Open Source Tools for Artists and Designers in a Closed Source Environment

Margarita Benitez[1] and Markus Vogl[2]

ABSTRACT

Although fashion is not governed by copyright laws (in the USA), the fashion and textile industry have an affinity for proprietary tools. Within our praxis we develop tools that are available for free and are released with an Open Source license. We concentrate on tools that augment the skill set of designers by simplifying the learning curve. With the help of funding of the National Endowment of the Arts and the support of our home institutions Kent State University and The University of Akron, we would like to introduce 3 Open Source tools in this paper. The tools can either be used to create textiles, design custom garments or virtual second skins to reframe design visions and to value add to the studio's arsenal.

KEY WORDS

Open Source; Open Hardware; Fashion; Art; CoCreation; CoDesign; Collaboration

INTRODUCTION

Software and hardware in creative industries, such as fashion, use closed source licensing of intellectual property. Open tools are few and far between and we hope our approach to the subject matter can lead to a fruitful discussion of how to disseminate tools to individual designer's and small studio's. In our collaborative praxis, //benitez_vogl there has been a shift in our strategies for outputs and measurements. In an attempt to comment on the issues of intellectual property within the arts, our most recent projects aim at creating Open Source tools (both software and hardware) which other artists and designers can use to create with as well as modify. We will delve into addressing some of these thoughts on copyright and licensing as well as formulate theories of how different channels of dissemination can potentially benefit our projects. For each project we will give a description and background, impact, license considerations and documentation release methods.

FASHION, COPYRIGHT AND CLOSED SOURCE TOOLS

The current state of intellectual property in fashion design is addressed through trademarks, trade dress, patents, trade secrets, and copyright.[3] Fashion designs themselves do not qualify for intellectual property protection. Current United States copyright law does not include protection for clothing designs as it is deemed a "useful article."[4]

Piracy is a complex problem to define in the fashion context. Terms used to describe the copying, inspiration or appropriation of fashion design usually come with a negative connotation, such as "knockoff" (legal copies of garments indistinguishable from an original) and "counterfeit" (illegal use and replication of branding/trademark sold as an original). The Council of Fashion Designers of America (CFDA) states fashion design piracy "describes the increasingly prevalent practice of enterprises that seek to profit from the invention of others by producing copies of original designs under a different label."[5] The Design Piracy Prohibition Act (DPPA) was introduced in 2006 in an attempt to modify copyright law for the inclusion of copyright protection to fashion design in the United States. DPPA would give a designer a three-year term of protection (the designer would be required to register with the U.S. Copyright Office within

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[1] Fashion Technologist and Assistant Professor, The Fashion School, Kent State University
[2] Assistant Professor, Myers School of Art, University of Akron
[3] Wade, Margaret E., "The Sartorial Dilemma of Knockoffs: Protecting the Moral Rights without Disturbing the Fashion Dynamic," Minnesota Law Review. Vol. 96 Issue 1, p336-369. 34p., 2011. (Terms are explained with examples on pages 344-349).
[4] FL-103, Reviewed December 2011, http://www.copyright.gov/fls/fl103.html (last viewed March 30, 2013)
[5] Design Piracy, COUNCIL OF FASHION DESIGNERS OF AMERICA, http://cfda.com/programs/protecting-intellectual-property (last visited March 30, 2013).

three months of going public with the design.)[6] The Innovative Design Protection and Piracy Prevention Act introduced in 2011 gives the same 3-year timeframe of protection to designers.[7] There are arguments for and against the inclusion of fashion design for protection under copyright. Some arguments in favor of implementing copyright protection include: fashion designers should be classified as artists, the US should follow international fashion design IP models, and piracy creating a barrier to market entry.[8] Some of the arguments against copyright protection: stakeholders in the fashion industry would be affected (as it may create more harm than benefits to fashion design), it would negatively affect fashion designers in all segments of the industry, and in turn this would affect the consumers as well.[9]

In addition to these thought processes many fashion houses use proprietary or limited availability software for sourcing and creation, by such companies as Lectra and Gerber. The software is generally protected with licensing keys and have an exorbitant price point, making it nearly impossible for the small to medium size fashion designer to afford these tools. Our tools will be no means fill this void, yet shall act as a mere hint that developing new and easily obtainable software could potentially help the growth and quality of contemporary artist, fashion designers and studios.

Closed Source and Open Source Culture
The majority of the software that is used in fashion and textiles are closed source. There truly aren't any comparable Open Source fashion CAD software packages or Open Source PDM packages at the moment. There are some Open Source imaging and graphics programs such as GIMP and Inkscape that can be used by designers and artists.[10] Most of the software used in the industry to create is closed source and uses proprietary Application Programing Interfaces (APIs) that the companies do not choose to open up. There are few Open Source software projects currently taking shape such as Virtual Loom (an Open Source woven textile design program).[11]

ENTER OPEN SOURCE AND OPEN HARDWARE

On the other end of the copyright spectrum we find the opinion that by not applying any copyright whatsoever and even going as far as releasing the patterns of the garments for free, the current trend of the making movement could potentially sustain a different process and dissemination model. Since we are in the midst of testing this outcome, we do not have any data to support (or dismiss) this claim as of yet. What we can currently offer for exploration is the framework we have chosen to operate within.

Licenses
Open Source and Open Hardware have one main purpose: the open sharing of knowledge (licensed at different levels of sharing). Open Source is also synonymous with the terms "Free Software" and "Copyleft." Several license models are available for Open Source software. Creative Commons licenses are probably the most popular choice. Creative Commons licenses have different levels to them and they can protect one's work to a chosen level of flexibility. The Creative Commons website at http://creativecommons.org/ offers tools to select the correct license.

While there are many flavors of Open Source licenses for software, the Open Hardware licenses are only a few years old so there are only a handful of them. Choosing the most complimentary license for one's Open Hardware project requires one to answer a few key questions.[12] Does one want to have creator attribution be required or optional? Must derivative works/projects remain Open Source as well? Can a derivitave work have a different license type? Can the derived work be sold for profit? Another main factor that should be taking into consideration is the documentation requirements of each specific license (full materials list, step-by-step instructions and other high-quality documenation, schematics, PCB designs, etc).

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[6] H.R.5055 -- To amend title 17, United States Code, to provide protection for fashion design. (Introduced in House - IH), 109th CONGRESS, 2nd Session, March 30,2006, http://thomas.loc.gov/cgi-bin/query/z?c109:H.R.5055: (last visited March 30, 2013)

[7] H.R.2511 -- Innovative Design Protection and Piracy Prevention Act (Introduced in House - IH), 112th CONGRESS, 1st Session, July 13, 2011, http://thomas.loc.gov/cgi-bin/query/z?c112:H.R.2511: (last visited March 30, 2013).

[8] Wade, *supra* note 3 (pg. 353-357)

[9] *See Id.* (pg. 357-362)

[10] List of a Source Programs, https://help.ubuntu.com/community/ListOfOpenSourcePrograms, updated January 2013 (last viewed March 30, 2013)

[11] Virtual Loom Sourceforge Repository, http://sourceforge.net/projects/virtualloom/ (last visited March 30, 2013)

[12] Open Hardware license comparison http://www.inmojo.com/licenses/ (last visited March 30, 2013)

Open Source Praxis

As artists (and by extension designers) there are many ways you can integrate Open Source into your studio practice regardless if you work collaboratively or as an individual. The fact that Open Source software exists and that the source code is available to the community at large to download and adapt to their needs is incredible.

One example of Open Source Hardware is the Arduino.[13] "Arduino is a tool for making computers that can sense and control more of the physical world than your desktop computer. It's an open Source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board." [14] The Arduino and the many Arduino compatible clones available, has given artists, designers and makers a toolset with a relatively easy learning curve that allows them to create interactive works.

Artists who want to work with technology may not have the funding to purchase the latest technology. Tools like laser cutters and 3D printers are accessible not only thru online service bureaus but also locally thru fab labs and hacker spaces. Fab labs within the fab lab network, have a set of common tools. These labs allow access to the public and train the public on the use of these tools. Hackerspaces generally charge a monthly admission fee and share a more unique tool base.

OSLOOM

Figure 1: OSLOOM at World Maker Faire 2012

Project Description

OSLOOM (short for Open Source Loom and pronounced "O S loom") aims at creating an Open Source electromechanical single thread-controlled Jacquard floor loom that is computer controlled at an affordable cost (less than $10,000). The Jacquard loom, patented in1804, allows for the individual control of each thread which in turn allows for photographic imagery to be woven.[15] Thread-controlled looms like this exist commercially (upwards of $30,000) which puts them out of reach for most individuals and educational facilities.

Funding was instrumental in the ability to research and develop such a loom. After 3 years of attempting to garner grants and artist-residency proposals for this project failed we found our angel investors in our community when Kickstarter launched. We "kickstarted" a couple of months after the site launched and it was still relatively unknown which made it a lot harder to raise the funds.[16] We did have a successful campaign due to a couple of reasons: the range of rewards, marketing to the target community (makers, weavers) and having an established member of the weaving community vouch for the project. The second round of funding for this project came thru Kent State University's Farris Family

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[13] Arduino, http://arduino.cc/ (last visited March 30, 2013)

[14] http://www.arduino.cc/en/Guide/Introduction (last visited March 30, 2013)

[15] ESSINGER, J. (2004), *Jacquard's Web, Oxford*: Oxford University Press, p. 35.

[16] http://www.kickstarter.com/projects/mbenitez/osloom-an-open-source-jacquard-loom-diy-electrom

Innovation Grant. In addition, volunteer specialized collaborators were a necessity for this type of project. We had several mechanical, electrical and computer engineers donate time to the project. The downside with volunteer labor unfortunately is that it is based on availability. The project has had multiple home-bases, first in Chicago (IL), concurrent development between Chicago and Kent (OH), and finally now fully developed in Kent, Ohio

Impact

Our hypothesis is that creating a tool for the weaving community that is easier to obtain and less expensive will add to the growth of the weaving community. Additionally, since we provide a shallower learning curve to enter the single thread weaving market we hope to create opportunities for artists and crafters that previously would not have considered learning to weave as one of their desired skills. The project's essential goal is to put a loom into weaving and craft studios, fab labs, maker spaces, tech shops and educational facilities. This might potentially revolutionize what the studio weaver could accomplish. Having access right in the design studio to prototype a textile could potentially speed up the design process and allow for small runs of designs. We presented the pre-alpha OSLOOM prototype at both Open Hardware Summit 2012 and the World Maker Faire 2012 (as seen in Figure 1). Many of the folks who saw the loom asked us about kits during these events and we will address this once we finish the alpha prototype and know what the specific hardware and labor needs are required to put together the kits.

Figure 2 – OSLOOM detail of thread control head

License Considerations

Both the OSLOOM software and hardware will be released under Open Source and Open Hardware licenses. We are considering Creative Commons - Attribution - ShareAlike 3.0 for both software and hardware.[17] There are a few reasons for this choice. We decided on the Creative Commons – Attribution - ShareAlike 3.0 license for two main reasons: creator attribution and for project derivatives to remain Open Source. We are open to exploring other options in open hardware licenses as more licenses become available. We are also considering the CERN Open Hardware license (OHL) 1.2 which is currently on revision 5.[18]

Documentation Release Methods

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[17] Creative Commons - Attribution - ShareAlike 3.0 License, http://creativecommons.org/licenses/by-sa/3.0/ (last visited March 30, 2013)

[18] CERN Open Hardware License (OHL) http://www.ohwr.org/documents/219 (last visited March 30, 2013)

The first consideration in Open Source culture for a project is the question of release. There were two ways to proceed in developing Open Hardware: releasing every step of the development or putting an alpha development team in place to make sure the prototype gets finished according to the project goal/vision followed by the release of documentation, plans and schematics under an open license. For the OSLOOM project we decided when we embarked on this project that we would only release once we had a full working alpha. There were simply too many directions the project could have taken and we wanted to pursue a specific actuator mechanism. Unfortunately, this has taking more time than expected. Currently after 3 years of R&D we are on the 4th actuating mechanism and showcasing the 64-thread prototype at the Mini-Maker Faire in Cleveland on April 13, 2013.

We are still finishing up the alpha prototype and as of writing this paper we have not released the documentation on the website. We are planning to release the full hardware plans, schematics, drawings and assembly instructions on our website osloom.org once the 64-thread alpha prototype is completely finished. After this release, we will continue to develop the full-scale model that will have approximately 900 threads by using 3 modules of around 300 threads each. Future considerations are given to potentially kit the loom so that materials can be easier obtained and sourced less expensively. This would require additional funding to setup the facilities or seed money to contract creating the handmade parts locally and more efficiently through machining. We are hoping that maker spaces and fab labs can lend a helping hand in putting together the electronic and mechanical components for those individuals that do not feel comfortable putting together the loom. In order to achieve it's cost goal, the loom uses muscle wires as the main component of the actuating system (can be seen in Figure 2). The software is coded using openFrameworks, another powerful Open Source solution based on the programming language C++.[19] The current version has 2 modes: one for the non-weaver that simply loads a bitmap image and converts it to a simple pattern (twill) that in turn can be woven. And another more advanced mode where one can load custom weave patterns. All code will be housed within a code repository and will adhere to standard update protocols.

All of the documentation for the OSLOOM project will be released at http://www.osloom.org.

CODED :: FASHION

Figure 3 – Coded:: Fashion – T-shirt on model BIFT, ITAA Beijing, March 2012

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[19] http://www.openframeworks.cc/ (last visited March 30, 2013)

Project Description

Coded :: Fashion investigates the role of the designer and consumer and how these roles can be intertwined through interactive coding experiences. Coded :: Fashion is a computer application that manipulates imagery and prepares files for prêt-à-faire (ready to make). The first application takes an image from a webcam (or via image load) and manipulates the input imagery based on the computer code. The software outputs a vector PDF file with the code generated image inserted into a custom pattern ready to be opened and cut by any laser cutter and it's respective proprietary software. There also is an option to choose to get the laser cut pattern pieces pre-sewn to add another level of interaction with the production of the garment. This application is currently written in an Open Source prototyping software called Processing. The current pre-alpha version requires images to be post-processed to achieve proper cropping and insertion into the pattern. You can see the shirt and a detail of the shirt created by the App in Figure 3 and Figure 4.

Impact

In Coded :: Fashion, we hypothesize that by utilizing ludological and interactive experiences, one can create a richer connection to the current design and production methods of fashion. Coded :: Fashion is publicly available custom coded software that will be interacted with by the user to generate a new type of fashion, one which we call prêt-à-faire (ready to make). Prêt-à-faire makes a commentary on the current state of design and production within the fashion industry and reverts it to a more sustainable cycle by empowering the consumer to participate in this production cycle. This project addresses the potential in merging the role of the consumer with the designer (although guided and retaining the fingerprint of the designer). A question we have is will direct interaction of the design process create an emotional bond with the apparel?

Coded :: Fashion has several stages and the goal is to end up with a series of applications. The current software manipulates live images to be implemented into a custom cut T-shirt design. We foresee several iterations of this software for different types of garments, even pillows and scarves and to allow access to other technologies such as digital textile printing and embroidery. We ultimately would like to see them as apps on mobile devices.

Figure 4 - Coded:: Fashion – T-shirt on model BIFT, ITAA Beijing, March 2012

License Considerations

All patterns created by the software will be released under a Creative Commons - Attribution - ShareAlike 3.0 license, whereas the original attribution and the newly co-designed creation have to be attributed if re-used by another design. If we choose to release the software, it will most likely be released with the same Creative Commons - Attribution - ShareAlike 3.0 license.

Documentation Release Plans

Coded :: Fashion is currently in hiatus for the alpha development for the computer application until Fall 2013 due to the time required for our two other projects, OSLOOM and S.A.R.A. At that time we will be looking for funding to continue development of the applications.

Coded :: Fashion is currently only available in alpha development format and by request only since we are relatively early in development stage. The plan is to release the produced patterns Open Source, but haven't really decided on if and how the software will be released as it is still at such an early point in the development.

Current status of the project will be located on the project website: http://codedfashion.com/

S.A.R.A. | SYNESTHETIC AUGMENTED REALITY APPLICATION

Figure 5 – S.A.R.A. – performance documentation ingenuityfest Cleveland – 2012 (photo credit Jeff Snowden)

Project Description

S.A.R.A. stands for Synesthetic Augmented Reality Application. S.A.R.A. is an interactive software application (App) written for mobile computing devices such as the iPhone or Android phones. Currently in alpha development, S.A.R.A. will be a fully interactive application that creates its own sounds and visuals based on the mobile device's camera video input and onboard sensors. The App will be available for download at no cost under creative commons agreements at the itunes and android stores, potentially reaching over 400 million devices.

S.A.R.A. converts images and video to a unique sound composition in realtime as you point your camera in any environment (the camera does require a bit of light to read). For example, you could listen to your surroundings while commuting to work in public transportation. It also takes in account the sensory data of your phone to make for a richer experience. Taking tradition from fine arts history, S.A.R.A. investigates the theme of synesthesia thru modern technology. S.A.R.A. will translate color to audio in real time and can also be used within live performances. S.A.R.A.'s performance capabilities have been showcased at the 2012 Cleveland Ingenuityfest in collaboration with Cleveland's Travesty Dance group. The current alpha iteration only includes image manipulation based on accelerometer input. The visuals the mobile application produces in a performance setting are stunning as seen in Figure 5.
S.A.R.A. has been graciously supported by a Media Arts grant of the National Endowment of Arts and will be released under an Open Source license.

For the first time in our career and thanks to the grant the National Endowment of the Arts has awarded us, we were able to employ a programmer to help with the code for this project. The grant calls for a 20 hour a week graduate student from Computer Science and he has been a great addition to our team. This has alleviated us from having to code ourselves. Since we don't have the experience in writing code in this particular language, his efforts in writing and assisting with the

technology have been invaluable to the project and we are hopeful to keep the momentum up until our projected release deadline at the end of Summer 2014.

Impact

This free App will bring more attention to the scientific teachings of synesthesia and provide a ludogical interactive approach to understand the potentials of sonifications at large. In addition, dance troops all over the country and potentially the world will be able to add an inexpensive interactive performance tool to their technological arsenal of expression.

The majority of S.A.R.A. users will be enjoying the App via free download. Users will be able to simply download the App to their phone and then enjoy the synesthetic interpretation of the environment they are in. Currently there are over 400 million devices capable of utilizing our app and we hope for a download rate of 0.1(25000) to 0.5 (125000) %.[20] The other group of benefactors would be performance or dance troops that potentially could utilize our technology and incorporate it into their routines. As the software is to be released Open Source, these users could customize the software to reflect their artistic vision in creating new works thru the use of S.A.R.A. as a framework for artistic expression.

Figure 6 - S.A.R.A. – devices and neoprene arm sleeve

License Considerations

Although the major focus for this particular project falls to the software, which we are planning to release under a Creative Commons - Attribution - ShareAlike 3.0 license. The patterns for the design of the arm sleeve containing the technology that is used by our collaborating dance troupe will also be released under the same kind of license.

Documentation Release Plans

The App itself will be available for free download at the App store and the Android marketplace. The source code of this App will be housed at a code repository of our choosing (currently we are considering github) and we will adhere to standard change and update protocols.

Please see our website for the project for more information: http://benitezvogl.com/projects/sara

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[20] MCCRACKEN, H. *iOS vs. Android: Lots of stats, little clarity,* 14 November 2011*, http://news.cnet.com/8301-33200_3-57323943-290/ios-vs-android-lots-of-stats-little-clarity/* (last visited March 30, 2013)

CONCLUSIONS

In conclusion, we are truly in the midst of exploring the avenues of Open Source and are hoping for directing our attention soon to releasing the projects we are currently working from our small test circles to the public at large.

Over the next few year's we will be able to analyze our measurements and pending on the findings adjust our praxis and goals accordingly. This is truly an interesting time as we believe that the tension between open and closed source development and the outcome of this discussion will closely shape our immediate future. Rather than the continued support of a privileged few we hope for the support of many.

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