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Situated practices in digital jewellery research: The collective voices of the new generation of jewellers

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Abstract: Digital jewellery is an emerging field of research and practice that combines jewellery practices with microelectronics and employs methodologies from art, craft, design and Human-Computer-Interaction (HCI). This interdisciplinary approach offers exciting possibilities for designing innovative digital devices on the body. However, the field of digital jewellery remains loosely defined and underdeveloped. It is timely to give voice to jewellers and to lead them to shape the many ways in which digital technology can be meaningful to the wearer. This paper synthesises insights from the past five years of digital jewellery research conducted in two jewellery education programs in the UK and Denmark. In doing so, it amplifies the voices of the new generation of jewellers, analysing their practices and highlighting their potential to shape the future of wearable devices. By emphasising longevity, emotional resonance, embodiment and self-reflection, the new generation of digital jewellers offers a compelling alternative to tech-driven wearables.

Keywords: digital jewellery research; poetic; wearables; care; jewellery; jewellers; digital devices; body

1. Introduction

Prompted by the rise of smart and wearable devices, practice-led jewellery research explores how digital technologies can integrate with conceptual and material narratives. Functional, tactile, and aesthetic elements combine to create meaningful digital jewellery—beyond mere techno-centric design. Terms include ‘digital jewellery’ (Koulidou, 2018; Versteeg & Kint, 2017; Wallace, 2007) ‘smart jewellery’ (Vones, 2015), ‘interactive craft’ (Frankjær & Dalsgaard, 2018), ‘digital craftsmanship’ (Tsaknaki, 2021), ‘interactive jewellery’ (Versteeg et al., 2016) or ‘jewellery-wearables’ (Ahde-Deal et al., 2019). This emerging field lacks a unified narrative. While jewellers enthusiastically adopted CAD and 3D printing technologies, awareness of digital jewellery research grows slowly. Meanwhile, the wearable tech industry sees the contribution of jewellery as decorative enhancement for devices like



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fitness trackers, overlooking jewellers' deep understanding of intimate body-device connections. Their expertise can transform digital applications, for example in health devices, and blur boundaries between jewellery and technology.

This paper consolidates digital jewellery knowledge to build a shared language and envision future directions. At the centre of this research is the idea that digital jewellery is wearable objects with interactive modalities (Arora et al., 2019; Fortmann et al., 2015; Jain, 2015; Silina & Haddadi, 2015; Versteeg & Kint, 2017) that have poetic qualities (Carpenter & Overholt, 2018a; Kettley, 2007; Koulidou et al., 2025; Koulidou & Mitchell, 2021; Ryan, 2018; Wallace, 2007) and foster meaning and connection to self, others, and places.

Over five years, the authors have introduced digital jewellery in jewellery education at Sheffield Hallam University and EK Erhvervsakademi København, encouraging jewellery students to treat electronic components as material. This paper examines selected student designs to explore jewellery's role in the digital era, spanning wearable devices and the Internet of Things (IoT), and addressing applications across adornment, emotional engagement, and healthcare. From artistic one-off artefacts to commercially oriented outcomes, these practices actively redefine the relationship between jewellery, the body, and technology. We demonstrate how materiality in jewellery practice is shifting, how practitioners are challenging the boundaries of digital jewellery, and how their identities as digital jewellers are evolving. Based on this analysis, we propose a set of principles for the conception and design of digital jewellery, providing a framework for craft practitioners, design researchers, and jewellers working with electronics as a material. Situated within existing literature, this work advances ongoing debates on digital-physical design and establishes digital jewellery as a critical site for innovation in on-body technologies.

2. Situated Practices in Digital Jewellery Education

It has been argued that jewellers need to see digital technology as another material (Koulidou et al., 2025; Koulidou & Mitchell, 2021; Redström, 2005) in their toolbox and follow a hands-on approach to materials to develop a deeper understanding of what digital jewellery can be, and the role they can play in our lives. However, when we think of skills development and tools to manipulate the digital, there is additional complexity to overcome as the digital is not manipulated in the same way as clay or metal is. But how this material can be understood and manipulated in the hands of a jeweller requires an understanding of existing jewellery practices and the educational setting where jewellers learn their skills.

In this research, we bring together examples of situated practices from two institutions, one in the UK and one in Denmark. Both authors have established design research education in digital jewellery in their institutions. We use Donna Haraway's (1988) concept of situated practices to frame the jewellery practices as a process deeply rooted in specific personal, cultural, and material contexts, rejecting the idea of universal, detached design solutions. Situated practices also resonate with diverse educational settings and curricula in digital jewellery education, such as studio-based learning, interdisciplinary approaches, community-engaged projects. These varied settings and curricula create learning environments where students explore digital jewellery as a site of cultural, ethical, and creative significance, embodying Haraway's vision of situated, responsible knowledge production.

2.1 Jewellery Education in the UK and Denmark

SHU offers a studio-based jewellery education emphasising hands-on skill development through tactile engagement and experimentation with materials (Fig. 1). Graduates often pursue self-employment, running their own studios, or further education. Over three years (or four with a placement year), students access a vibrant community of designers and artists, utilising creative workshops like casting, wood, ceramics, and metalwork across campus. Teaching occurs in the benchroom for practical activities and the studio for design critiques and lectures, with adaptable spaces for student use.

At EK, the curriculum prioritises design, technology and business over traditional arts and crafts (Fig. 2). Graduates often enter the jewellery industry or become entrepreneurs. The three-and-a-half-year course is project based, a project (between 8-20 weeks) goes from analysing a jewellery company and their target group, through a human-centred design process, using the jewellery workshop, 3D drawing/3D printing and casting to produce the products. The result of the project is a jewellery collection and full branding (logbook, storytelling etc.) presented for the company. The teaching is taking place in shared classrooms with other departments or in the labs (as the workshops are called) with the jewellery workshop and open learning area as its dedicated space, where the students hang out and study.



Figure 1 (left to right) a) Dedicated studio space for jewellery students at Sheffield Hallam University at the Head Post Office building, b) the benchroom, c) specialist workshop facilities for ceramics d) specialist workshop for metalwork. These facilities are situated on the 1st and basement (-1) floors of the building.



Figure 2 (left to right) a) Dedicated studio space for jewellery students at EK, b) the benchroom, c) an open shared space for collaboration outside the studio and d) the wearables lab. These facilities are located on the 4th floor of the building.

2.2 Digital Jewellery Curriculum

At SHU, jewellery students begin exploring microelectronics and digital technology in their second year, Semester 1, after mastering silversmithing basics. Digital jewellery enhances

their craft by introducing new materials and processes. The students critically engage with jewellery practice and material culture through a digital lens, designing a digital jewellery piece over a 10-week project. They document their design and making process in sketchbooks, supported by technical tools and guidance, emphasising sensibilities toward the body and critical artistic approaches.

At EK, digital jewellery is integrated into the third-year curriculum as an 8-week project, after a six-month industry placement. The program emphasises empathy-driven design.

Combining ethnographic research methods as the Wardrobe Interview (Klepp & Bjerck, 2014; Møller, 2018) with Maketools (Sanders & Stappers, 2012). During a Wardrobe Interview the students visit participants in their homes and initiate conversations about personal identity through objects and accessories. The participants share personal stories while showing their favourite items from their wardrobe and home. Maketools is a generative design approach in which students create a series of creative tasks for participants, exploring materials, colours, shapes, and body placement. Through these activities, participants co-create forms and exert strong influence on the design process.

Working in groups of 3–5 with technical design students and experts, students prototype digital jewellery. Projects conclude with an exhibition presenting concepts and functional prototypes to industry partners.

In both institutions, students received technical support from tech experts throughout their projects and an introduction to microelectronics and physical computing through a series of structured activities. At EK, students also collaborated with technical students to ideate and implement their ideas into physical prototypes. Table 1 shows an example of the projects' delivery and outcomes. We report elsewhere how a Digital Jewellery Kit we designed enabled jewellery students at SHU to get started with physical computing in 2021-22. Over the years we have adapted and informed our methods to ease the entry of jewellers into the world of physical computing and inspire them to think of meaningful contexts for their creations whilst keeping. An analysis of the methods falls outside the scope of this paper.

Table 1: Details on project's delivery and outcomes at SHU and EK (table continues on the next page)

Learning Goals	SHU in 2021-22	EK in 2022-23
	1. Expand your technical understanding and competence by autonomously engaging with specialist and technical design challenges. 2. Select and apply appropriate research strategies to identify creative opportunities, interpret and synthesise information to generate innovative design responses. 3. Employ skills of critical awareness, evaluation, self-appraisal and reflection. 4. To conduct research into a contemporary theme or sub-discipline within craft & design, which you identify as relevant to your own creative development.	1. To learn to combine jewellery and technology, and work with technology as a material. 2. To apply ethnographic design and speculative design methods in the design process, the focus is on empathy and user-centered design. 3. To learn interdisciplinary teamwork.

Class	3rd semester (second year, semester 1) 14-16 students, individual work, 10 weeks. Full-time, obligatory	6th semester (third year, semester 2) 32- 35 students, group work (8 groups), 8 weeks. Full-time, obligatory.
Technical support Technical support	Introduction to physical computing series using a Digital Jewellery Kit (Koulidou et al., 2025). Collaboration with two tech specialists.	Introduction to electronics with LittleBits and a Digital Jewellery Kit (Koulidou et al., 2025). Collaboration with tech class at EK and a tech specialist.
Outcome	A physical outcome. Working high-end prototype of the design solution. The submission included a sketchbook with a detailed documentation of the design process.	A physical outcome. Working high-end prototype of the design solution, with display, poster and a folder.

3. Methodology

3.1 Authors' Positionality Statement

At the time of writing, the first author is a Senior Lecturer and Course Leader for the BA Jewellery Materials and Design at Sheffield Hallam University (SHU), and the second author is a Senior Lecturer on the BA Jewellery Design and Technology at EK Erhvervsakademi København (EK). At SHU, the digital jewellery project was conducted during 2021–2022 and 2022–2023, prior to the unforeseen closure of the course in 2024. At EK, the digital jewellery project has been running since 2015; however, it has been led by the second author since 2018. We acknowledge that our position as educators and researchers in the field of digital jewellery carries power dynamics that can influence the research context. Below we outline our methodological approach in ways we selected, analysed and discussed the examples. Our collaboration started in 2023 when we co-led and run the digital jewellery project at EK (at the time of the collaboration the institution was called KEA - Copenhagen School of Design and Technology). From this initial shared experience in teaching digital jewellery, we started ongoing conversations on the differences and similarities of the outcomes of our students' work prior to the project and after, discussing how the backgrounds of the courses, the settings and resources, the methodology and the demands, fosters both contrasts and parallels in the students' works, and therefore influence digital jewellery practices. The ambition of this paper is to contribute to a critical discourse on the emerging qualities of digital jewellery and to collectively articulate the values and innovations that digital jewellers bring to an increasingly digital world. Through this work, we aim to further define digital jewellery research while offering provocations for researcher-practitioners engaged in exploring its significance and potential applications.

3.2 Annotated Portfolios as part of our methodology.

The analysis of digital jewellery pieces was carried out following a research-through-design process (Durrant et al., 2017). In this study, we employ annotated portfolios of research products (Hauser et al., 2018) as a methodology to illustrate our approach, using digital jewellery to uncover intermediate knowledge and explore emerging qualities in the field. Annotated portfolios (Gaver & Bowers, 2012) are collections of designs that, when analysed together, reveal issues, values, and themes that connect and distinguish them, while preserving the uniqueness of each example. Löwgren notes that annotations exist in a space between specific artifacts and overarching theories, containing “intermediate-level knowledge” such as patterns, concepts, or experiential qualities (Löwgren, 2013). In this research, we recognise the complexity of research-through-design (Koskinen et al., 2011; Redström, 2020) and present this work as open-ended, encouraging dialogue about the qualities designers should consider when designing digital jewellery. We began by collectively reflecting on digital jewellery examples from 2023, based on a set of questions we collectively decided to use (Table 2). An example of an annotated portfolio is shown in Fig.3.

Table 2: A set of questions to analyse digital jewellery examples

Functionality: What does it do? How does the functionality link to the form (if at all?)
Innovation: Why this object?
Narratives of the form: Why does it look the way it looks? Is there a personal meaning in the form/material selection?
Digital Interaction: What type of interaction does the piece suggest? Why? Use the poetic dictionary: time-specific, site-specific, intriguing, surprising, provocative, imaginative, unique, sensorial, sensational.
Location: Where on the body and why?

This interpretive process was enriched by the students’ written accounts in sketchbooks (in the UK context) or in presentation materials (in the Danish context). Through iterative cycles of reflexive thematic analysis (Braun & Clarke, 2019; Trainor & Bundon, 2021) we generated, revised and refined emerging topics. The open approach encouraged multifaceted discussions, embracing productive disagreements and diverse interpretations rather than seeking a forced consensus. The themes evolved as we became more acquainted with the data (Braun & Clarke, 2021; Byrne, 2022). If only one example helped us see digital jewellery practice from different angles, then this example was interpreted as meaningful and was included in the analysis of different thematic categories.

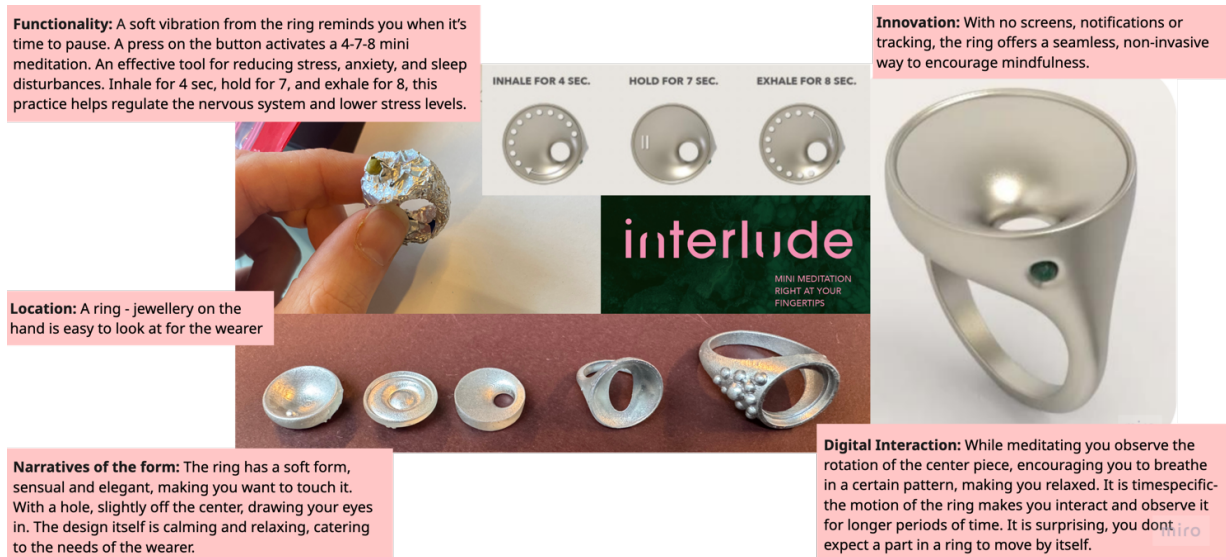


Figure 3 Example of an annotated portfolio of digital jewellery. The annotated portfolios for all the examples we have analysed can be found on Appendix 1 ([10.5281/zenodo.19882236](https://zenodo.org/record/19882236))

3.3 Manifesto-writing as part of our methodology

During our iterative analysis (Fig.4), we embraced the unexpected ways in which our reflections coalesced into new knowledge, opening a new design space for digital jewellery research. We noticed that the language used to annotate our examples echoed the bold, argumentative tone often found in manifestos. As design researchers, we seized this opportunity, integrating manifesto-writing into our annotated portfolio methodology to articulate findings and shape a collective voice for the field.

Inspired by feminist manifestos, we adopted this approach to foster shared perspectives rather than mere disruption (Ahmed, 2017). Drawing on Padan et al. (2020) we view manifestos as dynamic events that cultivate a collective voice, where it exists. Similarly, Lack (2017) describes manifestos as spaces for marginalised voices to express their diversity. Here, digital jewellers seek to distinguish their perspectives from mainstream wearable technologies, articulating both opposition and core values.

To avoid universalising readers' intentions, we adopted Padan's framework (2020)—manifesto as process, not product; consensus via dynamic, disruptive exchanges; shared values open to evolution—enabling us to forge individual and collective voices in digital jewellery research. This approach helped us find our voices and use this paper to shape a collective one for the field. We included brief descriptions of all examples that we initially selected and annotated in the ([10.5281/zenodo.19882236](https://zenodo.org/record/19882236)), rooted in feminist collective dialogue. Feminist manifestos (Brueske & Weiss, 2018), unite diverse voices through shared authorship, reflection, and dialogue to address complex challenges. Some examples crossed categories, enriching analysis and highlighting the fluid, iterative nature of our manifesto-inspired methodology. Some examples spanned multiple categories, further enriching our analysis and underscoring the fluid, iterative nature of our manifesto-inspired methodology.

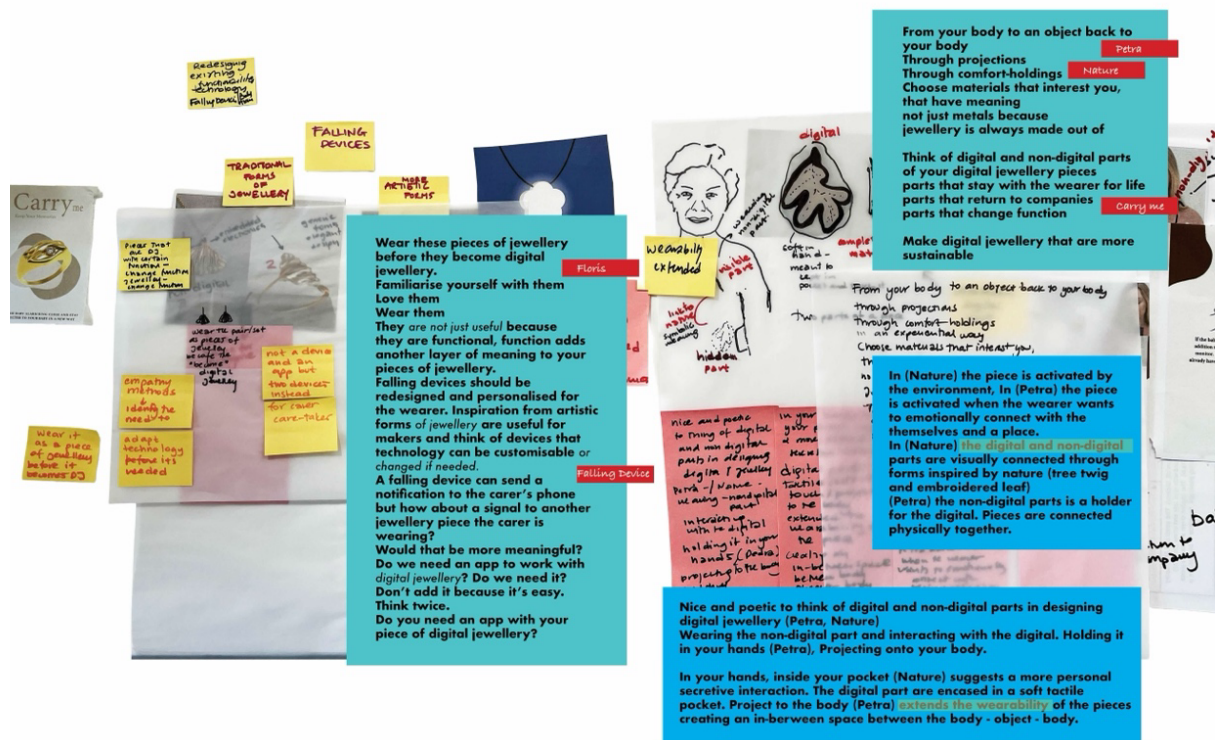


Figure 4 Analysis of digital jewellery using multiple annotation layers and provocations written in a manifesto style.

4. Towards a shared knowledge of digital jewellery practices

The different ways of making digital jewellery supported by the different institutions offer in turn a rich opportunity for negotiation of qualities, values and conflicts within new practices. In this section, we unpack the applications that are related to the practices of jewellers working with electronics in our effort to find similarities between them and then discuss their qualities in our attempt to negotiate conflict and move towards a shared knowledge of digital jewellery practices.

4.1 Thinking of Similarities: Thematic Categories in digital jewellery research

Emotions and Poetics

Pedra, Time Capsule, and Connected Brooches (Fig. 5) illustrate how digital jewellery can deepen the emotional relationship individuals maintain with significant places or others. This might occur through a real-time connection to a place via GPS technology (Pedra Fig. 5a), a live connection to another person through Wi-Fi connectivity (Connected Brooches Fig. 5c), or through stand-alone systems (Time Capsule Fig. 5b).



Figure 5 (left to right) a) Pedra: The wearer interacts with the piece by holding the pebble in their hands, b) Time Capsule: (top) The sea-shell shape object, (bottom) tilting the piece in the palm, c) Connected Brooches: Prototypes of the physical brooches.

- **Pedra** is a two-part brooch, comprising a detachable digital “pebble” with a holder connected to a smaller pebble via a silver chain. Activated by holding the piece and orienting the body toward a pre-saved location, triggering light projections through holes onto their body.
- **Time Capsule** is a hand-held piece of digital jewellery that connects a mother with her three daughters. Each daughter is represented by their star constellation. The light constellations light up independently when the wearer tilts the piece in their hand in three different positions, one for each child.
- **Connected Brooches** is a pair of connected digital brooches for two wearers. When the top layer of one brooch is spun, the other brooch lights up; the light increases in intensity as the spinning intensifies.

Collectively, such examples demonstrate how digital jewellery can materialise intangible emotional exchanges through data-driven or sensor-based interactions. A specific focus on fostering connection to oneself emerges through digital interactions that promote self-reflection and mindfulness (Interlude and Wabi-Sabi Fig. 6).



Figure 6 (left to right) a) *Interlude*. A visual representation of the ring and its functionality, b) *Wabi-sabi*: A set consisting of a digital earring and necklace, showing the wearer engaging with the earring.

- **Interlude** is a digital ring that guides the wearer through a breathing exercise creating pauses for introspection amid daily life. By pressing a small button on the side of the ring, the wearer activates a sequence in which the top part of the ring rotates for 4 seconds in one direction, pauses for 7 seconds, and then rotates in the opposite direction for 8 seconds.
- **Wabi-Sabi** is a set of digital earring and necklace. The earring illuminates when the wearer touches the necklace for a few seconds, encouraging mindful awareness of imperfection and presence.

Wellbeing and Healthcare

Digital jewellery reconceptualises the body beyond a source of biodata, recognising it instead as a site of experiential knowledge capable of sensing, regulating, and supporting natural bodily rhythms and life cycles (for example, menstruation, menopause, or overstimulation). Artefacts such as Amulet for Anxiety, Nature, and Alleviate (Fig. 7) engage with the body through sensory stimulation (Amulet for Anxiety), sensory awareness (Nature), and relaxation (Alleviate). Works such as Carry Me, Floris, and Falling Device (Fig. 8) reconfigure existing assistive technologies—such as baby monitors or fall-detection systems—to foster embodied connections between the wearer and loved ones, enriching the experience of wearing medical or functional devices. Floris and Falling Device reimagine the fall detection devices for the elderly, blending personal significance with functionality.



Figure 7 (left to right) a) *Amulet for Anxiety*: (top) The wearer touches the piece to activate the vibration. (bottom) Detail of the leather section that can be manually tightened. middle b) *Nature*: Detail of the embroidered bag that houses the electronics and the silver twig-shaped brooch. c) *Alleviate*: (top) Worn between the thumb and index finger, (bottom) showing a visual description of the electronic components.

- **Amulet for Anxiety** is a digital bracelet that vibrates when touched. The vibration of the amulet is activated by pressing two touchpads and could be fastened more tightly by pulling the strings manually on the side of the bangle.
- **Nature** is a two-part brooch with a hand-held piece hidden in the wearer's pocket. The digital part is encased into a fabric case and vibrates to offer tactile comfort when environmental noise overwhelms. The brooch is a sand-casted tree twig.
- **Alleviate** is a digital piece located between the thumb and index finger where Acupuncture point LI4 is situated. The acupuncture pressure point is known for its therapeutic effects in relieving headaches and migraines.

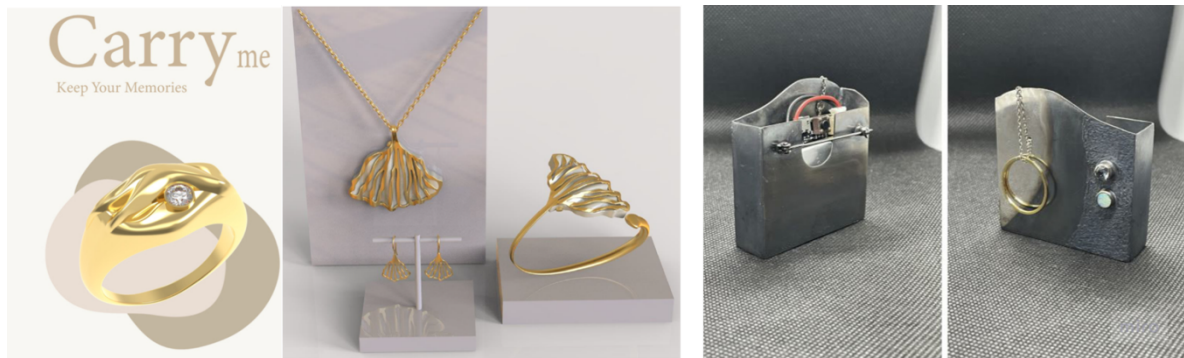


Figure 8 (left to right) a) Carry Me: A visualisation of the digital ring, b) Floris: A suite of jewellery designed for fall detection, c) Falling Device. Personalised jewellery serving as an encasing for electronics that detect falls.

- **Carry Me** is a digital jewellery ring paired with a baby alarm, offering tactile feedback to connect a mother with her baby from a distance. When the alarm is no longer needed to ring changes functionality to light up at special dates.
- **Floris** is a digital jewellery (bracelet or necklace) that sends alerts to a carer's phone. The set combines digital with non-digital earrings, worn before the fall detection alarm was required.
- **Falling Device** is a fall detection alarm encased in a form that incorporates a deceased spouse's wedding ring and wearer's favorite gemstones. The device sends haptic alerts to a carer's paired brooch when it detects a fall.

Security and Protection

Historically, jewellery has functioned as a talismanic object, offering material expressions of protection, identity, and emotional security. Within this lineage, digital jewellery extends notions of *Security and Protection* by embedding technological systems that afford new layers of psychological reassurance and symbolic safety. For instance, Bloomtech (Fig. 9a) enables women to test drinks for spiking, reframing protection as a collective and participatory act of care through the sharing and circulation of the piece.

Provoke and Raise Awareness

Digital jewellery has also been employed as a medium to provoke and raise awareness of social or political concerns. In alignment with traditions of art jewellery—often unconstrained by conventional forms or wearability—pieces such as Withdrawn (Fig 9b) address themes of addiction and Mask (Fig 9c) explores the politics of personal space. While this category arguably extends beyond the established boundaries of digital jewellery practice into the domain of critical design, it nonetheless informs the conceptual and ethical orientation of contemporary jewellers operating within this interdisciplinary field.

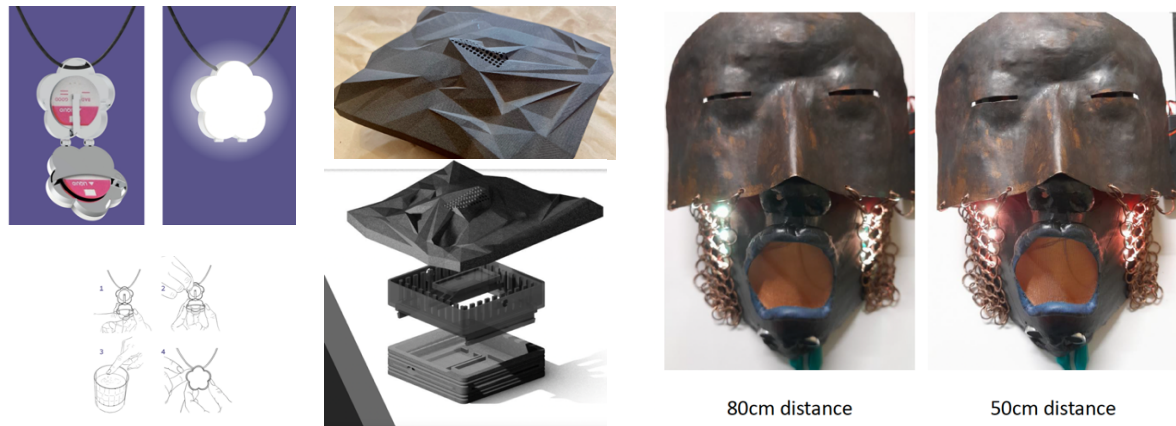


Figure 9 (left to right) a) *Bloomtech*: Visual representation of the piece and its use b) *Withdrawn*: The 3D-printed piece alongside a 3D visualisation of its interior. c) *Mask*: Light projections showing distance cues: green at 80 cm, red at 50 cm.

- **Bloomtech** detects drink spiking. The wearer opens the necklace, takes a SipChip from storage, places it in the container, adds a drop of drink to the pH paper, and closes the pendant. In seconds, it lights up with the result.
- **Withdrawn** visualises addiction's cycle through light. As the audience approaches, it brightens, echoing the pull of relapse. At touch, it flares then fades, exposing the emptiness of giving in. It settles back to a soft glow, drawing you in again—an endless loop of craving.
- **Mask** protects personal space with a digital, off-putting face. As someone nears, it shifts from blue (80cm) to red (20cm), revealing rising discomfort as boundaries are crossed.

Materiality and Playfulness

Finally, jewellers explore materiality through a playful mindset, investigating digital-physical interactions and the aesthetics of electronics. This extends beyond traditional materials such as precious metals and conventional jewellery forms like rings or necklaces. Works such as *Light Exchange* (Fig. 10), which experiments with modes of viewing through moving paper lenses exemplify this trajectory. The focus on Materiality and Playfulness in digital jewellery reflects broader concerns in contemporary craft practice where material experimentation and sensory engagement drive inquiry.

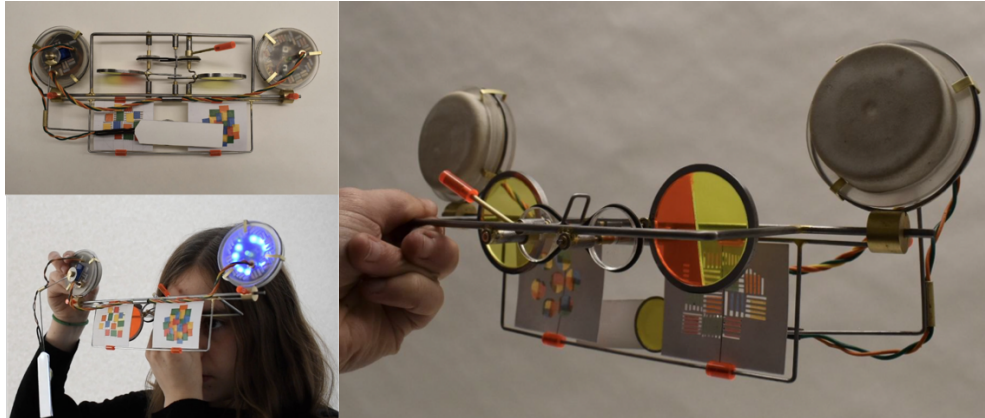


Figure 10 (left to right) *Light Exchange*. a) *Playful explorations of the piece and its functionalities.* b) *Close-up view highlighting the details of the piece.*

- **Light Exchange** is an interactive wearable object. When the wearer holds it to their eyes and tilt it down, away from light, a servo activates and moves a light panel in front of the lenses, turning it on. When they tilt it up, the panel turns off and retracts to its resting position.

4.2 Thinking of Conflicts: Negotiating qualities of digital jewellery practices

Studio craft practice values vs jewellery and wearable industry values

Within digital jewellery practice, we observed that jewellers educated within UK craft-based programmes brought a strong material sensitivity to digital materials. They combined specialist knowledge of familiar materials and processes—such as metalwork, textiles and ceramics—as demonstrated in *Light Exchange* (Fig. 10), *Falling Device* (Fig. 8c), and *Nature* (Fig. 7b). In doing so, students produced digital jewellery that departs from traditional jewellery forms, instead manifesting as artistic, one-off artefacts. These designs are grounded in studio-based craft education, with exploratory material practices at their core.

In contrast, jewellers educated within design and business programmes in Denmark appeared to engage less deeply with material experimentation. Students at EK, instead, embraced jewellery industry values, producing digital jewellery that adheres to more conventional forms and materials and can be readily scaled for mass production. These outcomes respond to the needs of broader user groups, in contrast to the one-off, artistic pieces developed by students at SHU.

Digital jewellery, therefore, spans from artistic, one-off artefacts rooted in studio-based craft practices, to mass-produced objects guided by design thinking. Craft-focused jewellers often draw on personal experience and experimental processes but may struggle to recognise the value of empathetic and user-centred methods. Conversely, design-led approaches prioritise collaborative prototyping and user needs, enabling scalability, but may overlook hands-on material exploration and experimentation.

We argue that these differences stem from resource availability and curricular focus, rather than inherent limitations of jewellery as a discipline. Craft practices have the potential to enrich both one-off and mass-produced digital jewellery, supporting innovative integrations of physical and digital materials. At the same time, highly open-ended approaches may result in objects that diverge from wearability or the body, positioning them outside conventional jewellery practice and potentially limiting their relevance to the wearables industry. Finally, the emphasis on understanding user needs to design meaningful technologies represents a significant strength that could be more fully integrated into craft-based pedagogies.

Stand Alone pieces vs Devices with an App or using phone's existing functionality

Contemporary jewellers increasingly integrate apps or leverage existing phone technologies, like GPS, to enhance their designs. App-based or smart-phone-related projects acknowledge the existence and importance of existing devices for the potential end users, which is a meaningful and sustainable integration with existing ecosystems. In Carry Me (Fig. 8a) when the baby alarm is no longer needed, it is returned to the company, and the ring's function shifts to changing colours on specific dates based on user input via an app, which also facilitates monitor returns, memory storage, and reordering. Falling Devices reimagines fall detection devices for the elderly blending personal significance (e.g., incorporating a deceased spouse's wedding ring) with functionality, such as sending an alert to a carer's paired brooch. In contrast, Pedra (Fig. 5a) uses a phone's GPS to link a piece to a fixed location the wearer calls "home," deliberately omitting an app to prevent location changes, highlighting the designer's role in limiting functionality. Other pieces, like Time Capsule (Fig. 5b), Light Exchange (Fig. 10), Withdrawn (Fig. 9b) and Wabi-Sabi (Fig. 6b), do not use apps for simple functions and maintain their standalone essence. For Alleviate (Fig. 7c) and Interlude (Fig. 6a), the wearers specifically requested not to have an app with the piece. They wanted direct interaction with the jewellery, experiencing it on its own, without the disturbance of connecting or registering personal information through the phone. This reflects a tension between leveraging technology in designing digital jewellery and preserving the jewellery's intrinsic value.

4.3 Designing for poetic interactions with technology: A design manifesto

This research lays a strong foundation for digital jewellery as a distinct field with unique contributions to HCI, craft and jewellery design. Jewellers when designing technology on the body put emphasis on craft values, care, reflective interactions, and embodiment, qualities that offer a refreshing counterpoint to the efficiency-driven technological landscape. Below we discuss the collective voices of jewellers in the forms of a design manifesto (Fig.11).

DESIGN MANIFESTO FOR DIGITAL JEWELLERY

designing poetic experiences with digital technology on and around the body

- 1 Craft objects and methods:
Material experimentation
and developing empathy.
- 2 Care for the longevity of digital
objects: Towards more sustainable
and adaptable designs.
- 3 Encourage reflective interactions
with technology and active
engagement.
- 4 Explore new locations on the body
and notions of wearability.
- 5 Balance wearer's control on the
digital interaction to maintain the
jewellery's intrinsic value.

Figure 11. A design manifesto for digital jewellery. The collective voice of jewellers in designing with digital technology for and around the body.

Craft objects and methods: Material experimentation and developing empathy

Studio practice values in jewellery at SHU education conceals the mutual connection to craft as a process of learning and understanding through material practice (Nimkulrat, 2012, 2021; Sennett, 2009). According to Nimkulrat (2021) through material engagement, a practitioner (in her case a textile practitioner) learns through the senses to manipulate at hand. Concept and material knowledge go hand in hand. When material knowledge is grounded in craft practice the making starts with a deep understanding of the material and its properties (Press, 2007), as we saw when jewellery students combined materials in an experimental way that leads to a novel combination of material properties and materiality of digital objects (Fig 10). In designing digital jewellery for people, jewellery students at EK draw on ethnographic research methods to build empathy. Methods such as the Wardrobe Interview (Klepp & Bjerck, 2014) and Maketools (Sanders & Stappers, 2012) have been adapted to help jewellers better understand the needs, desires, and dreams of the people they design for. We believe that jewellery students, when using ethnographic methods, have a profound opportunity to develop genuine empathy for wearers which can also be described from a feminist lens as care (Toombs et al., 2017) —offering comfort, security, and relief. Within digital jewellery research, these methods enable participants to express themselves through materials and objects. For jewellers trained in design thinking, this reveals a novel craft-based approach to creating meaningful connections with the wearer. This fusion enables students to craft emotionally resonant digital jewellery that combines experimental materiality with care, creating meaningful, wearer-centred connections.

Care for the longevity of digital objects: Towards more sustainable and adaptable designs

Digital jewellers provide new and valuable insights into sustainable interaction design, ensuring their creations remain relevant over time. From our analysis, we saw that digital jewellery, while leveraging advancements in electronics and digital technology, values

meaningful connections and longevity over cutting-edge technological trends. The design of the digital jewellery presented highlighted jewellers' focus on adaptability and sustainability, prioritising the longevity of their creations. Thinking of functionality, the Carry Me (Fig. 8a) ring transitions from baby alarm to a standalone object, making it a cherished item with potential generational value. Similarly, Floris (Fig. 8b), offering a set of both digital and non-digital jewellery, is designed to evolve with the wearer's needs across life stages. Whereas Nature embraces the concept of digital and non-digital parts and offers the option for the wearer to wear the parts independently if they desire. The examples show jewellers crafting enduring, adaptable objects; with shifting functionality or transitioning between digital and non-digital states—that challenge disposable consumption and align with Tsaknaki's (2023) view of craft as care for computational things. Digital jewellery practices therefore go beyond combining materials (physical and digital), to the emphasis of designs that foster lasting emotional and cultural significance, similar to values in a traditional jewellery practice.

Encourage reflective interactions with technology and active engagement

Findings from this research strengthen the argument that active engagement with digital jewellery pieces is more meaningful for the wearer (Koulidou & Mitchell, 2021). Traditional interactions with wearable devices typically involve scrolling, tapping, or pressing buttons. These interaction modalities have been critiqued within digital jewellery research for their limited engagement. Scholars in this field have proposed alternative, jewellery-inspired interactions, such as fidgeting, rubbing (Arora, 2019), pinning a brooch, or holding a piece (Koulidou & Mitchell, 2021). The body gives meaning to the digital through active engagement (i.e., rubbing, blowing, holding, wearing) or through its physicality (i.e., the warmth of the hands, breathing) (Koulidou et al., 2025). Building on this foundation, our analysis introduces additional physical interactions—beyond digital screen-based inputs—including spinning as input for the digital interaction (Connected Brooches Fig. 5c) and as output (Interlude Fig. 6a), pulling (Amulet for Anxiety Fig. 7c), and detaching and holding a component (Pedra Fig. 5a). These interactions foster a deeper, more intimate connection between the wearer and the device. The Interlude ring exemplifies this approach, offering a subtle movement as a tactile reminder to pause and breathe, without relying on screens, notifications, or data tracking. Similarly, Amulet for Anxiety (Fig. 7c) could be fastened more tightly by pulling the strings manually on the side of the bangle, enhancing the tactile experience of the vibration.

Designs themed around Emotions and Poetics or Health and Wellbeing prioritise meaningful connections over quantified metrics, aligning with slow technology principles in interaction design (Hallnäs & Redström, 2001; Odom et al., 2022). Unlike task-oriented wearables, digital jewellery encourages contemplative engagement, fostering self-awareness and emotional resonance.

Explore new locations on the body and notions of wearability

Digital jewellery forms expand beyond traditional rings, necklaces, earrings and bracelets, introducing innovative design spaces and interaction modes. For example, Alleviate (Fig. 7c) introduced a new body location between the thumb and index finger as a design space for digital jewellery, where Acupuncture point LI4 is situated. A surprising placement for a piece

of jewellery, based on ancient acupressure theories. While Pedra (Fig. 5a) offers an understanding of light projections on the body as a new form of wearability, it creates a dynamic interplay between body, object, and projection, deepening connections to place and self. Digital jewellery innovates in suggesting a new way of understanding wearables that of combining digital and non-digital parts as a compositional composite (Vallgård, 2009). Digital jewellery expands wearability through innovative body placements (Alleviate Fig. 7c), light projections (e.g., Pedra Fig. 5a), and hybrid digital-non-digital components (e.g., Nature Fig. 7b, Floris Fig. 8b). These approaches redefine traditional jewellery, enhancing emotional and sensory engagement in wearables research.

Balance wearer's control on the interaction to maintain the jewellery's intrinsic value

Previous research suggests that digital jewellery should function as standalone devices to avoid being categorised as mere "gadgets" reliant on apps (Carpenter & Overholt, 2018b; Koulidou & Mitchell, 2021). However, within digital jewellery practices we see both standalone pieces to those enhanced by apps or phone features. These designs merge personal significance with functionality like tactile feedback, fall alerts, or location connections, while designers balance the wearer's control over the functionality and intentional limitations. Some pieces remain fully standalone with simple, direct interactions. Others integrate apps or GPS to enhance functionality, reflecting ongoing tension between technological utility and emotional value. Standalone designs prioritise simplicity and direct interaction, preserving the jewellery's emotional essence. In contrast, app-integrated designs enhance functionality but risk being perceived as app-dependent gadgets. Jewellers strive to balance the wearer's control with intentional limitations to maintain the jewellery's intrinsic value.

5. Conclusions

This research asserts digital jewellery as a critical and necessary site for innovation in on-body technologies. This paper brings together two distinct educational settings to analyse how jewellers engage with the potential of digital interaction within their practices through the design of digital jewellery. We argue that the curricula of these differing educational systems significantly influence the outcomes of digital jewellery practices, with resource limitations constraining opportunities for hands-on material experimentation and the integration of empathetic approaches. The differing mindsets of design and business students from EK (Erhvervsakademi København), in contrast to craft students from SHU (Sheffield Hallam University) shape how the new generation of jewellers understands their practice and, consequently, how digital interaction is incorporated within it. Through the analysis of examples using an annotated portfolio methodology, and by adopting a manifesto style of writing, we synthesise key qualities of digital jewellery and consolidate emerging knowledge in the field. In doing so, we position digital jewellery as a distinct discipline spanning art, craft, design, and technology.

This research establishes a definitive set of principles for the design of digital jewellery. Our analysis foregrounds the situated practices of a new generation of jewellers, identifying shared approaches while also navigating persistent tensions—some previously recognised and others newly identified—that inform future research. These include tensions between

studio craft values and those of the jewellery and wearables industries, as well as between stand-alone devices and those dependent on companion applications or existing smartphone functionality. This work concludes with a design manifesto written by jewellers, intended to inform future approaches to poetic technological applications on and about the body. By prioritising craft, intimate engagement, and emotional resonance, the new generation of digital jewellers advances more sustainable and meaningful approaches to interaction design beyond mainstream wearables. In doing so, it makes substantive contributions to design research, interaction design and jewellery design. The proposed framework may support design practitioners and researchers working with electronics as a material in designing for and around the body.

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