

Pining for the Materiality of Code

Rikard Lindell

Mälardalen University.
Box 883
S72123 Västerås Sweden
rikard.lindell@mdh.se

Abstract

The new ubiquitous assistive devices have increased design space for innovative highly interactive design. Designers can no longer rely on a design process based on the known interaction idioms. This impedes the design process because the non-interactive material - sketches, scenarios, storyboards - does not provide designers the essential talk-backs needed to be able to make reliable assessments of the design characteristics. However, the interactive prototypes provide these talk-backs. How can we think of code as a design material? And how can the designer's repertoire expanded to include materials familiarity even to code?

Author Keywords

design, interaction design, experience design, experiential qualities, highly interactive prototypes, explorative programming, material, materiality, craft, design method

ACM Classification Keywords

H.5.2 User Interfaces: Theory and methods, and Prototyping

General Terms

Human Factors

Introduction

The new landscape of ubiquitous device with multitouch screens, accelerometers, gyros, compass, microphone, and camera make it more difficult for interaction designers to rely on a design repertoire based on the known interaction idioms. It requires quality-driven interaction designers and programmers with the ability to simultaneously establish and solve problems to create innovative, useful, and thought-provoking digital artifacts with rich experience qualities.

Interaction design describes itself as a design practice that form appearance and function of digital artefacts [1]. Interaction design contributions are often based on *research through design* [2]. The appearance and functionality are portrayed by sketches, storyboards, videomatics, and interactive prototypes to communicate requirements to the software and product developers [3, 4, 5]. The result of such design work is rich in clues to the finished product's appearance, behavior, and function. However, the material in the design process is radically different from the code need to be written to implement the design as a working artifact [5, 6].

Design as conversation with the material

Schön describes how design is a "conversation with the materials of a situation" [7]. He describes how the experienced designers have a habitual ability to handle situations that are known to them. Designers create controlled situations by constructing virtual worlds for thought experiments and reflection-in-action in which time can be slowed down so that there is more space for reflection. Habitual skills are necessary for reflection-in-action.

"But the virtual world of the drawing can function reliably as a context for experiment only insofar as the results of experiment can be transferred to the built world. The validity of the transfer depends on the with which the drawn world represents the built one. ... He learns, for example, how drawings fail to capture qualities of materials, surfaces, and technologies." (page 159) [7].

Schön describes the architect's material consciousness with both plans, drawings, and the finished building and his/hers ability to move between these materials. This ability can be transferred to the interaction design. In many design situations, designers can experiment with known interaction idioms. Users, design colleagues, and programmers can fill in the gaps based their experience and imagine the interaction experience of the finished artifact. However, this approach does not work for innovative forms of interaction and user experience [8].

Interactive prototypes are needed to provide talk-backs from design's features. The molding of code is thus, a part of the design process for innovative highly interactive digital artifacts. Writing code to explore the design is similar to the ability of craftsmen who simultaneously are setting and solving the problem [9]. According to Sennett problem, setting and problem solving has a rhythm. This rhythm relates subconscious and conscious reflection-in-action.

"Every good Craftsman conduct a Dialogue between concrete practices and thinking, this Dialogue evolves Into sustaining habits, and habits These Establish a rhythm between problem solving and problem finding." (page 9) [9]

Craftsmanship is thus characterized by the ability to see and solve problems through dialogue between hand and mind. Other characteristics are material consciousness and quality-driven approach on the edge of the manic [9].

Empirical study

In an empirical study on programming with 33 participants, including some interaction designers, we identified categories to describe approaches to programming.

Material

Material was the core category in the collected data. The material sets the conditions for the context and use of programming languages. It is also material that provides talk-backs for the creation of models, sketching, or exploration of a design. Utterances on flexibility and simplicity occurred repeatedly in the data. The material; the language and data have an inner pliability that enables designs to be molded and reshaped.

Explorative Programming

Another category that was identified was *exploration*. With explorative programming designers strive to portray aesthetic expression, function or interaction. They try their way into conversation with the material to find a design. Here, programming languages are tools to incrementally explore and understand a problem. "What I cherish the most is that [Processing] is incrementally so that I can test my way. Sometimes it feels like sketching in the truest/best sense, when I can try my way to a new idea into an interactive behavior. Sometimes."

Here is another quote that shows the exploration and problem-setting approach: "Both in the case of Flash and Processing you get to see directly and graphically the results of your coding, a kind of feedback that really enhances your comprehension of programming concepts, such as: "Oh, that's what happens if I loop it!", and "Hold it right there till someone presses a button!" This quote indicates that interaction designers explorative programming is about exploring a design, to do both problem setting and problem solving. They obtain a material consciousness of digital artifacts. Explorative programming can be seen as part of a design repertoire and as a craft.

Discussion

The future challenges in the interaction design field are how we can meet the need for innovative highly interactive design for the drastically increased design space so that designers and programmers can reason about artifacts' materiality and the material they are built of. How can we develop tools and programming languages that provide richer feedback and facilitating the transition between designing and crafting interactions? How can the designer's repertoire be expanded to include material consciousness with the code for explorative programming?

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