M	Frevo Dancer (Passista)	Frevo	Limited	Professional frevo dancer

5 Methodology

We employed Reflexive Thematic Analysis (RTA) following Braun and Clarke’s framework [6–8]. RTA was selected because: (a) the data consisted of rich subjective accounts requiring flexible pattern identification; (b) researchers were active participants in the residency, requiring a method that integrates reflexive positionality; and (c) the approach has been employed in NIME and HCI studies on musical interface experiences [33].

The analysis adopted a contextualist constructionist epistemological orientation [6], acknowledging that participants’ experiences are co-constructed within the cultural context of Recife, Brazil. Coding followed a predominantly inductive approach, operating at both semantic (explicit meanings) and latent (underlying assumptions) levels.

After review against both coded extracts and the complete dataset, these were refined into six final themes:

- (1) The Body as Interface
- (2) Tension Between Programming and Creation
- (3) Tradition as Resource, Not Barrier
- (4) Simplicity as Strategy for Mastery
- (5) Technical Limitations as Experience Shapers
- (6) Adoption and Future Imaginaries

6 Findings

The large majority of interview themes converge with issues already consolidated in the NIME literature: the Midas touch problem, the tension between programming and creative flow, the role of simplicity in mastery, battery and latency constraints, and the conditions for audience comprehension of gesture-sound mappings. Each subsection below presents the findings synthetically alongside its established references, closing with what was specific to this residency and not anticipated by the existing literature.

6.1 The Body as Interface

Participants consistently described the Giromin as an extension of the body—an experience of transparency in which the instrument recedes and gesture becomes sound directly [20]. Henrique Albino brought an unusually analytical attention to this experience, articulating a spontaneous taxonomy of sound-movement relations: *sound representing*, *accompanying*, and *resulting from* movement, alongside *preparatory*, *communicative*, and *executive* gesture. This taxonomy extends Tanaka’s practitioner-oriented mapping model [42] from a performer’s perspective rather than a designer’s. A second well-documented challenge of body-worn instruments also emerged: the Midas touch (always-on sensing) problem, in which any movement produces sound and the performer must learn to carve silence rather than activate it [4, 39]:



Figure 6: Mestre Wilson performing at the Paço do Frevo during the public presentation at the end of the residency (photo by Junior Teles).

“I felt trapped initially. The process was about uncoupling, finding spaces of silence within movement.” (Orun Santana)

6.2 Tension Between Programming and Creation

The most consistently reported frustration across all participants was the time lost to instrument configuration. This was the dominant source of process friction in the residency — more cited than battery life, latency, or any other technical constraint. Its root cause was structural: Giromin’s Max patch was developed as a *gambiarra* (see Section 2.1), built to work well enough for a solo researcher. When the same patch had to serve a collective of six artists, its modification cost — stopping the session, entering MIDI Map mode, retransmitting target CCs, selecting new destination parameters, resuming — was paid not by one person but by everyone in the room, repeatedly breaking embodied exploratory states that took time to rebuild.

Orun Santana articulated this frustration viscerally, describing the process as assembling a fragmented puzzle. His adaptive strategy was simplification: reducing mapped parameters proportionally increased time for creative exploration.

“We spent too much time trying to find things, too little time experimenting with what already existed.

I felt broken, assembling a puzzle.” (Orun Santana)

What is specific to this context: for communities organized around oral and embodied transmission—where knowledge is produced through collective rehearsal, improvisation, and physical co-presence—configuration time is not merely inconvenient. It is antithetical to the epistemic conditions under which these practitioners work. Breaking the exploratory flow did not just

slow the session; it interrupted the very mode of knowing that frevo and capoeira practitioners bring to any collaborative encounter.

6.3 Tradition as Resource, Not Barrier

Countering expectations, no participant demonstrated resistance to digital technology on the basis of tradition. As Tomás Brandão observed, “there was no clash between tradition and this somewhat disruptive thing; everyone was open.” Two modalities of engagement emerged. The first was tradition as entry vocabulary: Orun Santana used capoeira movements—ginga, kicks, spins—as raw material for Giromin exploration, discovering when and how to trigger sounds in tune with his movement and slowly suggesting incremental changes, such as a deep echo mapped to the height of his foot.

The second was tradition as material for reinvention: the most frequent emergent product was what participants called “reinvented tradition.” The Giromin neither replaced nor preserved traditions but transformed them into raw material for something new. Unlike many folkloric traditions that treat innovation as a threat, frevo is a living tradition in which reinvention is not incidental but constitutive—a condition of its survival and vitality.

This openness surfaced in unexpected moments: during one improvisation session, Mestre Wilson paused to remark that he had just invented a new *passo* (frevo step). This is also evident in Albino’s compositions, and how they share structural principles with frevos from the 1950s while introducing radical harmonic and rhythmic inflections. Frevo is composed of this contradiction between continuity and rupture, which is where frevo comes from—the tension between military musicians and marginalised *capoeiras*—and this is also how frevo has continuously renewed itself.

Mestre Wilson made this historical connection himself during the interview. Drawing on his deep knowledge of frevo’s origins, he recalled that in the nineteenth century, musicians would watch capoeiristas moving in front of the brass orchestras during Carnival and, contaminated by that velocity, would compose new frevos based on those movements—a body-to-sound feedback loop at the very origin of the tradition. He then connected that history to the present instrument:

“The Giromin gives you the possibility to do that in reverse. The *passista* has always danced behind the music. Today, the Giromin lets you dance in front of the music.” (Mestre Wilson)

The cultural references the Giromin introduced caused some friction, but that friction was productive rather than exclusionary: the foreign elements were absorbed and transformed, in the same way frevo has historically assimilated outside influences. Giromin was received not as a threat to the tradition but as one more foreign element to be digested, transformed, and made into new frevo.

6.4 Simplicity as Strategy for Mastery

Orun Santana and Henrique Albino achieved expressive results adopting deliberate simplification: fewer mapped parameters, fewer simultaneous timbres. This logic of mastering a reduced vocabulary before expanding echoes Tanaka’s account of sensor instrument technique [41] and Magnusson’s argument for designed constraints as conditions of virtuosity [24]. Orun Santana’s deliberate exploration of gyroscope breakpoints—pushing the sensor to its operational extremes, incorporating threshold

saturation and nonlinear jitter into choreographic phrasing—constituted a mode of extended technique native to sensor instruments, where the instrument’s computational limits become expressive material rather than obstacles [29]. Miguel Mendes named this process directly: “the first Giromin virtuoso.”

“The simpler the movement, the easier it is to understand the sound. Choosing a few timbres and variations within each Giromin worked better than multiple simultaneous timbres.” (Orun Santana)

6.5 Technical Limitations as Experience Shapers

Battery life and latency are canonical constraints of wearable DMIs [10, 17]. Both appeared here: Aishá Lourenço’s Giromin ran out of charge during the final presentation; Orun Santana reported that the responsiveness to foot trigger responses felt “somewhat binary” at fast tempos. These findings resonate with, respectively, Perry Cook’s directive that batteries die at the worst moments [10] and Jack et al.’s demonstration that latency tolerance is lower for performers with percussive backgrounds [17]. The culturally specific dimension: frevo and coco demand rhythmic resolution at a granularity that the current sensor fusion pipeline does not match. The Giromin, in its present form, favors continuous and fluid expression over discrete, rhythmically precise triggering—a constraint that bears differently on a frevo percussionist than on a performer from noise, or other experimental music traditions.

6.6 Adoption and Future Imaginaries

The visibility of gesture-sound relationships as a condition for audience engagement is well established [4, 39]: when mappings are perceptually opaque, audiences disengage. The final presentation confirmed this—fluid, visually legible mappings held more attention than abstract or technically unstable ones.

“There were quite artistic moments and other, more laboratory-like moments. We opened the laboratory and people are watching the process unfold. Science fair.” (Tomás Brandão)

Tomás Brandão’s formulation—“science fair”—names a tension that recurs across NIME public presentations [26]. Part of that perception was situational: the event was structured as a process show, presenting explorations developed within the residency’s limited timeframe rather than a finished artistic work. But the tension runs deeper. The *Paço do Frevo* audience arrived with expectations shaped by living frevo performance, where virtuosity is visible, embodied, and culturally legible. What they saw also carried the aesthetic register of NIME performance—a tradition Giromin belongs to as much as it belongs to frevo. This is not a failure to be corrected but a constitutive feature of the encounter: adapting Giromin to frevo and adapting frevo practitioners to Giromin were both happening simultaneously, and neither direction was complete. This residency was the negotiation between these two (and many other) Worlds. Reducing it to a purist perspective of a design process of a DDMI fully absorbed into a situated cultural practice would have foreclosed the very tension that made the residency generative.

All six participants expressed desire to continue using the instrument, though under different conditions. Orun Santana envisions a full show; Henrique Albino wants to use it in concerts and exhibitions; Miguel Mendes already uses it professionally.

Aishá Lourenço mentioned she would use it with appropriate technical support and Tomás Brandão conditions future use on a simplified interface.

7 Discussion

The body is not simply a control surface; it is a cultural archive [3]. Frevo and other Afro-Brazilian traditions encode histories of resistance, celebration, and collective identity. When a gestural digital instrument enters this terrain, it is evaluated not only technically but culturally.

Technically oriented frameworks on wearable DMIs [13] and gesture-sensing paradigms [5] provide crucial foundations for understanding body and gesture in DMI research, but implicitly treat the body as an expressive and largely universal substrate, setting aside the cultural complexity and contradictions.

Each of these frictions has a specific shape. The sections that follow examine them in turn: the collision between two incompatible ontologies of instrumentality; the structural conditions that made one performer a bridge where others found impasse; the ideological commitments embedded in Giromin’s architecture before any performer touched it; and the four specific instruments the intra-active process produced—none of which existed before the residency happened.

7.1 Two Ontologies of Instrumentality

Henrique Albino was direct: “frevo will not adapt to the Giromin. Frevo is there, it exists.” He observed that Mestre Wilson—a professional *passista* with little formal music training—could not modify his gestures to control the programmed mapping; he wanted to move as frevo and have frevo come out. Miguel Mendes named the gap plainly: Wilson “is not playing with what we have—he is trying to play an instrument that is not ready yet.”

What Wilson expected was for the instrument to act as a musician: the body moves as it does when following music, and the instrument should respond with the music he was expecting. This perspective sets aside the notion of instrumentality—in this case, the dancer does not seek a low level control over sonic parameters but a culturally coded high level correspondence between gesture and sound. It is, in effect, a demand that his Giromin should become the frevo orchestra and his body the conductor. —an approach that Giromin does not yet afford, and that would have taken too much time to redesign within the residency’s timespan.

Albino, approaching from the musician’s side (with a less developed body consciousness), occupied the opposite pole. His mapping assigned each of the three Euler angles to three oscillators’ frequencies—making chords in space. He would hold a position of his body to sustain a chord and shift to find another. The body became a precise controller; expressiveness was subordinated to low-level control. The movement served the sound and was sometimes immobilized by it.

Albino himself noted that the mappings he developed felt closer to experimental music contexts than to frevo—and that this was not a failure but a reflection of where he perceived more openness for this kind of sonic exploration. Yet this observation should not be read as a distance from frevo: Albino is himself a vector of frevo’s ongoing transformation. He has written Frevo compositions such as *Salto Quântico* from the album *Música Tronxa*, built on heavy dissonance and irregular time signatures; his more recent album *Frevo Macuca*, a collaboration with the Carnival bloco Boi da Macuca featuring many guest

artists, brings together experimental sensibilities and rigorous adherence to frevo’s traditional structures and formats¹¹. Frevo, in Albino’s practice, is not a fixed object that resists or accepts technology—it is a field in motion, of which he is an active shaping force.

In a similar way, Aishá Lourenço’s mapping strategies allowed subtle microgestures to extend the expressive possibilities of her *eletropercuteria* kit. Integrating the Giromin alongside a *pandeiro* and a Roland SPD30 sample pad, she mapped foot-angle changes to modulate effects in real time while her hands remained free to play the pads. Foot strikes, in turn, triggered samples from the pad independently, extending the vocabulary of digital percussion well beyond what conventional foot controllers typically afford.

7.2 Dual Proficiency as Structural Access

The participant who best bridged the two poles of the DDMI design was Orun Santana. Albino named the reason: “he is a musician and he has command of the body. When you put both together, it works.” Orun sought simple, corporeally natural parameters—a foot strike triggering samples, the quantity of arm movement synthesizing wind sounds from Tiago Brizolara’s Elemental [9]—that preserved both musical instrumentality and bodily expressiveness. His fluency in both domains was not exceptional talent but structural access: Giromin’s instrumental technique is bodily awareness and musical sensibility in combination [41], and the instrument, in its current form, is navigable only by performers who already carry both.

7.3 The Instrument Is Not Neutral

Giromin itself—and the accelerometers, gyroscopes, sensor fusion algorithms, and gestural processing code that constitute it—cannot be understood as neutral technical tools. As McPherson and Lepri [27] argue, musical technologies embed aesthetic, cultural, and political assumptions within their architectures. Choices about smoothing filters, threshold detection, parameter ranges, latency tolerance, and mapping structures implicitly privilege certain kinds of movement, timing, and control while marginalizing others. This asymmetry is not merely a question of better mappings within the same architecture. Even a more flexible Giromin platform would carry prior ideological commitments embedded in how it organises its parameter space: sensors producing numerical streams, parameters arranged as spatially navigable ranges, control flowing unidirectionally from gesture to sound [28]. These are not neutral engineering choices but inherited assumptions—from telecommunications and modular synthesis—that understand music as representationally stable, gesturally controllable, and temporally static. Frevo does not operate within this ontology: in this tradition, sound and body co-produce rather than one controlling the other.

The ideology of a mapping engine is pre-inscribed by how its dimension spaces are constructed, long before any performer touches it [34]. The residency did not produce the wrong mappings. It revealed that the architecture itself was asking performers to begin from a set of categories their traditions did not share.

7.4 Intra-active Design and Specific Instruments

These incompatibilities were not dead ends, but elements of friction to warm up the creative process. Each mapping negotiation

¹¹Available in some streaming platforms

began with a proposed mapping—a suggestion encoded in hardware and software—that performers brought into body and sound. What emerged was not confirmation or refutation of a prior hypothesis but the spark to ignite new possibilities. Some of them were further developed from the resident artists' demand, and some were simply discarded. The encounters between the artists during the process would influence each other's process, like the foot-stomping trigger, which was first used by Orun and incorporated by Aishá and Albino, even though each artist would adapt to their practice.

Sound designers also proposed new timbres; the researcher reprogrammed the patch; the cycle repeated. What this process produced was not a refined universal controller but a set of specific instruments: a foot-triggered sound trigger rooted in coco's rhythmic attack, with a deep echo effect modulated by the leg's tilt angle; a gestural saxophone or berimbau effects processor built from the instrumentalist's few affordances to move his instrument up and down; Aishá Lourenço's as an element of a *eletropercuteria* kit, allowing subtle foot-angle changes to modulate effects of other instruments extending the vocabulary of digital percussion beyond what foot controllers typically offer; and Mestre Wilson's one-man frevo orchestra—still unrealised, but named with precision by a performer who knows what it would have to do. The encounter between Orun Santana's capoeira and a Max patch developed in a technical context does not resolve that distance. It makes it productive.

Lepri [21, 22] further argues that technological systems carry inscribed values and imaginaries that shape not only how devices function, but how they invite particular forms of subjectivity and action. From this perspective, Giromin does not simply extend the body; it proposes a particular model of embodied agency structured by continuous sensing, parameter modulation, and algorithmic interpretation. When situated within the residents' musical and dance experience, this model encounters alternative ontologies of rhythm, collectivity, and corporeality. The resulting tensions and adaptations reveal that DMI, IDS, and DDMI design processes often under-consider the socio-technical entanglement between sensing technologies and culturally embedded movement systems.

The residency, therefore, foregrounds a friction that NIME research has not yet resolved: sensors, mappings, and algorithms are culturally situated—but situated in which culture? Giromin carries the aesthetic and technical assumptions of one tradition; the performers carry the ontological commitments of another. Albino named this directly: “frevo will not adapt to the Giromin. Frevo is there, it exists.” The instrument did not fully absorb frevo. Frevo has not fully absorbed the instrument. What the residency produced was not synthesis but confluence—in Antônio Bispo dos Santos' sense [12]: a river does not stop being a river when it confluences with another; on the contrary, it becomes itself and other rivers. When we confluence, we are together without getting mixed up.

8 Conclusion

The findings reported here are better understood as contradictions surfaced than as problems solved. Two months is a longer testing period than most instruments presented at this conference usually receive—yet it is a short interval within the fourteen years Giromin has been in development, and a negligible moment against the 119 years of frevo's existence. The frictions documented here—between two ontologies of instrumentality,

between parametric control and culturally coded correspondence, between an architecture built for one kind of body and traditions that operate from another—are not failures of the residency. They are its most important output for DDMI design.

The development of musical instruments has never been confined to laboratories, workshops, and factories. It continues in the bodies of performers: in each new technique developed, each new composition, each performance in which a body tries to make an instrument its own, and each tradition the instrument enters over time. Giromin is not finished, it is being shaped—by Albino's chords in space, by Orun's foot instrument, by Aishá's *eletropercuteria*, by Mestre Wilson's demand to transform his body into a frevo orchestra. Each of these is a design act.

9 Ethical Statement

The participants consented to the use of their names and images during the residency. They verbally consented in a recorded statement to the non-commercial academic use of the interview content. All participants were paid to participate in the residency program. All ethical considerations were taken into account during the conduct of this study, and the participants' rights and well-being were protected throughout the research process.

Throughout the residency, the residents' musical and dance practices and the traditions they belong to were respected. Their voices were heard throughout the process, responding to their requests for sounds and gestural parameter mappings. We also respected their time, allowing them to engage with the proposed practice at their own pace, within their availability and the collectively agreed schedule.

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