FUTURE MASTER CRAFTSMANSHIP: WHERE WE WANT ELECTRONIC TEXTILE CRAFTS TO GO

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Craft, both as process and resulting artifact, implies notions of care, foresight, human skill and investment. In this paper we examine the practice of creating E-Textiles as a contemporary craft, and we ask ourselves what will become of this craft when the first fully automated machine for E-Textiles production hits the market. Will the craft in E-Textiles survive, and why do we care that it does?
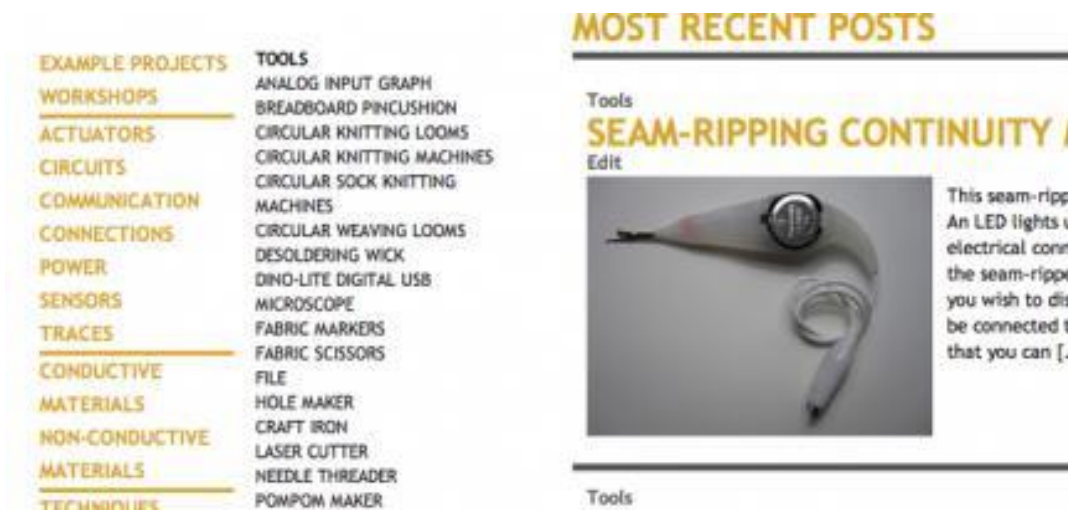

Figure 1: screenshot from 'How To Get What You Want' (www.howtogetwhatyouwant.at) online database.

Figure 2: workshop participants discussing over their textile circuit design. (photo: Mika Satomi).

Figure 3: Summer Camp participants collaborating on their embroidery circuit project. (photo: Hannah Perner-Wilson).

INTRODUCTION

Researchers, engineers, educators, artists and designers combine electronics and textiles for different reasons, to produce seamlessly integrated artifacts known as E-Textiles. While E-Textiles are produced for different reasons, the individuals involved in the process of making them, all benefit from exercising E-Textiles as a craft.

Researchers and engineers are looking to make electronics smaller, more flexible, stretchable and washable. Finding reliable and durable ways of creating electronic textiles is one of the most immediate research goals in their field. [1] Educators are introducing E-Textiles into the classroom as a means of situating electronics and computation in new, attractive and more accessible contexts. [2] Designers are conceiving garments, accessories and furniture upholstery that incorporate sensors, actuators and computational power into soft, comfortable, wearable experiences in order to demonstrate the possibilities of future textile technologies. [3] Artists are producing work that combines electronics and textiles as an expressive medium, often using E-Textiles as a vehicle for other content. [4] [5] [6]

While their motivations and goals my be different, craftsmanship is exercised throughout all of these disciplines. The researcher, the engineer, the educator, the artist and the designer are all capable of creating work in their field with attention to the craft quality of their work. As we continue to talk about E-Textile craftsmanship, we are not referring to a specific discipline or application, instead we refer to the skilled craft of individuals experienced in the use of the materials and tools involved.

THE CRAFT IN E-TEXTILES

We consider E-Textiles to be a contemporary craft, not only because it combines novel materials, tools and techniques with those traditionally associated with crafts. The process of creating functional, reli-

able and aesthetically pleasing E-Textile results, also relies heavily on the manual skill and technical expertise of the maker. It is a risky process, full of opportunity for innovative solutions and new inventions. It fits David Pye's description of workmanship of risk [7] - one of the defining notions of what constitutes craftsmanship.

"(I shall say as a first approximation that) it (craftsmanship) means simply workmanship using any kind of technique or apparatus, in which the quality of the result is not predetermined, but depends on the judgement, dexterity and care which the maker exercises as he works." [7]

In David Pye's terms, we can think of craftsmanship as a process of making, in which the quality of the result is continually at risk. When we use the term craft, it does not exclude the use of hand operated machines. Craft does not mean made by hand, without tools or technology. It means made with care, with foresight, with skill and involvement. Drawing with Computer Aided Design (CAD) systems or programing computers can be also considered craft, as long as they involves human skill and judgement in their process. The balance between the difficulty of the required task and the skill one possesses determines the size of a risk. The bigger the risk you take, the bigger the accomplishment and the greater the feeling of reward.

"Craftsmanship names enduring, basic human impulse, the desire to do a job well for its own sake." [8]

By calling E-Textiles a contemporary craft we don't want to take anything away from existing and traditional definitions, rather we want to add a contemporary notion of craft as an interdisciplinary practice, producing cutting edge artifacts, use of novel materials and high-end technologies. The results of this contemporary craft process are unique and novel artifacts, they are inventions, innovations, artworks and personal accomplishments. While some of these artifacts remain strictly decorative, others fulfill specific purposes. Craftsmanship itself is not an indicator of good research, engineering, education, design or art, it can be applied and appreciated for its own sake. As automated production processes become capable of doing what we currently craft, the question presents itself: what will happen to the craftsmanship in E-Textiles?

WHO ARE WE, AND WHY DO WE CARE

Now that we have established E-Textiles as a contemporary craft, we want to introduce ourselves as E-Textiles craftspeople. We are individuals from different disciplines who have a stake in the craftsmanship associated with E-Textiles.

Currently, production of textile circuitry relies heavily on skilled work, mostly executed by hand and semi-automated machines, simply because automated manufacturing methods for combining textiles and electronics do not yet exist. As the field develops and demand for mass-produced soft, textile and wearable technologies increases, it will not be long before the processes that currently involve human skill, can be replicated by automated machines.

If the industrial revolution defined craft from industry, [9] maybe we are now in a position to launch the "craft revolution," in which we seize the opportunity to situate our practice as contemporary and progressive, adjectives not normally associated with craft. Progress is a big word, that often seems to stand between industrial production and craft, and is one of the first things that needs to change in this craft

revolution we envision. Progress does not imply quantity as much as it implies quality. Quality, individuality, uniqueness, are becoming important social values, as movements such as slow food, slow life and DIY practices demonstrate. [10] [11]

Production, formally known as craft, was swallowed by the industrial revolution, and craft became known as non-industrial production. But there is no real reason why craft has to exist as a counter movement to industry. It is not simply nostalgia for the rewarding feeling of a job well done, we also believe that our mode of production and work ethos offers benefits that industry can't, or doesn't care to.

The existence of automated machinery, that replicates craft processes, will not stop us from doing what we do, because we do it for different reasons. And yet, particularly at this point in time, it is a good question to ask: how would we like our practice to continue, once industrial automation kicks in? Will we become E-Texiles grandmothers, sewing LEDs onto t-shirts for our grandchildren while industry produces them in bulk? Will our grandchildren think of our creations as un-cool because they are crafted?

Our answer is that we would like to continue practicing our craft for many of the reasons people continue to practice it today, but to emphasize the potential for innovation and novelty, associated with a workmanship that is risky and geared towards quality. When our skills become devalued because machines can produce work faster, cheaper and "better", we will still enjoy the craft process. But instead of sitting back to become E-Textile grandmothers, perhaps competition from the automated machines will encourage us to move on. In accepting this challenge, as future master craftspeople, our aim is not to re-invent craft, but rather to re-invent ourselves as future master craftspeople. By talking openly and critically we hope to continuously find ways in which our practice can seek to express the advantages of man over machine.

In the remainder of this paper we discuss conventions, traditions and practices within the field of E-Textiles that support the kind of future craftsmanship we seek.

WHERE TO GO FROM HERE

In June 2011, The Swedish School of Textiles organized a week-long E-Textile summer camp with the theme of 'Future E-Textiles Master Craftsmanship.' [12] Eighteen practitioners from the field attended the camp, and actively participated in discussions, skill-shares and group projects. The camp was a platform for discussion about our current practice and about how we want to continue practicing our craft. We were concerned about finding ways of portraying and communicating our trade, that don't just focus on the common traits associated with craft, but also show a side to our practice that is interdisciplinary and tech-savvy.

From discussions that took place during the summer camp, and from our own experiences, we distilled a list of three core aspects, that we believe are key to supporting the kind of future craft practice we are aiming for:

1. Learning: acquire new skills, both knowledge (explicit) and know-how (tacit)
2. Community: engage with others, both online and offline
3. Exposure: share your results and study other people's skilled work

LEARNING

E-Textile practices involve both explicit and tacit knowledge. For example, circuit schematics or weaving patterns embody explicit knowledge, while learning how to solder and operate a weaving loom require tacit knowledge that comes from practice and experience.

When mastering one discipline, you need to learn both the explicit and tacit knowledge of the field. In E-Textiles practices, because of its interdisciplinary character, the practitioners are required to know multiple disciplines' both the explicit and the tacit knowledge. Often, one has to learn it outside of one's expertise. Currently many practitioners obtain this knowledge from books, online documentation or by attending educational courses and workshops.

E-Textiles itself is also producing its own knowledge, for example weaving Electro-Luminescent wire (EL-wire) into textiles, requires explicit knowledge of circuitry connections within woven structures, as well as tacit knowledge on how to choose the thread tensions when weaving the EL wire.

Example: How To Get What You Want

Since 2009 we have been documenting the materials, tools and techniques we use in our practice on our website titled 'How To Get What You Want.' [13] The site contains information regarding techniques for making sensors, actuators and a variety of circuitry, from conductive textiles. Most of these techniques are introduced with step by step tutorials that include a movie to best demonstrate the outcome of the application. The site follows the Open Source Hardware [14] definition, allowing people to freely use and modify our designs, as well as produce and publish new designs based on our work. Circuit schematics, source code and fabric patterns are made available for download in common file formats. The vendors of the materials used in our creations are also documented on our site, so that others can purchase the resources that they will need to replicate our designs.This database is not meant to be an encyclopedia of E-Textiles techniques, but rather a documentation of our trade, and one of the ways we pass on our knowledge.

COMMUNITY

Many practitioners in the field of E-textiles participate in the DIY community, by documenting their techniques online on various platforms such as Instructables [15] and Ravelry, [16] but also on their own blogs and websites. Some practitioners hold workshops or teach at educational institutes. These workshops and face-to-face meet-ups encourage collaborative learning and working models, fostering an attitude that thrives on sharing knowledge and skills openly. Physical meetings also foster discussions and healthy critiques of work, something which the anonymity of the Internet often lacks. DIY (Do-It-Yourself) or DIWO (Do-It-With-Others) communities serve as a platforms for exchanging both explicit and implicit tacit knowledge, motivating creative processes and encouraging collaborative work.

Example: Workshops

Since 2008 we have held over 20 workshops in many countries, hosting between 5 to 20 participants each time. The participants' background is various, from electronics beginner to experienced engineer to trained seamstress. During the workshops, we demonstrate or display our own technique on E-Textiles.

Participants are then asked to create their own projects using the introduced materials and techniques. Often these techniques are modified for their skills and applications creats new versions of it. These workshops provides a chance for participants to physically observe the processes and results that they can see in the online documentations. It is also an opportunity for them to get in touch with actual materials as well as with people with similar interests, serving as a place to start local communities among practitioners.

Example: Summer Camp

The E-Textiles Summer Camp gathered experts in the field to share and collaborate in intermediate-expert level. Participants were asked to share skills through hands-on workshops in which individuals shared E-Textiles techniques that they had developed and refined. The camp ended with a day of intense project work, in which participants split into groups based on their areas of expertise and interests (textiles, performance, craft...) to very rapidly brainstorm and realize a project that communicated some of the ideas discussed during the week. These discussions included questions of online vs. off-line documentation and community, open source issues, the level of expertise skills in collaborative works, finding ways to establish a community based on physical practice among distanced practitioners, ideas for new kinds of apprenticeships. Much was discussed and learned in this week and we hope to continue to organize similar opportunities for exchange in future.

EXPOSURE

Exposing ourselves to others work, by visiting exhibitions, fairs and conferences gives us a chance to study other people's skills and trades. Since E-Textile craft productions are most frequently shared and showcased online, there is very little opportunity for practitioners to study each other's work up-close and in real. Because of this, it is hard to establish a feeling for quality. By observing others work, as well as your own, we as craftspeople need to negotiate standards and nourish the skill to judge and distinguish 'good work'. The 'ability to judge' is crucial to developing critical standards for one's own practice.

Craftspeople in Medieval times traveled around during their apprenticeship called "journey man" to learn skills outside of their local community. Artist-in-residence programs allow practitioners to travel and collaborate with local communities. We could consider this as a modern apprenticeship model.

CONCLUSION

E-Textiles is a contemporary craft practiced across many disciplines. As E-Textiles craftspeople we envision that this craft will continue, even when automated machines are able to reproduce our work. We seek a "craft revolution", which associates craft with words such as progress, innovation and inventivenes. In this future society, we will create work that continues to be unique and rely on our individual skills, our human abilities to think independently and to care about and enjoy life.

To maintain the relevance of E-Textiles, passing on one's knowledge and trade, engaging with others, exchanging ideas and exposing yourself to the work of others is necessary. We need to keep our practice alive, but also insure that it grows to meet future challenges, that is why we talk about "future master craftspeople."

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