

Supporting Live Craft Process in Digital Musical Instrument Design

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Abstract

Despite digital lutherie's goal of enabling liveness in performance, digital lutherie as a process often lacks liveness. The tools of digital lutherie, adapted from domains where liveness was neither feasible or important, can make craft process feel dull, blind and isolated. Understanding and supporting live craft process in digital lutherie is important for advancing and disseminating the art, and for improving digital luthiers' control over the liveness of their instruments. This requires a shift in focus from declarative and explicit knowledge of instruments, to the study of liveness, craft process and tacit knowledge in digital lutherie. This research aims to provide a foundation for this shift through integration of traditional and digital lutherie, and detailed comparison of digital luthier behaviour in different live crafting environments.

Keywords

Digital lutherie
Musical instruments
Interface design
Craft process

1. Purpose of the research and its importance to the field

To support the creation of digital musical instruments, academic communities have over the last six decades repurposed knowledge and methods from science, technology, engineering, mathematics and design. Declarative knowledge such as criteria and principles have been proposed to facilitate recognition of “what to look for” in digital instruments, and how to evaluate them. The procedural or imperative knowledge of how to actually make a great instrument is left to the designer to discover through the acquisition of tacit knowledge. Much like traditional lutherie, digital lutherie (Jordà 2005) remains an art form with craft process at its heart. Unlike traditional luthiers who have a richly embodied relationship with their craft, digital luthiers are often restricted to disembodied processes by digital media.

The purpose of this research is to situate traditional and digital lutherie together as craft processes with important similarities and differences, design and evaluate tools and methods to support live craft process in digital lutherie, and investigate ways digital luthiers can interpret and disseminate their craft process. This research is important to the field because digital lutherie can improve itself greatly through the study of and integration with traditional forms of lutherie, digital instrument making is an art form in want of specialised artistic tools and language for liveness, and there is no well understood procedure or infrastructure for disseminating digital lutherie craft process.

2. Background, related work and proposed approach

Examining digital lutherie as an art form is based on the foundation laid by Jordà (2005) and the insights of Buxton (1997) and Cook (2001). This is supported by philosophical investigations by Magnusson (2009), which are in turn supported by frameworks for tacit knowledge (Collins 2010) and embodiment (Clark 2015). Craft’s

historical context is provided by Dormer (1997), its principles by Kettley (2012) and its contemporary methods by Beuchley & Perner-Wilson (2012). From these works, fundamental tensions in digital lutherie are extracted; top-down vs. bottom-up, declarative vs. imperative, explicit vs. tacit, symbolic vs. embodied, and logical vs. analogical. These tensions are examined in the context of digital lutherie crafting activities which are interpreted using design move analysis and linkography (Goldschmidt 2014).

3. Expected contributions

This work is expected to contribute foundations for a perspective on lutherie which integrates digital and traditional genres, insights into what kinds of interventions support live craft process in digital lutherie, and informed recommendations for the representation and dissemination of digital lutherie craft process in academic and popular culture.

4. Progress towards goals

Three studies have been completed thus far, with a study comparing two of those three currently in progress, and two subsequent studies anticipated (six in total). In Study 0 (published), interviews with violin luthiers about their craft process were thematically analysed and implications for digital lutherie frameworks, tools, methods and community infrastructure were discussed. In Study 1 (submitted, under review), digital luthiers were observed and analysed when given an ‘unfinished instrument’ to work with for one hour in groups using crafting materials. In Study 2 (completed, unpublished), digital luthiers were given the task from Study 1, using software instead of crafting materials. In Study 3 (in progress), Study 1 and Study 2 are being compared to derive design goals for digital lutherie crafting tools. In Study 4 (early planning stage), novel digital lutherie crafting tools focusing on facilitating liveness and bottom-up process will be designed and evaluated. Study 5 (anticipated) will iterate on Study 4.

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- Buechley, Leah, and Hannah Perner-Wilson.** 2012. "Crafting Technology: Reimagining the Processes, Materials, and Cultures of Electronics." *ACM Transactions on Computer-Human Interaction (TOCHI)* 19 (3): 21.
- Buxton, Bill.** 1997. "Artists and the Art of the Luthier." *ACM SIGGRAPH Computer Graphics* 31 (1): 10–11.
- Clark, Andy.** 2015. *Surfing Uncertainty: Prediction, Action, and the Embodied Mind.* Oxford University Press.
- Collins, Harry.** 2010. *Tacit and Explicit Knowledge.* University of Chicago Press.
- Cook, Perry.** 2001. "Principles for Designing Computer Music Controllers." In *Proc. NIME.*
- Dormer, Peter.** 1997. *The Culture of Craft.* Manchester University Press.
- Goldschmidt, Gabriela.** 2014. *Linkography: Unfolding the Design Process.* MIT Press.
- Jordà, Sergi.** 2005. "Digital Lutherie: Crafting Musical Computers for New Musics' Performance and Improvisation." *Universitat Pompeu Fabra.*
- Kettley, Sarah.** 2012. "The Foundations of Craft: A Suggested Protocol for Introducing Craft to Other Disciplines." *Craft Research* 3 (1): 33–51.
- Magnusson, Thor.** 2009. "Of Epistemic Tools: Musical Instruments as Cognitive Extensions." *Organised Sound* 14 (02): 168–176.