Integrating Technology in Creative Practice using 'Materialise'

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Abstract
In this position paper we discuss 'Materialise' – a building set consisting of physical building blocks and digital media input that allows for the building of hybrid creations – as an example of a design that integrates technology in creative practice. We show it does so by facilitating interactive craft practice, aestheticizing technology, and allowing for the customization of technology. Through an easy-to-use integration of technology and creative practice the set can benefit digital artists, as well as allow 'everyday people' to become digital artists. As such, we argue, it opens up a promising future direction for design, in which focus lies on the integration of technology and creative practice, or design for interactive or hybrid craft.

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Hybrid crafting, interaction design, design research, physical materials, media, digital technology, digital art

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Introduction
Creative practice, making and crafting have been interwoven in people's lives for a long time, and in our current mass-production society there appears to be a

turn back towards making [1, 2] which becomes evident in the existence and popularity of maker faires and online communities with how-to resources and blogs of makers' experiences, such as 'Instructables' (instructables.com) and 'Make Magazine' (makeprojects.com). We are interested in crafting as a careful form of making and creative expression in our everyday lives; a process of exploration, and aiming to do something well for its own sake [2, 4]. Within our current society, filled with technology and digital media, it has become relevant to consider the role of technology and digital media in these creative practices. Questions arise regarding the relations between digital means and technology, and physical practice and results, such as how people go about making things in the digital space, and how this may be integrated with making in the physical space. We address the design of 'Materialise', a building set that aims to address such questions by allowing for the creation of physical-digital integrations, or hybrid [3] creations. The set enables everyday people to creatively engage with digital media and technology and thus, in a way, become digital artists. We will draw on experiences from working with the building set to discuss the relationship between the technology and creative practice. We will show how this kit integrates technology into creative practice by: 1 - facilitating an interactive crafting experience, 2 – aestheticizing technology, and 3 – allowing for the customization of technology for creative practice.

About Materialise

Materialise (Figure 1) is a combination of physical and digital building blocks that allow people to build hybrid creations which incorporate digital media and physical compositions. The physical building blocks consist of 'active building blocks' – which either display an image or a series of images, or play an audio file or a series of audio files – and 'passive building blocks' – which provide a great diversity of building possibilities in different materials and shapes to use in combination with the active blocks for the creation of physical compositions.

Figure 1: Prototype of Materialise, with the 'active building blocks' in the center and the 'passive building blocks' left and right.

In addition to these physical building blocks there is a software component which allows users to explore their composition on screen and upload media to the active blocks using digital representations of the building blocks. Using a combination of different media files and a diversity of physical components, Materialise allows

Figure 2: Example of a thematic media display created in a workshop: Jamaica theme: the Jamaican flag, the sun, one of the Three Little Birds (from the Bob Marley song with the same title), and Bob Marley being washed away by the waves (with accompanying sound of waves).

for the creation of artworks that link digital media to physical materials in meaningful ways, for example by creating a physical composition that enhances a photographic representation beyond the screen, or by creating thematic photo displays or audio systems (Figure 2). A prototype of the set was realized using .NET Gadgeteer technology (netmf.com/gadgeteer), and four creative workshops were held with this prototype. Workshops were held with small groups of 3-4 interaction designers, crafters, parents and teenagers. We will use our experience and examples from these workshops to illustrate how Materialise integrates technology and creative craft practice.

Facilitating Interactive Craft Practice

The physical building blocks could be connected using magnets, making flexible connections that could be changed, and remade as often as desired. Furthermore, magnetic blocks were provided to connect with Lego, an inherently playful, interactive platform. As such, the design of the set encouraged experimentation and iterative building with the technology. In the workshops we observed participants developing their creations on and on until they were forced to stop, rebuilding physical elements as well as uploading new media to enhance or change their creations. Further implemented functionality made the crafting experience more interactive: the active building blocks could communicate with one another, meaning that in a series of pictures on one block, if the user changed the picture, the other blocks would check their media collections for related media and (dis)play this media at the same time. For example, navigating to a picture of one's favorite musician on one block may trigger the audio block to play this musician's music. In the workshops, participants started wondering how they could create physical compositions that would change with the changing media. As such, the set facilitated an interactive and iterative engagement with the technology in a craft practice, rather than the creation of a finalized artwork where technology merely 'serves its purpose'.

Aestheticizing Technology

The incorporation of the technical functionality into compact physical building blocks allowed for the inclusion of these building blocks in a visible, complementary way in the artwork. The physical building blocks and the media on them, the technology, were seen as the core around which to build something, rather than something that had to be hidden. As a way of integrating digital technology, or technological components, into physical artwork, the set thus enabled technology to become an aesthetic element in the creation of the artwork, in its result, and in its environment. An example is the use of the active blocks to represent school buildings in the participating teenagers' college-themed creation (Figure 3).

Customizing the Technology

Because of its flexibility in how building blocks may be connected and the provision of blocks that provide links to other platforms (Lego) or other building materials – there were blocks with holes, a pin board, a frame, transparent sleeves, clips, magnetic boards, and a black board – it was encouraged to explore the possibilities and boundaries of the set. Participants had a great degree of freedom in combining materials and adding additional materials, as was illustrated by one designer bringing in his Lego model of a Volkswagen van to complement the creation around a hippie/Jamaica theme, and one crafter using the metal

Figure 3: The teenagers' model of their college with "the piazza", the "yellow umbrellas", and the "trees where the freaks hang out", using active blocks as school buildings (using pictures of their college friends and the Britney Spears song 'I'm not a girl, not yet a woman').

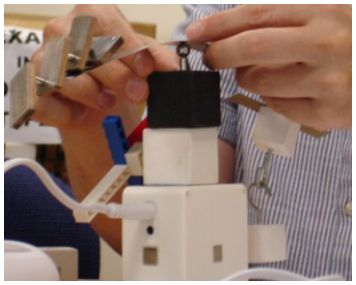

Figure 4: Exploring and experimenting with the materials: using metal connectors to create a moveable balance system.

connectors and the back of a clip to create an intrinsic, moveable balance system that was later used in an abstract representation of the Berlin wall (Figure 4). The building set is thus a good example of a technology that can be expanded and customized to fit the needs of an artist or craftsman as these needs arise during the crafting process.

Conclusion

We have addressed Materialise as an example of a design that integrates technology in creative practice by making it a core element of the crafting experience with the set. By making technology available and easy to use for the everyday user, we aim to encourage interactive hybrid making and customization of crafting materials. Within our current society people engage in physical and digital making practices and at the same time become more and more tech-savvy. Using toolkits like the one we have designed, the integration of technology and creative practice becomes more accessible and is no longer merely the domain of specialized experts. As such, considering the design of new ways to integrate technology and creative practice can not only be beneficial to digital artists, who may find new ways to engage with their art, but can also allow 'everyday people' to become artists and craftspeople and engage in creative practice with their own personal media. We therefore believe the integration of technology and creative practice, or designing for interactive or hybrid craft, is a promising future direction for design.

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