

This project investigates the blending of traditional craftsmanship and making with open-source electronic technology. It explores the possibility of artisans embracing technology within their craft objects and speculates on the possibilities of connecting these craft objects to the IoT within the 4th industrial revolution.

# Design Research Project

Shining a Light on Craft &  
Technology: Blending Tradition  
and Electronics in Crafted  
Objects

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**DARE**

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## PROJECT NOTES

**Note to the reader:** For optimal viewing of the full project, please visit the project web page at:

<https://www.francescadare.com/research/crp/>

**Brief:** This Design Research Project investigates the role of culture, craft, and lore in the 4th industrial revolution, considering how we should maintain and promote activities that have supported societal advancement for centuries.

We were encouraged to explore this research project from many perspectives, including but not limited to storytelling; artisan making; material culture; textiles & fashion; paraphernalia; architecture; agriculture & diet; societal classes; and more. This investigation considers how these traditional activities can be made relevant to contemporary society and how human participation in the making process adds value to a designed outcome.

**Objective:** The aim for this design research was to Investigate the role of making, craft, and technology in contemporary society by exploring the value of blending traditional craft with modern electronics using a trans-disciplinary process.

**Methods:** Case Study, Co-Design, Speculative Design

**Stakeholders:** Artisans, Craftspeople, Designer Makers, Programmers, Researchers, Educational Professionals, Craft Consumers

## PROJECT REPORT

# Shining a Light on Craft & Technology: Blending Tradition and Electronics in Crafted Objects

## Acknowledgements

I would like to thank Neil Fyffe for collaborating with me on this project and being such a great design partner. I would also like to thank Richard [last name] from Proto-pic who helped me with gathering components, discussing the technical parts of the project and providing me with a new board without charge when I blew the original one purchased. Finally, I would like to thank the staff at Napier University who have help and supported me and this project.

## Keywords

Craft, Making, Co-Design, Speculative Design

## Introduction

When we think of traditional artisans, we often think of someone working with their hands to create something tangible. This object might be a piece of furniture, a pottery bowl, or a painting. Creating these objects requires skill, patience, and often years of experience. However, in recent years we have seen the rise of technology that can product objects at a fraction of the cost and time (Anderson 2012). For example, 3D printers can now create objects that are almost indistinguishable from those created by traditional methods (Shahrubudin et al. 2019).

But the value of the hand is undeniable. Arguably information gained through the touch of the hand is more reliable than information gained through the eyes (Sennet 2009). The eye can give misleading information, and there is something about working through a problem with your hands, moving the materials, playing like when you were younger that just isn't the same regardless of your skill for imagination. Think about the expressions "get a grip", or "come to grips with something"; these expressions evoke images of the hand, even in reference to conceptual ideas. These expressions represent the "evolutionary dialog between the hand and the brain." (Sennet 2009, p.151)

In the past, such as medieval age workshops, the master would teach the apprentice. Today the lines are even more blurred. Just with the definition of craft evolving to include less traditional materials, so it the process of learning craft and making itself. Modern technology has changed how craft is perceived, made and potentially craft objects themselves.

## Aims

This research project aims were to investigate the role of making, craft, and technology in contemporary society by exploring the value of blending traditional craft with modern electronics using a trans-disciplinary process.

Due to the scope and nature of the project, this qualitative research will not reach overarching conclusions, but aimed to add to existing understanding and knowledge, as well as gain insights into the process of craft making in the context of the 4th industrial revolution and beyond.

Specifically, this project looked at the use of electronic components and open-source coding (such as Arduino) within traditional crafts (making and objects) and explored the technologizing of craft objects and connecting them with the internet of things.

**Research Questions:** *How can traditional crafts be made relevant in contemporary society? To what extent should traditional craftspeople embrace the technology of the 4th industrial revolution in their objects?*

## Approach

This qualitative project takes an affirmative stance to the research questions and was conducted within an interpretivist paradigm, recognising the complexity of socially constructed multiple realities (Rehman and Alharthi 2016) and the influence the researcher has on the project (Grix 2004, p.82).

This project follows the belief that there can be multiple interpretations to a phenomenon, and the affirmative stance taken is not mutually exclusive. There is value in the view that traditional crafts can, and perhaps should, be preserved without modern influences.

## Context

In this project, I use the terms craft and craftspeople as anyone can be a craftsman (or craftsperson), and the terms reflect "a more inclusive category

than the artisan” (Sennett, 2009, p. 144). Sennett (2009) argues that people regress inward when the material things or work in their lives no longer provide them with mental engagement. There is a strong argument that making provides added value and meaning the human experience that other types of work or entertainment cannot (Sennet 2009; Korn 2017). Something about craftsmanship brings people together; its less about advanced skill (which is often associated with preserving craftsmanship), and more about the act of creating and investing in the work for creating’s sake.

However, some might argue that low skilled craftspeople are easily replaced by machinery. Sennett does comment that it becomes problematic when robotics and machinery try to “replace high-cost skilled labor” (2009, p.106), this is one of the ways where technology can become a threat to the preservation of the culture of crafts and making.

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*“Highly specialized skills represent not just a laundry list of procedures but a culture formed around these actions.”*

(Sennet 2009, p.107)

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What differentiates craftspeople from machinery is that they see and experience the world differently and are shaped by experiences (Korn, 2017). Tactile information makes a strong imprint on the mind as we cannot shut off sensory intake (Korn 2017). Like Sennet(2009), Korn believes that craft and making is social, that “the transmission of information from one person to another a physiological process, comparable to that of a virus.” (Korn 2017, p.110). Even so, many craft practices are considered at risk, endangered or even extinct (The Heritage Crafts Association 2021). Craftsmanship is important part of keeping culture and heritage alive (Conservation & Heritage Journal 2022) and it is currently at risk.

Its not all bad news. Technology has created a new type of makers—a product of the 4<sup>th</sup> industrial revolution (Anderson 2012). This revolution includes rapid changes in technology, society, and politics from the digital age. We are now more connected than ever, and have greater access to advanced machinery, such as 3D printers, laser cutters, CNC machines and open-source design and electronic components (Anderson 2012). Access to these types of technologies has changed how objects can be made and manufactured, and by who. These new ways of making have their communities to, and so, from a social aspect, are reflective of traditional crafts. People connect with each other to help with projects such as those made with Arduino, not for financial gain, but because of



their interest in making for the sake of doing a job well done (Anderson 2012). In Chris Anderson's book "Makers: The New Industrial Revolution" (2012), he describes a story of allowing a programmer access to update one of the files they had been working on, only to discover later that they had gone in and corrected flaws in the code in other areas. This above-and-beyond approach is the same motivation that Sennett (2009) describes in his book "the craftsman", sometimes external motivators are not fulfilling enough, and we make because we can.

While new types of makers have been born, traditional artisan work has regularly been under fire. "In the nineteenth century steel industry; skilled artisans faced two potential futures because of technological change: deskilling or dismissal" (Sennet 2009, p.107), and this is still true across many industries today. The difference is that the threat to traditional crafts are not just from the prevalence of machinery and automation but from a reducing interest from younger generations to take up craft work (Eurobest 2014). Very few projects combine making traditional craft objects with modern technology; however, the Samsung Smart Bike from the Samsung Maestro academy is one notable example. The Italian-made bike is interesting and the aims of the project in promote cross-generational learning and an interest in craft making.

Another example of cross-generational learning is Music Hackspace's "Build an interactive textile instrument" (Topley 2022) course. This "practice-led" course teaches how to combine traditional needle felting with Arduino and e-textiles to create an interactive instrument. Arduino is an open-source platform for electronics (both hardware and software) that are intended to be easy-to-use. Arduino boards read inputs, such as a finger on a button, and turn them into outputs like turning on an LED (<https://www.arduino.cc>)

When looking to the future, it's important to remember that objects aren't just the things themselves, things we have in our homes to look at or just to have, they have value from a heritage perspective, human hand craft, and also the affordances they give us (Gibson 1979). Keeping these perspectives in mind when thinking about combining technology within craft objects is a way to enhance their value, not to take away from it.

## Methods

### Case Study

This research project started with a case study using an example of a traditionally crafted object blended with Arduino electronic components and digital design.

Case study is a popular method of qualitative research (Hyett et al. 2014) and is focused on a single, bounded subject or event. Case studies can explore and describe processes and/or outcomes. As Hyett et al. pointed out, “case selection is a precursor to case analysis, which needs to be presented as a convincing argument” (2014, p.6). For this research question, I used the Samsung Smart Bike as an example of traditional craftsmanship meeting electronic technology. More specifically the Samsung Smart Bike used an Arduino board connected to a Wi-Fi and Bluetooth module.

## Research Through Design (Co-Design and Speculative Design)

Building on the study of the Samsung Smart Bike, I used research through design (Frayling, 1993) as an additional method of investigation. Examples of how research through design can be achieved include (a) ‘action research’ where the designer / researcher keeps a note of the step-by-step process of studio work and creates a resulting report to contextualise the work; and (b) development work such as, “customising a piece of technology to do something no-one has considered before and communicating the results” (Frayling 1993, p.2).

This project included working with an expert artisan to make a craft object with integrated electronic components, as well as documenting the process, prototypes, drawings, videos, observational notes, and other artifacts (Koskinen et al. 2012; Stappers and Giaccardi 2017). This qualitative method allows for conversations and learning through making to provide a diverse development of understanding and this method “for making give[s] people – designers and non-designers – the ability to make ‘things’ that describe future objects, concerns or opportunities” (Sanders and Stappers 2014, p.6).

Creating a speculative design (Dunne and Raby 2013) based on the object created allows for the exploration of futures where this type of object becomes integrated into our lives but also future technologies. Speculative design asks the “what if” questions without venturing into a complete fantasy (Auger 2013). *“Speculative design is not only to encourage contemplation on the technological future but can also provide a system for analysing, critiquing and re-thinking contemporary technology.”* (Auger 2013, p.12). The speculative design component of this project is based on the created object from the co-design – it is an exercise in exploration of the future, giving the opportunity to push the idea of craft objects blending with modern and advanced technologies.

## Scrapbook as Method

Frayling's (1993) idea of keeping a design diary was expanded for this project into a scrapbook. Scrapbooking is not a well published research method, but Walling-Wefelmeyer argues that it is a "specific theoretically informed methodology ... in response to the voice of self, experience, and truth which is frequently elicited and constructed in qualitative research" (2020, p.4).

This 'approach to knowing' (Walling-Wefelmeyer 2020) allowed for the documentation of the design process, as well as other secondary sources. The documentation consists of a physical scrapbook as well as digital components, linked together. This method engages the scrapbooker in making sense of the collected items and data. Like collage as method, which "form and content reflect the juxtaposition of individual ideas, realms of thought, texts, images, and other creative works, and the conversation that develops between them" (Vaughan 2005, p.41), and bricolage which describes research bricoleurs as "pick[ing] up the pieces of what's left and paste them together as best they can" (Kincheloe, 2001, p. 681). This method allows for flexibility in the research documentation, expression, and interpretation.

## Results and Interpretation

### Samsung Smart Bike Case Study

A case study was carried out for the Samsung Smart Bike and published online in full (see [Appendix A: Journal Post – Samsung Smart Bike](#)). It was discovered through this research that the Samsung Smart Bike came out of Samsung Maestro Academy, which was an online platform designed to connect Maestros with students. It was described as "*Samsung's first digital platform for aspiring younger generation to connect with the legendary handcrafting masters through Samsung technology, preserving the future of "Made in Italy" and fostering a new generation of Italian artisans.*" (Samsung Newsroom 2014). Despite searches online, and on a Samsung phone, it appears that the platform is either no longer available at all, or not available outside of Italy. As the publications were from several years ago, it seems likely it is no longer active. Perhaps, despite its Cannes Lions awards (Samsung Newsroom 2014) and initial media attention, there was not enough demand for the service. Unfortunately, there is no readily available information as to what happened to it.

This case study however, concentrated on the Samsung Smart Bike - which was a success in receiving 'buzz' (Eurobest 2014). The bike was created by Maestro Giovanni Pelizzoli is a world famed frame builder who worked together with Alice Biotti, a young student of Samsung Maestros Academy to create the

Samsung Smart Bike. They combined traditional craftsmanship with Arduino technology to create a one-of-a-kind bike with added features (Huddleston 2014; NerdsChalk Staff 2014; Samsung Maestro Academy [no date]). The bike features included: a curved frame (that neutralizes dangerous vibrations caused by rough city streets), four laser beams (that create individual bike lanes), an integrated GPS system, and a rear-view camera. Additionally, the bike has a live stream of video and riding data to the handlebar-mounted Samsung device (Zolfagharifard 2014; Samsung Maestro Academy [no date]).

The overall goal of the project was also to help with the preservation of handicrafts in Italy, Samsung believed that creating a success story of cross-generational project success with the use of technology would help motivate younger generations to take up handicrafts, a lot like the co-design portion of this project.

## Research Through Design & Co-Design

This project involved working with an expert artisan in developing a craft and electronic technology blended object. I worked closely with Neil Fyffe, a local craftsperson who specialises in using native timber in carving, woodturning and specialist joinery (<http://www.neilfyffe.co.uk/>). I documented the co-design and making process online ([Appendix A: Journal Post – Neil Fyffe](#)).

Before working with Neil, I focussed the scope of the project by deciding to co-design a responsive lamp. This scoping balanced the project's potential vs. the time and skill available. As this was my first Arduino project, I also documented learning how to build and code the components ([Appendix B: Journal Post – Crafting with Components](#)). Neil had previously worked on a project building-in Bluetooth speakers but did not have much involvement with the electronics portion of that project and did not witness how the components fit into the piece. He simply made insets for the pieces to be housed. In this project, I did the coding and most of the assembly in collaboration with Neil. I shared the prototype stages and brought all the components with me for our workshop day.

We each approached the design from different perspectives. Initially Neil had a large piece of elm that he was thinking we could carve out spaces for the components, similar to his previous work. Although Neil loves wood carving, like other artisans (Korn 2017) Neil rarely has time to work on his carving work as he spends more time on paid work (Korn, 2017, p. 149).

Together we explored various component options and general restrictions and decided a box-like shape would be more suitable. Again, however, we thought differently about box construction. I would have approached box-building from

the idea of 6 pieces, but Neil suggested we create a cut-out from a thicker piece of wood. This design approach used more of the natural strength of the wood and allowed for easier attachment of the lighting arm.

The electronic components also influenced the design of the lamp at various stages of the design-making process. As we got into a making rhythm, we made decisions and revisions throughout the making process. In fact, our process was much more collaborative and organic than designing and then sending plans to an artisan to create. We worked together through numerous changes as we attended to various details and Neil commented that the lamp *"started to take on an aesthetic of its own"*. The design started to show influences from both of us, and we had a laugh over how the construction of the base had a slight instrument feeling to it; Neil commented that his wife would say he is "obsessed with guitars making." It was easy to see this influence come through.

Neil was interested in the electronic components and, as the day went on, he started to think of other scenarios where he could incorporate some of the design-making ideas we had worked with (such as a display box with a light on opening or a wardrobe). When I asked directly if he would consider using electronics in future projects, he said that he would be "keen to, but not the coding." I agree. Throughout the making process of this project, I flip-flopped on my view that traditional artisans should be learning Arduino to support their craft. Working with Arduino was not as easy as I expected, especially the coding. The assembly of the components was very tactile and experimental—something I could see as more likely to be taken up by traditional artisans. However, the coding was a different type of crafting. This project shows that making with components could be considered a type of contemporary craft, and coding an art. The object we created also has significance to both of us due to the personal investment in the making process. For me it reminds me of the day, but also is a special object because of my hand in the process. Perhaps this is because, while the purpose of this research project was more interested in the process and being in with workshop with Neil, we both couldn't help wanting to make something nice out of the experience. Perhaps it is as Richard Sennet says in his book, that the craftsman "represents in each of us the desire to do something well, concretely, for its own sake" (2009, pp.144–145).

Technological objects made in conjunction with a traditional craftsperson will inherently have more value due to the skill require in their production, and the human element the object captures compared to mass-produced, or even small batch manufactured items. Selling these types of objects could help keep

craftsmanship alive, but also working alongside craftspeople will help as well. “The history of the workshop shows ... a recipe for binding people tightly together” (Sennet 2009, p.80), and this was definitely the case for me, by the end of the workshop day I felt like I knew much more about Neil than if we had spent the time doing something else.

## Research Through Design (Speculative Design)

Another component of this project was the development of a speculative design based on the crafted object. After completing the co-design portion with Neil, I used the made lamp to inform the speculative design. We spoke briefly about what possible functions the lamp could have once connected through Wi-Fi to a phone or a computer, but the speculative design process was completed on its own (without collaboration with an artisan).

The speculative design ([Appendix C: Journal Post – Speculative Design Lamp](#)) includes an interactive lamp with features such as; various light options, human presence, mood, and temperature sensors, adjustable lamp arm, app connectivity, button to send artisan(s) who made the lamp appreciation, and an artisan monitored tea plant (mood details are sent to an artisan grower and they recommend nutrient packs to feed the plant and influence your tea – and your mood) with built in moisture sensor. The app will include monitoring of your mood, tea plant, light usage, and preferences, as well as information on how the lamp was made, information about its creators, and the history of the object (as this could become an inheritable piece).

This design has some features that are possible with today’s technology and some that are not. It does still however have that craft component. The idea is to imagine a future that isn’t worried about the possibility of youth getting into crafts because it is part of their everyday and technologically advanced lifestyles.

## Scrapbook

Joe Kincheloe says, “There is nothing simple about conducting research at the interdisciplinary frontier” (2001, p.690). This project was no exception. The creation of a scrapbook (and supplemental digital ‘scraps’) was an effective method of gathering and expressing data ([Appendix D: Project Scrapbook](#) and [Appendix E: Online Project Journal](#)). Instead of a randomized collection of data, the scrapbook helps tell the story of the research in a visual manner. The process of creating and compiling the scrapbook, using my hands, gluing, selecting visual elements, data

stories, and layouts, gave a new perspective and better understanding of the collected data. It was an effective way to reflect on the process, and do some of the “thinking” required “through craft” (Adamson 2020).

## Conclusion and Recommendations

This co-design project spanned disciplines and generations – creating interests on both sides. More projects of this nature could help keep traditional crafts and heritage alive through younger generations, as well as exposing older generations to new possibilities of making and community.

Due to the limited information available, the case study of the Samsung Smart Bike was not as in-depth as I would have preferred. Ideally, a robust case study performed closer to the project's completion would have included interviews with Maestro Giovanni Pelizzoli, Alice Biotti and others involved in the project (Eurobest, 2014) wanted to gain a better understanding the Samsung Smart Bike project on Italy's attitudes towards craftsmanship long term.

In Chris Anderson's book *'Makers: The New Industrial Revolution'* (2012), he discusses at length the support he received from the online community for his electronic components and coding. I did reach out online to a Reddit group but received no traction on the post, so would not describe my experience in the same way. I did however feel the connection with the community when speaking with Richard from Proto-pic, feeling his enthusiasm, and receiving his assistance without hesitation (see more on [Appendix B: Journal Post – Crafting with Components](#)). As a result, this project is lacking a full understanding of the 'open-source makers' community. After completing the lamp, I shared it online, again with limited traction ([Appendix D: Journal Post – Sharing Our CraftTech Lamp](#)). This lack of traction could mean there is little interest in craft objects being blended with Arduino components. Perhaps my newness to the community and my lack of knowledge of the best ways and places to share, contributed to the lack of interest.

Through the speculative design process, I explored possible futures and pushed the idea of blending technology with craft objects. Due to the time restrictions to this project, it was not possible to include artisans in the speculative design portion of this research. However, including an artisan in speculative design could benefit further research projects. I would be interested in taking this approach and incorporating an analysis of their views of the future of their craft.

The use of multi-methods for this research project was valuable, although a mixed-method may be more effective in understanding broadly the feelings of

artisans using components in their work. Combining quantitative methods such as large surveys and statistics about the criticality of crafts in the UK with interviews, co-design, and speculative design (as used in this project) would create a more robust research project. This area needs more research and for this work to be done with various other artisans. I also recommend getting a group of artisans together to discuss their viewpoints and explore the idea of blending crafts and technology with experts.

The scrapbooking method in this project effectively combined multiple methods, ideas, and concepts. This combination allowed the pieces to come together and tell a story of the research visually compared to other methods. I recommend the scrapbooking approach as a unique and viable research method for further research on this topic.



## References

- Adamson, G. 2020. *Thinking Through Craft*. London: Bloomsbury Visual Arts: Bloomsbury Publishing Plc.
- Anderson, C. 2012. *Makers: The New Industrial Revolution*. London: Random House Business Books.
- Auger, J. 2013. Speculative design: crafting the speculation. *Digital Creativity* 24(1), pp. 11–35.
- Conservation & Heritage Journal 2022. *Craftsmanship is key to keeping heritage alive*. [Online]  
Available at: <https://www.consandheritage.co.uk/articles/craftsmanship-is-key-to-keeping-heritage-alive>  
[Accessed: 26 May 2022].
- Dunne, A. and Raby, F. 2013. *Speculative everything: design, fiction, and social dreaming*. Raby, F. ed. Cambridge, Massachusetts: The MIT Press.
- Eurobest 2014. *2014 PR: Samsung Smart Bike*. [Online]  
Available at:  
<https://www2.eurobest.com/winners/2014/pr/entry.cfm?entryid=2497&award=101&order=7&direction=1> [Accessed: 25 April 2022].
- Frayling, C. 1993. Research in Art and Design. *Royal College of Art Research Papers* 1(1)
- Gibson, J.J. 1979. The Theory of Affordances. In: *The Ecological Approach to Visual Perception*. Dallas, London: Houghton Mifflin
- Grix, Jonathan. 2004. *The foundations of research*. Basingstoke: Palgrave Macmillan.
- Huddleston, T.J. 2014. *Samsung's Smart Bike, the ride of the future?* [Online]  
Available at: <https://fortune.com/2014/06/12/samsung-smart-bike/> [Accessed: 19 May 2022].
- Hyett, N., Kenny, A. and Dickson-Swift, V. 2014. Methodology or method? A critical review of qualitative case study reports. *International journal of qualitative studies on health and well-being* 9(1), pp. 23606–23606. doi: 10.3402/qhw.v9.23606.
- Kincheloe, J.L. 2001. Describing the Bricolage: Conceptualizing a New Rigor in Qualitative Research. *Qualitative Inquiry* 7(6), pp. 679–692. doi: 10.1177/107780040100700601.

Korn, P. 2017. *Why we make things & why it matters: The education of a Craftsman*. London: Vintage.

Koskinen, K., Zimmerman, J., Binder, T. and Redström, J. 2012. Constructive Design Research. In: Roumeliotis, R. and Bevans, D. eds. *Design Research through Practice: From the Lab, Field and Showroom*. Waltham, MA, USA: Morgan Kaufmann Publishers, Inc. (Elsevier)

NerdsChalk Staff 2014. *So Smart Bike is Samsung's next smart project?* [Online] Available at: <https://nerdschalk.com/smart-bike-samsungs-next-smart-project/> [Accessed: 23 April 2022].

Rehman, A.A. and Alharthi, K. 2016. An introduction to research paradigms in distance education. *International Journal of Educational Investigations* 3

Samsung Maestro Academy [no date]. *Samsung Smart Bike Design Story*. [Online] Available at: [https://design.samsung.com/global/contents/s\\_bike/](https://design.samsung.com/global/contents/s_bike/) [Accessed: 23 April 2022].

Samsung Newsroom 2014. *Cannes Lions: Was Samsung Maestros Academy award worthy? Yes, totally*. [Online] Available at: <https://news.samsung.com/global/cannes-lions-was-samsung-maestros-academy-award-worthy-yes-totally> [Accessed: 25 May 2022].

Sanders, E.B.-N. and Stappers, P.J. 2014. Probes, toolkits and prototypes: three approaches to making in codesigning. *CoDesign* 10(1), pp. 5–14. doi: 10.1080/15710882.2014.888183.

Sennet, R. 2009. *The Craftsman*. London: Penguin Books.

Shahrubudin, N., Lee, T.C. and Ramlan, R. 2019. An Overview on 3D Printing Technology: Technological, Materials, and Applications. *Procedia Manufacturing* 35, pp. 1286–1296. doi: 10.1016/j.promfg.2019.06.089.

Stappers, P.J. and Giaccardi, E. 2017. Research Through Design. In: *The Encyclopedia of Human-Computer Interaction*. 2nd ed. Hershey, PA, USA: Idea Group Reference, pp. 1–94.

The Heritage Crafts Association 2021. *The HCA Red List of Endangered Crafts 2021 (Categories of Risk)*. [Online] Available at: <https://heritagecrafts.org.uk/redlist/categories-of-risk/> [Accessed: 25 May 2022].

Topley, S. 2022. *Build an interactive textile instrument*. [Online]  
Available at: <https://musichackspace.org/events/build-an-interactive-textile-instrument-2/>  
[Accessed: 14 March 2022].

Vaughan, K. 2005. Pieced Together: Collage as an Artist's Method for Interdisciplinary Research. *International Journal of Qualitative Methods* 4(1). doi: 10.1177/160940690500400103.

Walling-Wefelmeyer, R. 2020. The Methodological Potential of Scrapbooking: Theory, Application, and Evaluation. *Sociological Research Online* 26(1). doi: 10.1177/1360780420909128.

Zolfagharifard, E. 2014. *Want your own cycle lane? Samsung's smart bike uses LASERS to project lines on a road and stop motorists getting too close*. [Online]  
Available at: <https://www.dailymail.co.uk/sciencetech/article-2659240/Want-cycle-lane-Samsungs-smart-bike-uses-LASERS-project-lines-road-stop-motorists-getting-close.html>  
[Accessed: 25 April 2022].

## APPENDICES

## Appendix A: Journal Post – Samsung Smart Bike

<https://www.francescadare.com/samsung-smart-bike-case-study/>

# Case Study – Samsung Smart Bike

Design Research Project / 27 April 2022

Technological advancements in cycling over the last few hundred years have mostly come from the frame construction and use. Today's bikes can handle anything from street racing to mud-splattered single-track. There are those who ride a bike every day for their commute. Samsung built a safer smart bike for these people (Eurobest, 2014).

This bike, however, was not just about creating a safer bike for commuters, but about preservation of handcraft and blending this with technology. Samsung stated in their Eurobest submission that *"We looked at the current situation in Italy: the disappearance of great handcrafting excellences despite their economical power and the dramatic unemployment of younger generations. Our challenge was to make young people look at handcrafting with new eyes, reconnecting two generations."* (Eurobest, 2014). Samsung Maestros Academy student Alice Biotti and Italian frame builder Giovanni Pelizzoli worked together to design the Samsung Smart Bike which is packed with a slew of Arduino based technology (NerdsChalk Staff, 2014), all of which is controlled and supported by a Samsung smartphone combined with excellent craftsmanship and frame design advancements (Zero27, 2014).

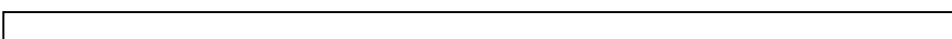
The goal of protecting traditional craftsmanship is to make sure that craft skills and practices are passed down from one generation to the next and they are an important part of cultural heritage (Dormer, 1997). Additionally, the handicraft industry is an important source of income and jobs, in 2014 when the Smart Bike was submitted to Eurobest, Samsung reported that despite the growing rate of unemployment in Italy, there were thousands of handcrafting positions available. The problem was that younger generations were not interested in this type of work and is partly why the "Made in Italy" tradition was at risk of fading (Eurobest, 2014). After many lessons together, Alice Biotti along with Maestro Pelizzoli started to think about a new concept of safety-bike bike (Zolfagharifard, 2014).



Samsung reported that this project had remarkable success and “inspired many young talents to change their mind about handcrafting, starting to find ways to innovate Italian heritage.” (Eurobest, 2014). It was also featured heavily in media, including newspaper articles, magazines, one of the episodes of the Maestros Academy TV-series, had 6 million TV-viewers, 7 million Facebook and Twitter-users reached, and 60 million media-impressions (in Italy alone) (Design Boom, 2014; Eadiciccio, 2014; Eurobest, 2014; Huddleston, 2014; NerdsChalk Staff, 2014; Samsung Maestro Academy, n.d.; Samsung Newsroom, 2014; Summerson, 2014; Zero27, 2014; Zolfagharifard, 2014).

Samsung is a technology company that seeks to “launch people” (Eurobest, 2014), and “amplify their life’s potential” (Eurobest, 2014) through the design of its products. The Samsung Smart-Bike is the first safe-bicycle that protects the rider with its built-in smart-components, which are automatically activated through a Samsung smartphone and an app. Milan Design Week featured a successful demonstration of the smart bike (Eurobest, 2014).

An Arduino board, a Wi-Fi + Bluetooth module, a battery, and a digital camera (located below the rider’s seat), which can be controlled via a Samsung smartphone. A virtual bike lane is one of the most key features of Samsung’s smart bike thanks to the four laser beams (Zolfagharifard, 2014). As a safety measure, this feature alerts other cyclists to the fact that there is a bicycle ahead of them. To further enhance visibility, the Smart bike rider can adjust the beam’s intensity. In addition, there is a built-in GPS system that shows you exactly where you are going. The phone’s location is fixed at the handle of the bike, making it easy to access while riding (Eadiciccio, 2014).



## Samsung Smart Bike



This project was successful at the time in creating 'buzz' and interest in handicraft in Italy (Eurobest, 2014), but it appears to have not yet made become a product available to purchase (Although I suspect if you reached out you could probably have one made for you without the Samsung brand).

*Video courtesy of Samsung Maestro Academy*

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## References

Design Boom 2014. *arduino and handcrafted tradition come together with samsung smart bike*. [Online]  
Available at: <https://www.designboom.com/technology/samsung-smart-bike-06-12-2014/>  
[Accessed: 15 March 2022].

Dormer, P. 1997. *The Culture of Craft*. Manchester: Manchester University Press.

Eadicicco, L. 2014. *Samsung's Smart Bike Of The Future Will Make Sure You Never Get Lost Again*^ [Online]



Available at: <https://www.businessinsider.com/samsung-smart-bike-2014-6>  
[Accessed: 24 April 2022].

Eurobest 2014. *2014 PR: Samsung Smart Bike*. [Online]  
Available at: <https://www2.eurobest.com/winners/2014/pr/entry.cfm?entryid=2497&award=101&order=7&direction=1>  
[Accessed: 25 April 2022].

Huddleston, T.J. 2014. *Samsung's Smart Bike, the ride of the future?* [Online]  
Available at: <https://fortune.com/2014/06/12/samsung-smart-bike/>  
[Accessed: 19 May 2022].

NerdsChalk Staff 2014. *So Smart Bike is Samsung's next smart project?* [Online]  
Available at: <https://nerdschalk.com/smart-bike-samsungs-next-smart-project/>  
[Accessed: 23 April 2022].

Samsung Maestro Academy [no date]. *Samsung Smart Bike Design Story*. [Online]  
Available at: [https://design.samsung.com/global/contents/s\\_bike/](https://design.samsung.com/global/contents/s_bike/)  
[Accessed: 23 April 2022].

Samsung Newsroom 2014. *Samsung Smart Bike: What was it about?* [Online]  
Available at: <https://news.samsung.com/global/samsung-smart-bike-what-was-it-about>  
[Accessed: 23 April 2022].

Summerson, C. 2014. *Samsung Teams Up With Italian Bicycle Builder Giovanni Pelizzoli To Create One Badass Smart Bike*. [Online]  
Available at: <https://www.androidpolice.com/2014/06/12/samsung-teams-up-with-italian-bicycle-builder-giovanni-pelizzoli-to-create-one-badass-smart-bike/>  
[Accessed: 25 April 2022].

Zero27 2014. *Technology And Handcrafting Tradition Comes Together With Samsung Smart Bike*. [Online]  
Available at: <https://zero27.com.br/post/92559104070/samsung-smart-bike-from-samsung-maestros-academy>  
[Accessed: 25 April 2022].

Zolfagharifard, E. 2014. *Want your own cycle lane? Samsung's smart bike uses LASERS to project lines on a road and stop motorists getting too close*. [Online]  
Available at: <https://www.dailymail.co.uk/sciencetech/article-2659240/Want-cycle-lane-Samsungs-smart-bike-uses-LASERS-project-lines-road-stop-motorists-getting-close.html>  
[Accessed: 25 April 2022].

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## Appendix B: Journal Post – Crafting with Components

<https://www.francescadare.com/crafting-with-code/>

# Crafting with Components and Code

Design Research Project / 9 May 2022

I purchased an Arduino for beginners kit along with a multi-relay and a PIR sensor. Richard from Proto-pic was very helpful and also provided me with the " ... " kit.

Richard's electronic components shop sells mostly online at <https://proto-pic.co.uk/>, but they also have a location in Kirkcaldy, Scotland. Due to Covid, they weren't open to the general public – but Richard kindly opened up and met me there in person. He was extremely helpful with my project and discussed Arduino technology with a beginner such as myself. He seemed very keen to get more people into this type of making and commented that he had introduced his wife through these kits and she's really gotten into it. We discussed the variety of options and the complexity that this project could take on, or how to simply make a proof of concept. It was much easier to look at the electronic components and discuss how they would work together in person, this would also prove the same when I went on to work with Neil ([read more about that here](#)).

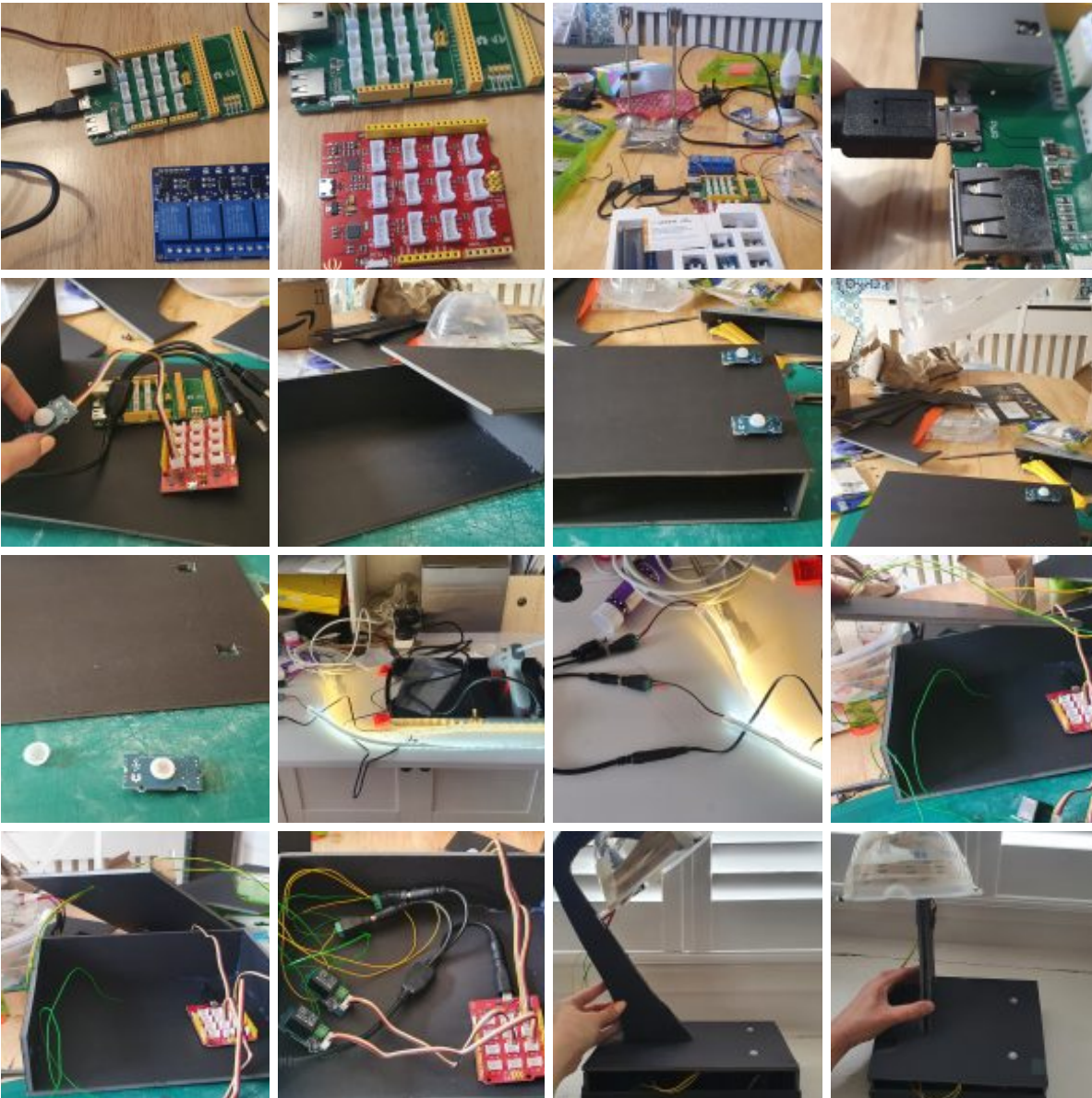
After further investigation, I also purchased 2x [Grove PIR Sensors](#) \*Adjustable (which I would later learn was not just sensitivity but also time.) as they were a smaller size and had the same Grove plug and go connections.

## Creating First Lamp Prototype and Playing with Components

Ultimately this project is about blending traditional craft with modern technology, so I spoke with craftsman Neil Fyffe about our design direction before starting on this portion. You can read more about that here: <https://www.francescadare.com/neil-fyffe-workshop-day/>

I started with how the electronic components would fit together so that we had a rough idea of how much space we would need. We also decided this lamp would be mains powered, rather than a battery. This meant there was some investigation into how to power each of the 2 light sources along with the board. I purchased this splitter from Amazon, along with a converter kit to change the power to 12V to match the LEDs. Unfortunately at this stage, I didn't purchase the converter to change from 12V to 5V for the board (which would mean I would later blow out the board by plugging it straight into the 12V power supply (whoops!)), besides that it was a brilliant plan, especially for size and aesthetics.

The plan was to have relay switches turn the lights on and off, which would be controlled by the Seeduino board, which would ultimately be taking its instruction from the sensors. Instead of using the 4x relay box – I went with 2x of the individual [Grove Relays](#) and plugged them into the board, I also plugged the 2x [sensors](#) into the board. The LEDs were then wired with one wire through the relay and another into the converter and ultimately into the power. I tested the converter circuit before adding the relays to make sure my LED strips were set up correctly.



*Figuring out the electronic components' size, wiring and function within the lamp*

Once I figured out the components and sizing I moved on to getting some code written for the board so that it knew what we wanted it to do.

## Writing and Testing Arduino Code

As with most projects of this nature, the first step was getting my board connected to my computer and able to receive code. This was more of a task than I expected, but being a beginner it will not be as time-consuming on future projects after figuring out setting up on this one.

To test this I wrote the following code with the help of [Andrew O'Dowd](#) at Napier which simply switched between the relays in time (in a loop).

```

/*
  Blink

  Turns an LED on for one second, then off for one second,
  repeatedly.

```

Most Arduinos have an on-board LED you can control. On the UNO, MEGA and ZERO it is attached to digital pin 13, on MKR1000 on pin 6. LED\_BUILTIN is set to the correct LED pin independent of which board is used. If you want to know what pin the on-board LED is connected to on your Arduino model, check the Technical Specs of your board at: <https://www.arduino.cc/en/Main/Products>

modified 8 May 2014  
by Scott Fitzgerald  
modified 2 Sep 2016  
by Arturo Guadalupi  
modified 8 Sep 2016  
by Colby Newman

This example code is in the public domain.

```
https://www.arduino.cc/en/Tutorial/BuiltInExamples/Blink
*/
int Relay1 = 2;
int Relay2 = 6;
// the setup function runs once when you press reset or power the
board
void setup() {
  // initialize digital pin LED_BUILTIN as an output.
  pinMode(Relay1, OUTPUT);
  pinMode(Relay2, OUTPUT);
  Serial.begin(9600);
}

// the loop function runs over and over again forever
void loop() {
  Serial.println(analogRead(2));
  digitalWrite(Relay1, HIGH); // turn the LED on (HIGH is the
voltage level)
  digitalWrite(Relay2, LOW);
  delay(1000); // wait for a second
  digitalWrite(Relay1, LOW); // turn the LED off by making the
voltage LOW
  digitalWrite(Relay2, HIGH);
  delay(1000); // wait for a second

}
```

I then proceeded to work on setting up the sensors to be inputs and receive the instruction so they could then control the relays (and in turn the LED strips). I looked at the Wiki pages for help on this section and tested a modification of the code that was given at:

[https://wiki.seeedstudio.com/Grove-Adjustable\\_PIR\\_Motion\\_Sensor/](https://wiki.seeedstudio.com/Grove-Adjustable_PIR_Motion_Sensor/). This was successful in terms of turning on the light, but it would then automatically turn off after a certain amount of time. Leaving me somewhat puzzled.

```

/*macro definitions of PIR motion sensor pin and LED pin*/
#define PIR_MOTION_SENSOR 2//Use pin 2 to receive the signal from the
module
#define LED 4//the Grove - LED is connected to D4 of Arduino

void setup()
{
  pinsInit();
}

void loop()
{
  if(isPeopleDetected())//if it detects the moving people?
    turnOnLED();
  else
    turnOffLED();
}

void pinsInit()
{
  pinMode(PIR_MOTION_SENSOR, INPUT);
  pinMode(LED,OUTPUT);
}

void turnOnLED()
{
  digitalWrite(LED,HIGH);
}

void turnOffLED()
{
  digitalWrite(LED,LOW);
}

/*****
/*Function: Detect whether anyone moves in it's detecting range*/
/*Return:-boolean, ture is someone detected.*/
boolean isPeopleDetected()
{
  int sensorValue = digitalRead(PIR_MOTION_SENSOR);
  if(sensorValue == HIGH)//if the sensor value is HIGH?
  {
    return true;//yes,return ture
  }
  else
  {
    return false;//no,return false
  }
}

```

We were looking to have the sensors act as touchless light switches, where one motion would turn the light on, and then the second motion would turn the light back off. As I didn't realise at first that the timer was built into the sensor it took some time to figure out why this was happening without any timer code loaded. I reached out to Richard for advice, and I also posted on Reddit for some help.

## HELP: Coding hack for a PIR that stays on

Hi All

I am looking for some help with a project. I have a Seeduino Lotus, 2x Grove Relay's, 2x Grove Adjustable PIR Sensors and 2x LED Lights that are connected to power.

Using the code suggested for PIR sensors I can get the light to turn on when the sensor sees motion but then it turns off after a period of time. Like a traditional motion sensor application.

I am looking to make a touchless lamp where the sensor turns on with a wave, and then off again with the second wave. So it would be IF senses motions, Then check if light is on, if light is on, turn off, if not then turn on.

I do not know how to code this. Can anyone help?

Thanks

### My kit:

Board: [Seeduino Lotus - Seeed Wiki \(seedstudio.com\)](#)

Sensors: [Grove - Adjustable PIR Motion Sensor - Seeed Wiki \(seedstudio.com\)](#)

Relays: [Grove - Relay - Seeed Wiki \(seedstudio.com\)](#)

r/arduino • RogueBlueSeaHorse • 23d ago

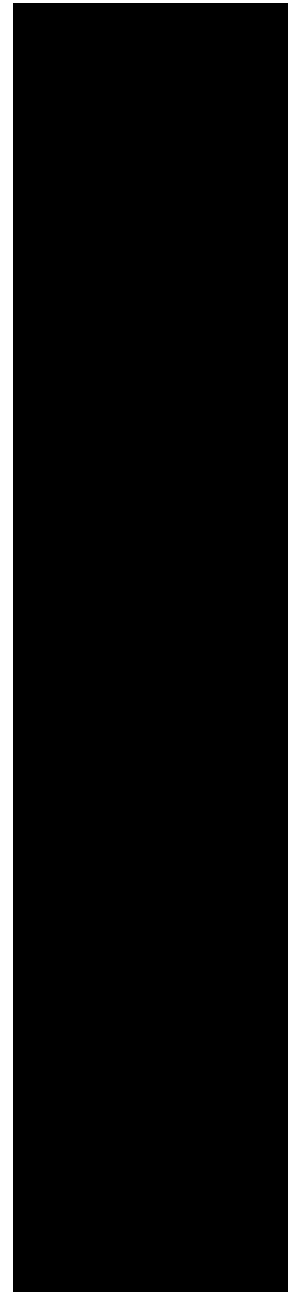
1 points • 2 comments

After taking a step back I thought maybe it wasn't the code, and I looked again at the specifications of the sensors (aha!), which revealed the problem. I spoke with **RS PRO** (where I purchased the adjustable sensors), who confirmed I would need either the **Mini Grove Sensor**, or the simpler **Grove Digital PIR Sensor** or **Grove PIR Sensor**. I wasn't able to get any of these before my **workshop day with Neil** – so I set out to make the best of the components I had (as many Designer Makers do).

Arduino works on a simple IF – THEN style logic, and I knew that I could adjust the sensor to have a short timer (under 3 seconds), so ultimately what I wanted was to tell the relay to stay on once it received the first signal and to not turn off until it received another one. This meant changing the sensors to Analog inputs and figuring out a way to tell the board to wait 3 seconds before looking for another sensor input. Because Arduino also works on a simple Loop function and using `delay()` would start to create unwanted delays, I knew that was probably not the way to go. I could see on the input that the sensor would send readings while the timer was running and then go back to 0. The problem with extending the delay and saying turn on when you see a change in reading meant the light would just switch on and off. What I really needed was to say "IF you see a reading THEN turn on the relay, and wait while the timer runs out, but keep the light on." THEN to have the

light turn off I was essentially asking the board to “check only after 3 seconds that there is a change in the sensor input”. This way it would know it was from a new instruction and not from the in-built timer.

Essentially I need to write a code that would trick the onboard timer. And after hunting around various chat boards and Wiki pages, it looked like using `millis()` to start an onboard timer was the way to go. This worked a treat (you can see the test video below). Unfortunately copying this over to use on the second sensor just simply didn't work. It is likely because they interfere with each other – ultimately this sensor was then changed to have the longest available on board on time and would work as a traditional motion sensor instead of a light. (this change in function would inform our lamp base design decisions later by moving the sensor to the side – so it worked as a ‘presence’ sensor – read more [here](#)). I do realise this is a more complicated way of doing this, and buying new sensors may have been easier, but it's all part of the crafting/making process, so I did feel a great sense of accomplishment in working it out this way. ([Neil also has a similar moment when he realises he could have made a portion of the woodwork crafting easier](#) – but again, it adds a unique flair and stamp).





0:00 / 0:11



*Video of motion sensor test to the light switch, after replacing code with millis() as a workaround*

```
const int ledPin = LED_BUILTIN;           // the number of the
LED pin

// Variables will change:
int ledState = LOW;                       // ledState used to set the LED
int relay1State = LOW;
int relay2State = LOW;

// Generally, you should use "unsigned long" for variables that hold
time
// The value will quickly become too large for an int to store
unsigned long previousMillis = 0;         // will store last time LED
was updated
unsigned long previousSensorRead1 = 0;
unsigned long previousSensorRead2 = 0;
unsigned long time;

// constants won't change:
const long sensorInt1 = 3000;
```

```

// board assignments:
const int relay1 = 2;
const int relay2 = 3;
const int Sensor1 = A0;
const int Sensor2 = A2;

// the setup function runs once when you press reset or power the
board

void setup() {
// set the digital pin as output:
  pinMode(ledPin, OUTPUT);
// set others:
  pinMode(relay1, OUTPUT);
  pinMode(relay2, OUTPUT);
  Serial.begin(9600);
}

// the loop function runs over and over again forever

void loop() {

  delay (1050);

  // here is where you'd put code that needs to be running all the
time.

  int sensorValue1 = analogRead(Sensor1);
  int sensorValue2 = analogRead(Sensor2);
  unsigned long currentMillis = millis();

  //TIME
  Serial.print("MillisSinceStart: ");
  //prints time since program started
  Serial.println(currentMillis);
  // wait so as not to send massive amounts of data
  delay(1);

  //SENSOR READING PRINTING
  Serial.print("1.");
  Serial.println(sensorValue1);
  delay(1);
  Serial.print("2.");
  Serial.println(sensorValue2);
  delay(1);

  // RELAY1
  if (sensorValue1 > 1.5) {

    if (currentMillis - previousSensorRead1 >= sensorInt1) {
      previousSensorRead1 = currentMillis;

      if (relay1State == LOW) {
        relay1State = HIGH;
      }

    }

    else {

```

```
        relay1State = LOW;
    }
    digitalWrite(relay1, relay1State);
}}

// RELAY2
if (sensorValue2 > 2.5) {

    if (relay2State == LOW) {
    }
    relay2State = HIGH;
    }

    else {
        relay2State = LOW;
    }
    digitalWrite(relay2, relay2State);

//Loop End
}
```

After getting a new board and equipped with our final design direction, I added a 12V to 5V converter to protect the board, then completed and loaded the following code – and finally [shared our project with the online community](#).

Working on this project I realized how many different ways there are to achieve the same, or at least similar results, from different components to writing the code. It also takes some trial and error, as well as experience to get the electronics to work. This type of making is in my option the craft of the modern age and we may look back in hundreds of years and consider Arduino coding a ‘traditional craft’ just like we think of woodworking.

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Design Journal

## Appendix C: Journal Post – Neil Fyffe

<https://www.francescadare.com/neil-fyffe-workshop-day/>

# Working in the Workshop with Master Artisan Neil Fyffe

Design Research Project / 9 May 2022

Neil Fyffe is a designer, artist, craftsman and all-around master artisan. His portfolio of work is impressive and his woodworking experience spans more than 30 years. He is a qualified joiner but started his making career as an artist. He graduated from Edinburgh University in 1986 with a Master of Arts and set up his own workshop in 1993, commenting that he became “his own apprentice”, later taking on apprentices of his own.

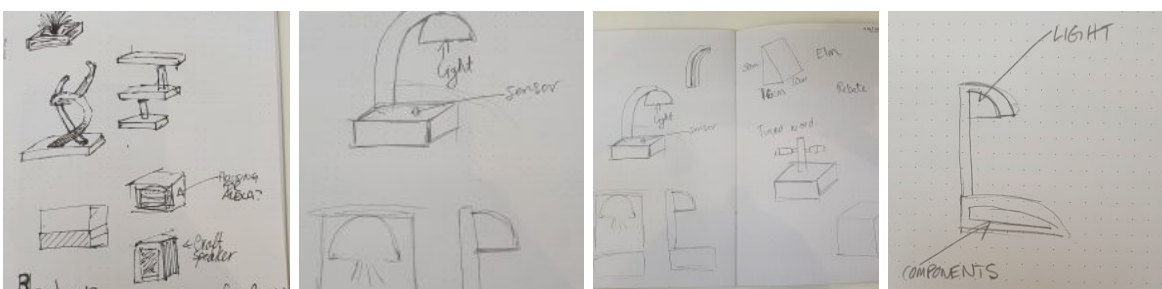
I had the utmost pleasure of working with him on a recent [project](#) for my MA in Product Design Making exploring the use of 4th Industrial Revolution Technologies in traditional craft objects and making.

## Pre-Work

Neil and I were introduced by [Andrew O'Dowd](#) from Napier. They had worked on a project previously which incorporated a Bluetooth speaker embedded into a chair.

Before meeting with Neil in his workshop we had a phone call to discuss the project and a follow-up digital design meeting over video chat where we sketched out some ideas and discussed different technologies that could be embedded into the design. As I didn't want to take up too much of Neil's valuable time, I had already narrowed down our scope to a table lamp. I felt this type of project was small enough in scale to be easily transported, it also works with an object that can be considered traditional and modern depending on its design. Additionally, this was the first time either of us had worked with Arduino components and I was going to be doing the testing and coding, often controlling an LED light is one of the first recommended projects for beginners. You can read more about the coding portion of this project in my journal post [here](#).

Neil works often with carvings and while he doesn't have much time for his wood art nowadays, he did show me a number of his previously completed pieces. So it was no surprise that the project started with the possibility of carving out spaces for the components out of a beautiful piece of elm he had in his workshop. We quickly realized that this may not be feasible in the time we had and that approaching the project from the idea of a casing/ box premises was a simple way to get going.



## *Sketching and notes during virtual design meeting (25/04/2022)*

After our video meeting, I built a foamboard version of what we had discussed. As Neil had some spare wooden bowls he had previously made we decided to use one of those for the shade, and I found a plastic bowl I could use in the first iteration of our design ideas.

I sent Neil the photographs and measurements I had taken by email so he could look out some materials he had at his workshop before I headed down.



*Sending photos of test run and measurements to Neil (28/04/2022)*

I then worked on testing the components and writing code. You can read more about that [here](#).

## Workshop Day (05/05/2022)

### Getting Started

Upon arriving at Neil's workshop I was welcomed with a beautiful smell of wood shavings. Neil said it might be burnt elm from the day before but either way it was delightful. Neil's workshop is bright and airy, with an array of materials to choose from and previous project spares to be inspired by. He has a combination of hand tools and power tools, commenting that his hand plainer was his simplest but best working tool (after I mentioned having some difficulties working with a hand plane in Ghana many years before).

Before starting with any woodworking I showed Neil the prototype I had made and the components I had brought with me (both the ones used in the test and the other sensors and components available in the kits I had purchased. Neil was very engaged with the technologies I presented, he was interested in how the components went together and what they could do. It was so much easier to discuss ideas in person with the pieces in front of us than over video, which isn't surprising (however video did mean we could both be prepared).

While the main aim of this project was to explore not just the object but the making process as well – we were still both keen to have a nice piece in the end. We discussed a variety of options, such as infrared for use with a remote, a touch sensor, or even an air sensor (however with Covid we agreed that would be strange to turn the light on by blowing on it) the final decisions about using motion sensors were decided prior to the workshop day but we did have a look at the other centres in person before getting into the woodworking.



*Working at Neil's workshop in Selkirk*

## Design Decisions Through Making

It was fascinating and great fun to work with Neil, in part because we both like to make design decisions through the making process. Even though we had some idea of the design before we started – we didn't have the exact details. There were still a few specifics that were to be decided on the day. Neil had set aside some pieces of plywood that he had used on our previous project and had leftover from previous work and we agreed that the stripe detail on the edge of plywood would be a nice addition to the lamp's aesthetic. It is also a relatively easy material to work with – so it was ideal.

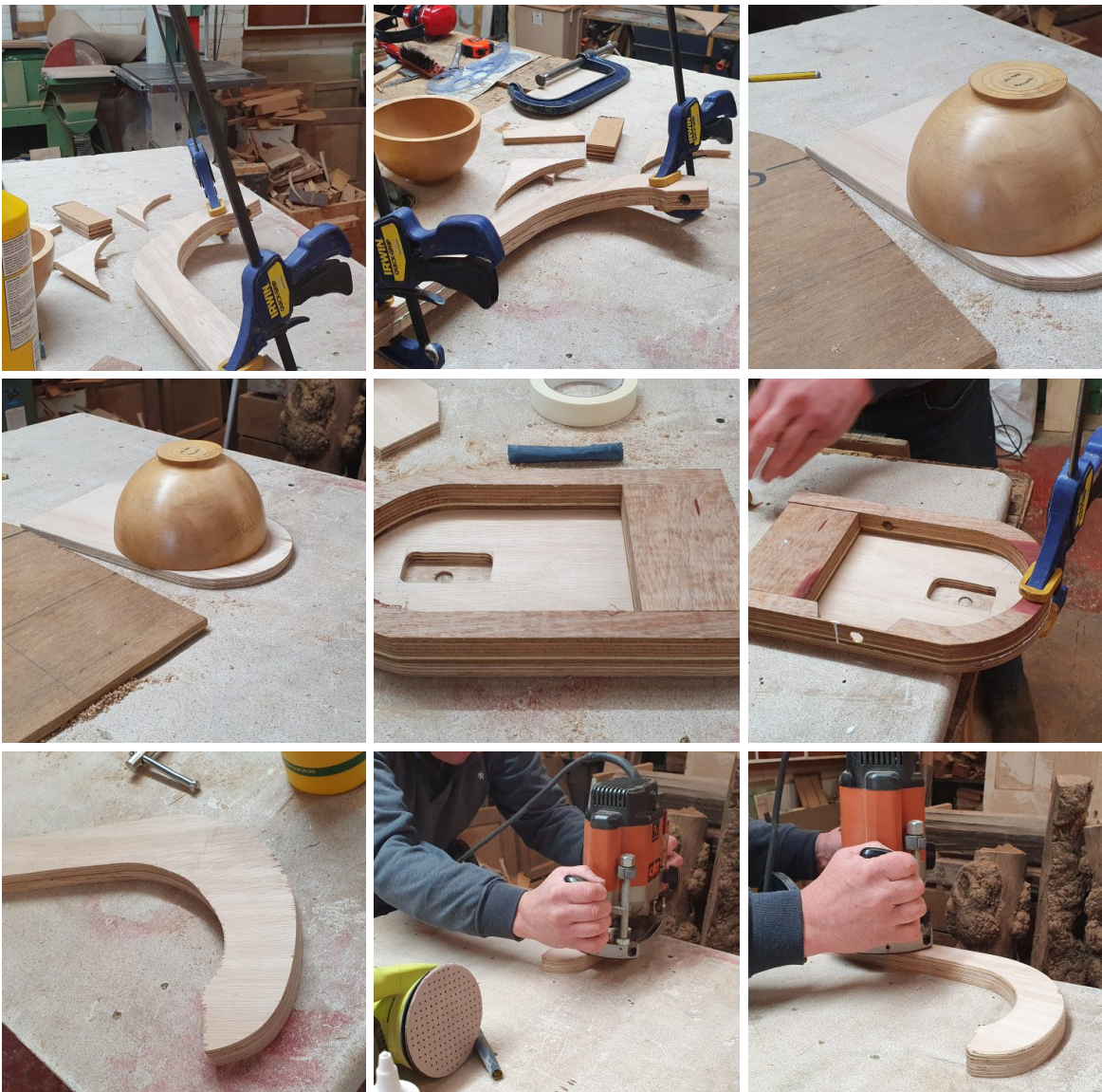
Neil also had an existing wooden bowl that he had turned for a previous project that was leftover so we decided to use that bowl as the shade. He selected this one because it looked similar in size to the plastic bowl I used in the mockup, it was an appropriate scale for what we were looking to achieve.

Neil also had some existing curved items in his workshop and we used them to trace and make the curve. We then used a router to create the cut-out for where the wiring was going to go. Neil skilfully cut the curve that would hold the lampshade and I sanded the pieces down on the rotary sander.

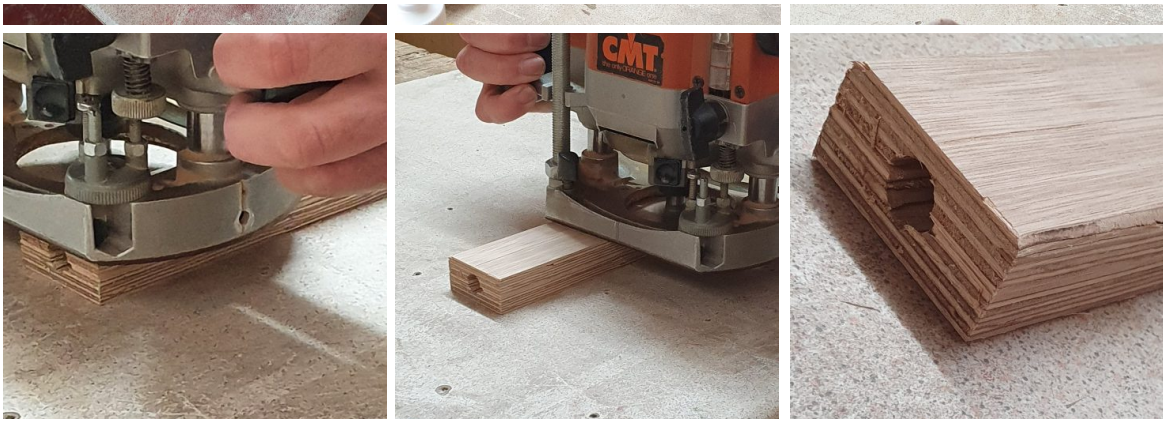
I had purchased two white strips one with a cool colour and one with warm colour and couldn't decide which one to use for the lamp so put both in one click sensor in the future in future iterations of this project be developed further to allow for choice between warm and cool lights. (See more about the speculative design portion of this project [here](#)).

Other decisions we made during the design process included, changing the angle of the post from 90° to have a slight angle to add a bit more interest, moving the second sensor to the side (as the programming meant it was stuck on the timer setting – you can read more about that [here](#)). We also both agreed that the base would have a nice aesthetic if the width was the same as the shade and so we measured the base piece out and cut it as a rectangle, but once we had the piece in front of us we decided to trace the curve of the shade/bowl – as it would add something extra aesthetically to the piece. This serendipitously made placing the top motion sensor an easy decision in the centre of the curve as it too was round.

At each turn when a new challenge or opportunity presented itself it was easier to discuss ideas and suggestions by demonstrating with the pieces, and through the making process rather than having an exacting plan. This meant that the lamp *“started to take on an aesthetic of its own”* as Neil would come to say at the end of the day. This is the real distinction between ‘knowing through making’ or the making process in general rather than simply manufacturing or building. A lot of the decisions (and fun) wouldn't have happened if it was simply a manufacturing exercise.







*Working at Neil's workshop in Selkirk*

## Blending Craft Objects and Making with Modern Tech

Throughout the day and during the creation of this lamp Neil and I discussed the use of technology in traditional craft objects. He was enthusiastic about the idea and he was interested to learn more. He did however state that learning the code would probably be too much for him but he liked the plug-and-play style components of the Grove Kit that we were using, which meant we didn't have to worry about soldering wires etc. While Neil had not used this type of technology before, by lunchtime he had already started thinking of other ideas for projects that which this technology could be used. For example; making the custom cabinet with a small light that would turn on when the cabinet door was opened he did ask if the boards came with programs – which I told them unfortunately they don't, but it would be a good offering idea because I agree there is a big difference between making something with kit parts and learning code which is a new and different language.

We carefully created openings and space for the technology to live seamlessly with the wood and it created a nice aesthetic – if I do say so myself – and it started to feel like we really were making something special.

## Taking a Lunch Break

We would eventually decide to take a break, and I had the delight of enjoying lunch with Neil and his wife Dot in their beautiful farmhouse. I brought my own wrap from Marks & Spencer's and Neil had what he called a 'special pie' which he needed to explain to me meant it was meat and black pudding (this was the part of the day my husband seemed very interested in when I told him about my day – asking what kind of meat was in the pie and then going to buy one the next day!).

Over lunch, we showed Dot the progress we have made and discussed the project along with other possibilities and projects that could be made. Neil shared his enthusiasm for the possibility of choosing a warm or cool light by the user within the lamp with Dot and she thought that would be a great idea for different times of day or tasks you might be working on.

I also shared with them the [Samsung Smart Bike](#) design story and explained how it was intended to encourage cross-generational learning and increased interest in traditional crafts (similar to what we were looking at together). Dot commented that she is comfortable with technology when she's had a chance to get to terms with it but finds the initial starting sometimes to be difficult. This was generally because her grandkids jumped right without explaining how it works. I agreed that I had

felt similarly with the Arduino beginner's kit I purchased for this project because there was no start guide printed in the box. It did come with a QR code, which makes sense for a tech-based kit, but I still would have liked a small booklet or card guide to help get my computer connected to the board and walk through the first few steps. Even though I am quite comical technology was slightly intimidating at first.

## A Master at Work

Watching Neil work was a great experience and working together on this project was a lot of fun. It was interesting to see how even with years of experience you can still realize an easier way of doing something after you've made it more difficult. Neil is a master carver and used his chisel to match the angle of the lamp post with the notch in the base, only to comment "Oh I could have just cut the post straight rather than angle the base" (N. Fyffe, 2022) – I'm sure that would have worked great but it was still good to see his expert skills in action.

## Other Projects

Over the course of our day together, Neil shared how he started in woodworking by building his own instruments (mainly acoustic guitars). He has also worked on a number of other projects, with most of his work coming from architects or through his website. He noted that he had always found business through word of mouth but did notice once he had a website that work started coming through that.

One of his notable projects he had spare pieces left from was the Barton Hotel, where he was commissioned to work on the gables by the architects, which was a fine example of the type of work he usually works on.

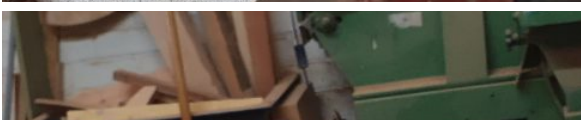
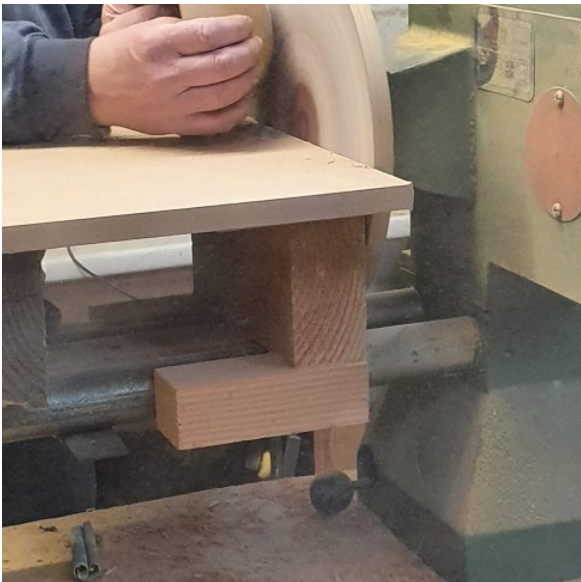
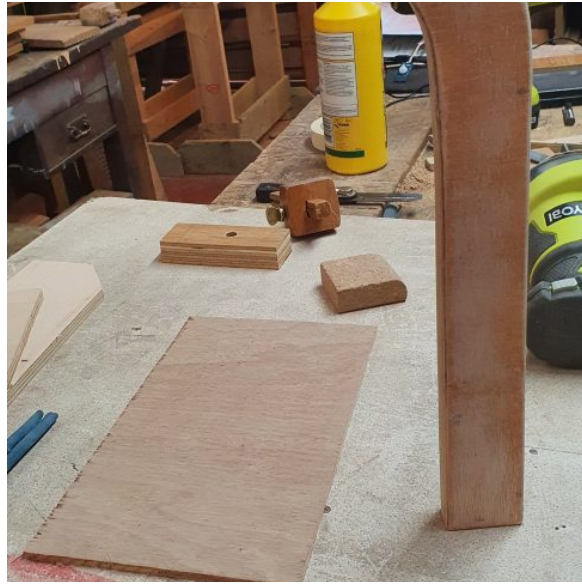
We also spoke about other collaborative projects, including his work on a Canadian totem pole project up in Aberdeenshire. It was funny how we came to speak about this project actually. I was asking him about the tools he had in his workshop, commenting that my parents had a small dremmel when I was younger and I used it to make a totem pole project (but did not venture much into hand carving with chisels). He said that he has actually worked on a totem pole project with a team of Canadian craftspeople and that the chisels they used "looked more like spades" (because of their large size). He did get the chance to try out their tools and they shared some of their skills with each other. While they were each responsible for carving a particular portion of the pole, it was truly a collaborative project.

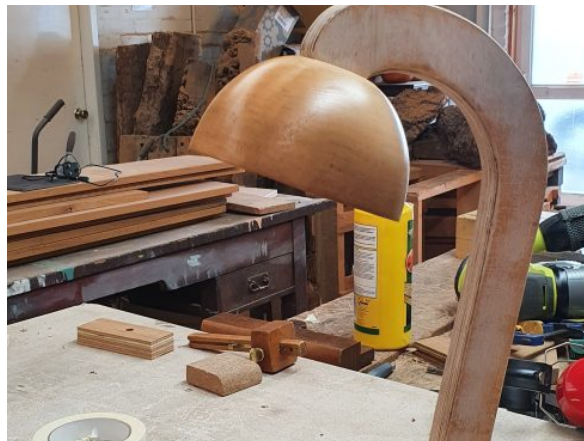
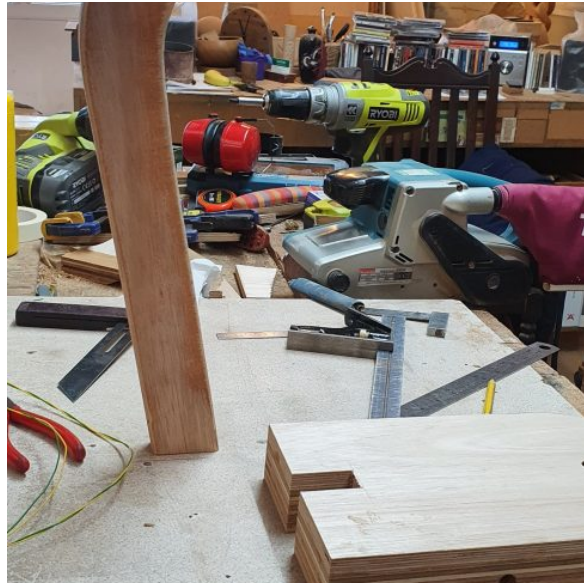
## Coming together

The base of the wooden bowl Neil had created previously needed to be removed to give the lamp more of a shade appearance (rather than a bowl). Things started to come together. I sanded down the lamp post and fed wiring through, connecting it to the 2x LED strips we had attached to the inside of the newly modified lamp shade.

It did start to appear that the base of the lamp started to have a guitar-like feel to it, which was of course unintentional but interesting considering that instrument making is how Neil got started in woodworking. The way he approached the making of the box for the base by using a solid piece and cutting out the interior space – rather than starting from the idea of a cube of separate planes was

an interesting approach but meant we could add the weight back in and the curve was easier to match with the top. It also meant we could have the stripes of the plywood as a distinguishing feature. In the end, the base does almost have a solid appearance – rather than looking like a box.







## Appendix D: Journal Post – Speculative Design Lamp

<https://www.francescadare.com/speculative-design-craft-object-iot/>

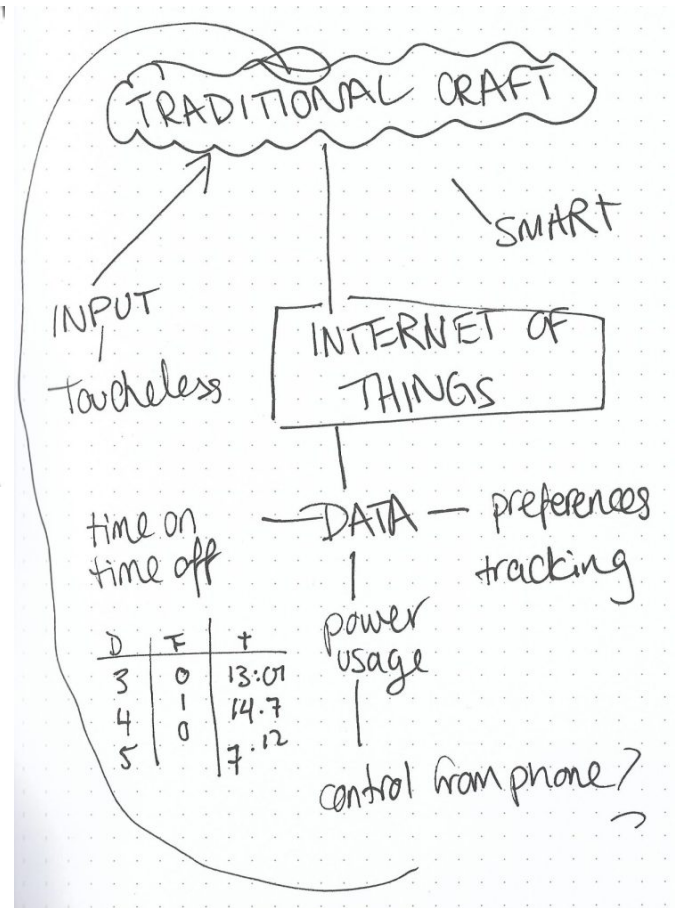
# Speculative Design – Craft Object & IoT

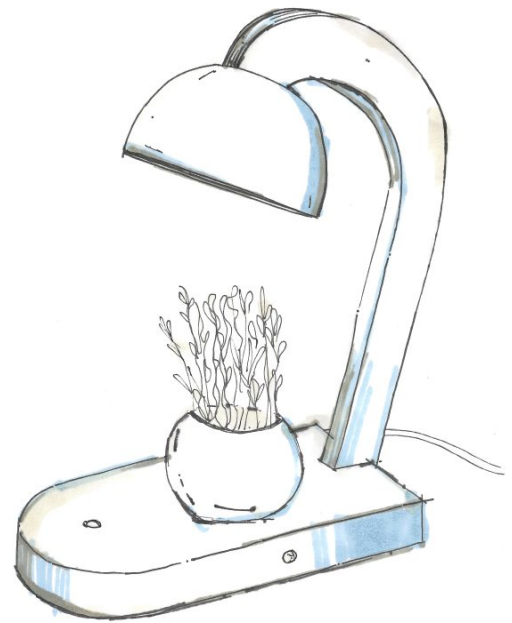
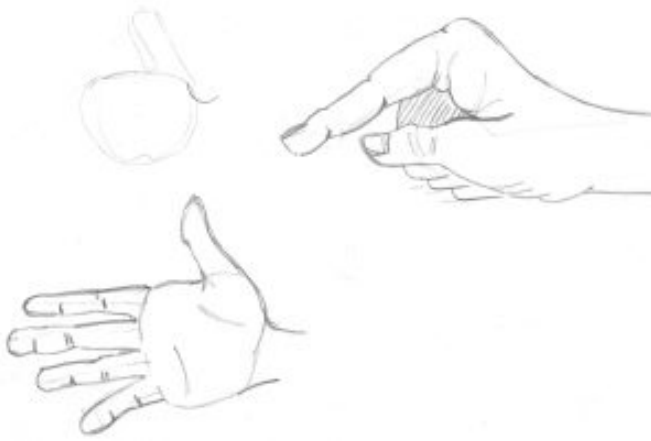
Design Research Project / 19 May 2022

Speculative design practice allows for the design of objects that aren't currently possible, but are plausible in a future world.

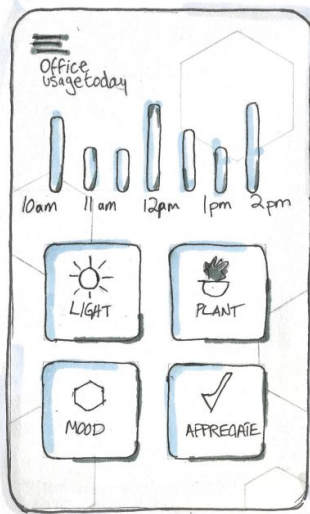
This **responsive companion lamp** is a craft object that joins the Internet of Things. It has been designed with the following features:

- Various light options
- Human presence, mood, and temperature sensors
- Adjustable lamp arm
- App connectivity
- Push Button to send artisan(s) who made the lamp appreciation
- An artisan monitored tea plant (mood details are sent to an artisan grower and they recommend nutrient packs to feed the plant and influence your tea – and your mood) with built in moisture sensor.
- An app will include monitoring of your mood, tea plant, light usage, and preferences, as well as information on how the lamp was made, information about its creators, and the history of the object (as this could become an inheritable piece).



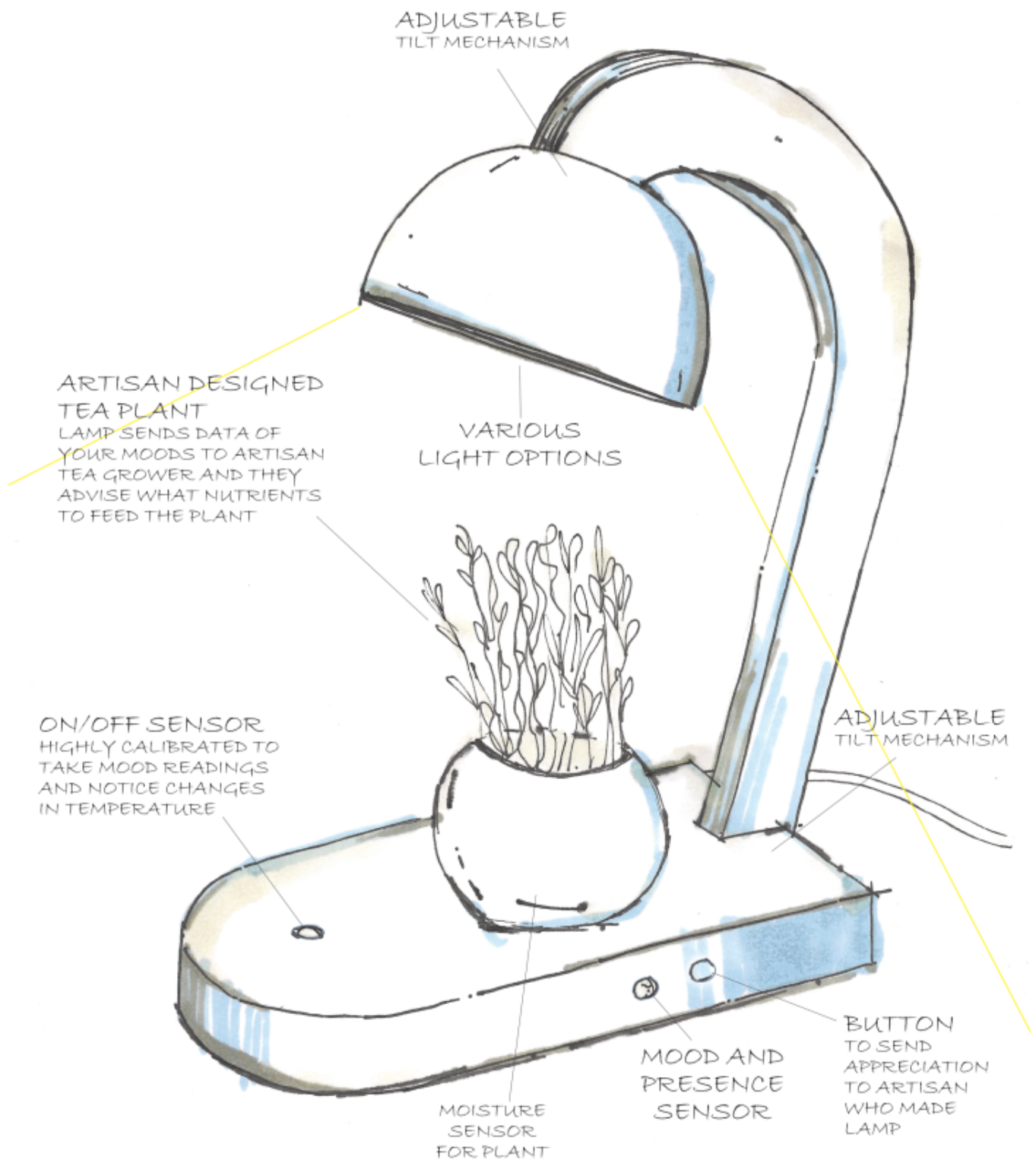


TRACKS USAGE = MOOD



SEND APPRECIATION TO ARTISANS





Its the hope that in the future, craft object will continue to hold value, if not more than today. With added technology they could become invaluable staples in our everyday lives – more personalised – more in tune – more us.

## Appendix E: Journal Post – Sharing Our CraftTech Lamp

<https://www.francescadare.com/sharing-my-first-arduino-project/>

## Finishing Our CraftTech Lamp and Sharing Online

Design Research Project / 19 May 2022

Once we had completed what we could during our workshop day ([see post about working with Neil Fyffe](#)), I completed the woodworking portion of this project at the Napier workshop where I sanded the shade to smooth the shape and remove the top coat finish. I then taped up the openings for the electronic sensors and gave the lamp multiple coats of wood wax to enhance its natural aesthetic.

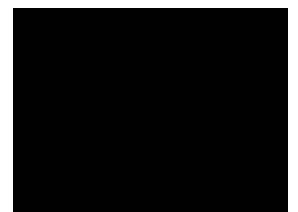


*Finishing by sanding and applying multiple layers of wood wax.*

I also obtained a new Seeduino board (thanks to Richard at [Proto-pic](#)) and proceeded in my next attempt to load the code and complete the electronics within the lamp. (see my previous attempts [here](#))

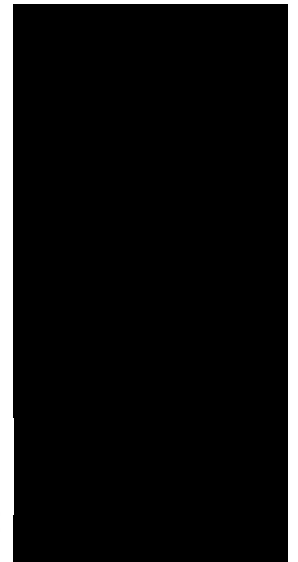
Finally success!

I shared the results of this project with the online Arduino Reddit Community [here](#).





0:00 / 0:25



### *Final Video*



### *Project Photos*

## Final Code

The following is the final code loaded to the board.

```
const int ledPin = LED_BUILTIN;           // the number of the
LED pin
// Variables will change:
int ledState = LOW;                       // ledState used to set the LED
int relay1State = LOW;
int relay2State = LOW;
```

```

// Generally, you should use "unsigned long" for variables that hold
time
// The value will quickly become too large for an int to store
unsigned long previousMillis = 0;          // will store last time LED
was updated
unsigned long previousSensorRead1 = 0;
unsigned long previousSensorRead2 = 0;
unsigned long time;
// constants won't change:
const long sensorInt1 = 3000;
// board assignments:
const int relay1 = 2;
const int relay2 = 3;
const int Sensor1 = A0;
const int Sensor2 = A2;
// the setup function runs once when you press reset or power the
board
void setup() {
// set the digital pin as output:
  pinMode(ledPin, OUTPUT);
// set others:
  pinMode(relay1, OUTPUT);
  pinMode(relay2, OUTPUT);
  Serial.begin(9600);
}
// the loop function runs over and over again forever
void loop() {

delay (1500);

  // here is where you'd put code that needs to be running all the
time.
int sensorValue1 = analogRead(Sensor1);
int sensorValue2 = analogRead(Sensor2);
unsigned long currentMillis = millis();
//TIME
  Serial.print("MillisSinceStart: ");
  //prints time since program started
  Serial.println(currentMillis);
  // wait so as not to send massive amounts of data
  delay(1);
//SENSOR READING PRINTING
  Serial.print("1.");
  Serial.println(sensorValue1);
  delay(1);
  Serial.print("2.");
  Serial.println(sensorValue2);
  delay(1);

// RELAY1
  if (sensorValue1 > 1.5) {

    if (currentMillis - previousSensorRead1 >= sensorInt1) {
      previousSensorRead1 = currentMillis;

      if (relay1State == LOW) {
        relay1State = HIGH;
      }

    }

    else {
      relay1State = LOW;
    }
  }
}

```

```
    }
    digitalWrite(relay1, relay1State);
  }}
// RELAY2
if (sensorValue2 > 2.5) {

  if (relay2State == LOW) {
  }
  relay2State = HIGH;
  }

  else {
  relay2State = LOW;
  }
  digitalWrite(relay2, relay2State);
//Loop End
}
```

## Sharing to Reddit

The following is the shared project post on Reddit.

# CraftTech Lamp - made with professional artisan (Warm or Cool Light Options)

Check out what we made!

## [Final Video](#)

This lamp was created in partnership with a professional woodworker (with 30 years of experience), and myself (with no experience in Arduino).

This light has 2x motion sensors, the one on the side turns on the warm coloured LED and senses when someone is in the room and has a 120second timer. The one on the top acts like a touchless switch and turns the cool LED light on and off each time the sensor is triggered.

See more about this project here: [Design Research Project](#)

## [Initial Prototype](#)

## [Final Lamp](#)

The next steps are to think about connecting a wifi transmitter to the lamp so it can send information to a phone app, such as how long the lamp is on, which of the two LED strips are on the most etc. If you have any suggestions or ideas for further development let us know!

Thanks !!

r/arduino • RogueBlueSeaHorse • 7d ago  
2 points • 0 comments

• • •

This post relates to a project page, view the project page to see other related posts and outcomes.

[Go to Project Page](#)

[Click Here to return to Journal Posts on Project Page](#)  
or click Next Post below to keep reading posts in this category

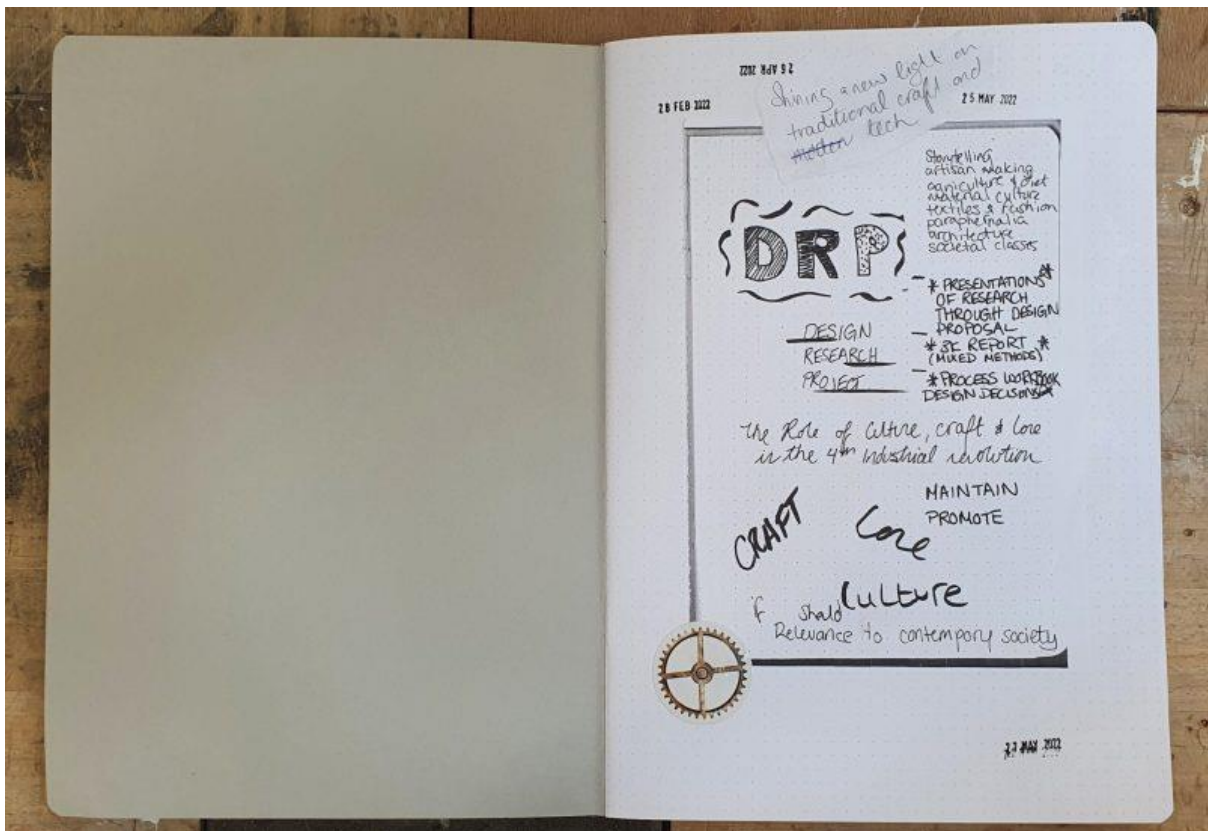
[← Previous Post](#)

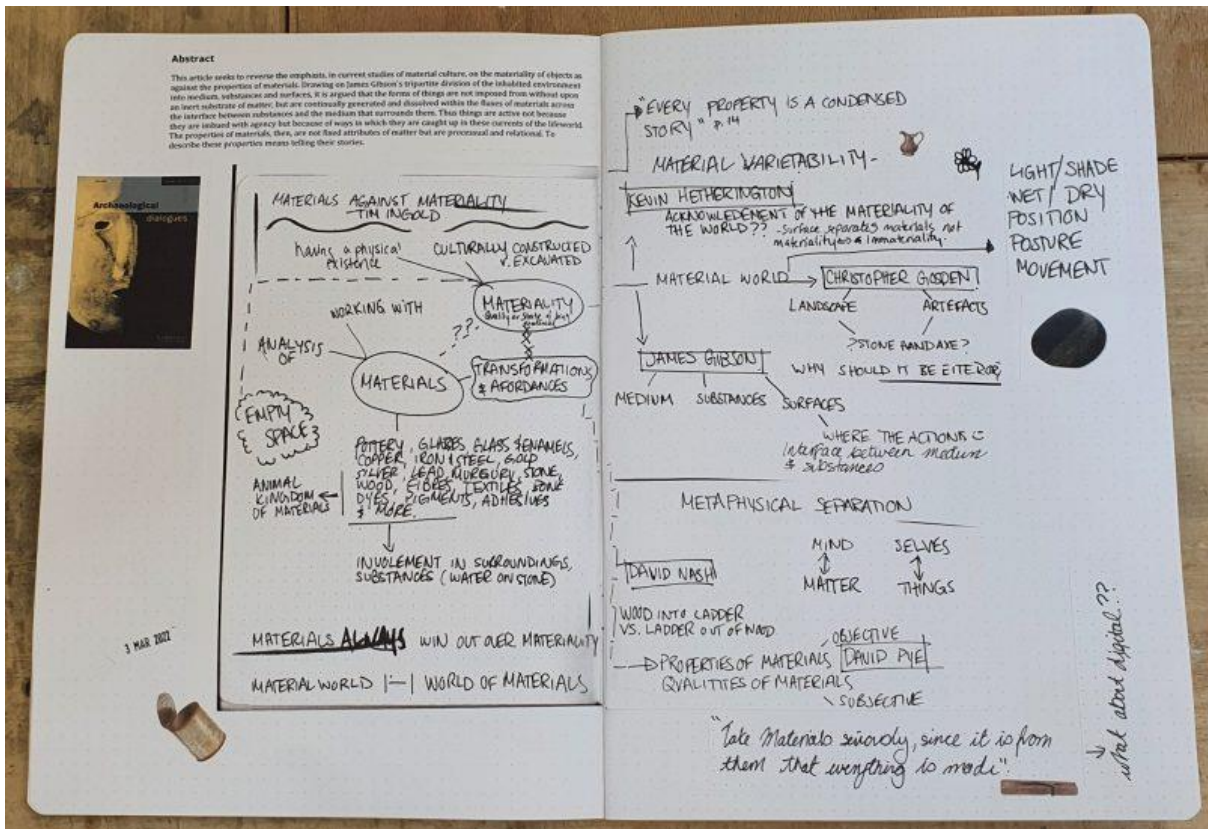
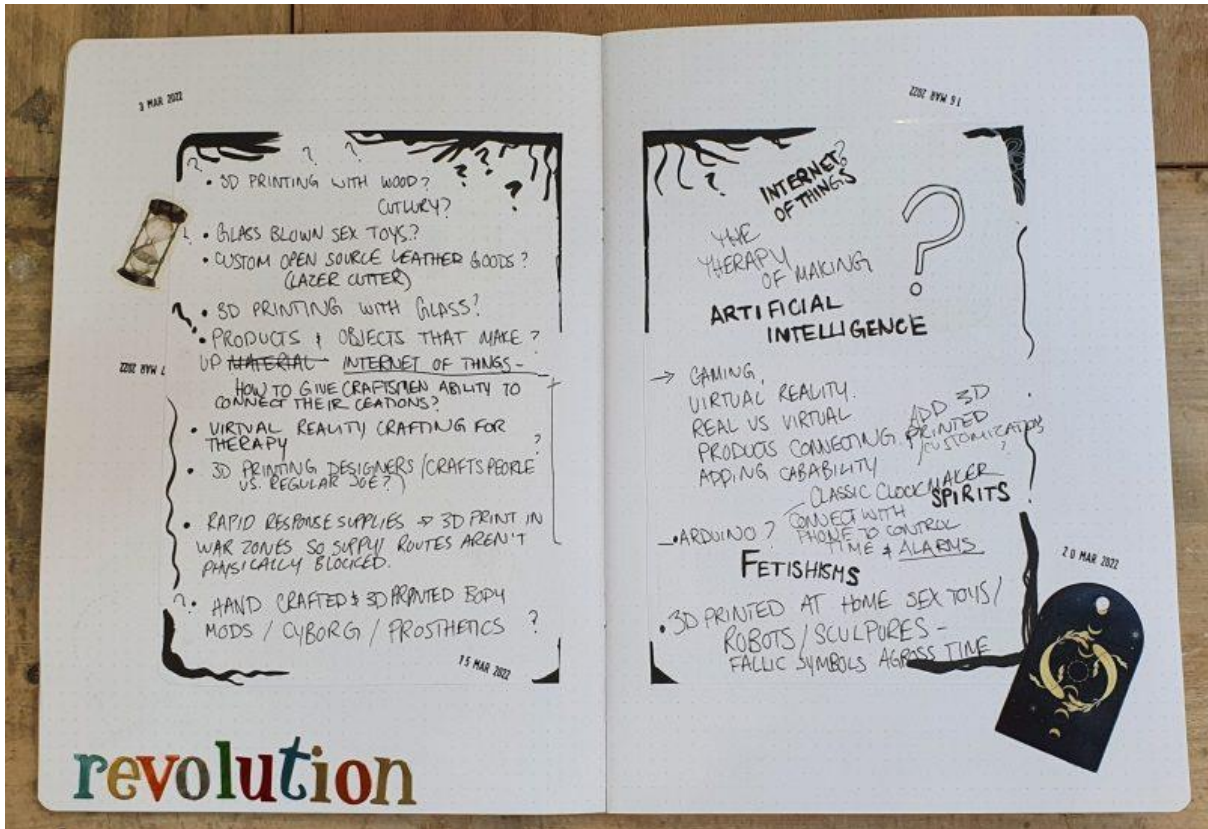
[Next Post →](#)



# Appendix F: Project Scrapbook

<https://www.francescadare.com/research/drp/#scrapbook>





5 MAR 2022

GROWING LIVING BRIDES IN MUMBAI, WATSON J.

LIVING BRIDE NETWORK → COMMUNAL LAUNDRY

SUSTAINABLE  
 ↳ INFRASTRUCTURE  
 ↳ ACCESSIBILITY  
 ↳ PUBLIC AMENITIES

EXTRA WATER TO TREES  
 ↳ REDUCING CO2

LIVING MATERIALS

MEGHALAYA → MUMBAI

COMMUNITY ENGAGEMENT

FICUS ELASTICA  
 ↳ 10-15 YEARS BEFORE FUNCTIONAL  
 ↳ ROOT GUIDANCE SYSTEMS TO SPREAD ACROSS RIVER/STREAM  
 ↳ NEED A LOT OF WATER TO GROW  
 ↳ TEMP STRUCTURE WHILE GROWING

LIVING ARCHITECTURE  
 ↳ Changing the way cities are designed using nature based solutions.

COULD LIVING DESIGN BE A 5th INDUSTRIAL REVOLUTION???

THE SPIRIT OF MATTER: ON FETISH, RARITY, FACT & FANCY - PETER FELT

IF THE FETISH IS A GOOD GUIDE (ITS EXPLANATION OF PRESENT WITH ANOTHER SOCIAL HISTORY)

"The fetish foregrounds materiality because it is the most aggressive expression of the social life of things: we really believe it is an animated entity that can dominate persons" - p91

DEFINITION OF FETISH  
 1. a form of social desire in which satisfaction is linked to an abnormal degree to a particular object  
 2. an inanimate object worshipped for its supposed magical powers or spirit

ARJUN APPADURAI  
 IS THINGS HAVE NO MEANINGS EXCEPT THOSE HUMANS ENDOW AND THEM

OUT OF TOUCH WITH REALITY? → Things that are disconnected from the social and the spirit of matter

MARXISM PERCEPTION  
 ↳ Social phenomena material and this requires to have human material facts

PSYCHOANALYSIS

Whether as an "Afro" Religion, as the overvaluation of aesthetic commodities, also a specific articulation of social desire, the fetish remained an object of abnormal traffic.

THE BELIEF THAT SPIRITS INHABIT SOME OR ALL CLASSES OF NATURAL OBJECTS OR PHENOMENA

FETISHISM ↔ ANIMISM

THE BELIEF THAT NATURAL OBJECTS HAVE SUPERNATURAL POWERS, OR THAT SOMETHING CREATED BY PEOPLE HAS POWER OVER PEOPLE

LABOR KOPITOFF  
 FETISHISM IS OTHER KINDS OF WORTH  
 ↳ LINKED TO COMMUNITIES

SPIRIT IN ↔ SPIRIT OF  
 ↳ SINGULARITY IS ORIGINAL & NOT THE RESULT OF SENTIMENTAL HISTORICAL OR OTHER PERSONALIZED VALUE  
 ↳ OTHER THING

TRANSCENDENCE OF MATERIALITY  
 TOTALENISM  
 ↳ Thing to surpasser human beings by its materiality p94

FETISHIZED COMMODITY ↔ DEMAND  
 ↳ AFFIRMATION & DENIAL OF REALITY (FREUD) p92

THE FETISH'S AESTHETIC VALUE RADICALLY DISTINGUISHES IT AS A MATERIAL OBJECT FROM THE SUBJECT IT COMBINES

CAPITAL IS FETISHIZED BY THE VALORIZATION BY LABOR

↳ to enhance/try to enhance the price/value of things by organized action

CAPITALISM  
 ↳ CONSUMER DEMAND TAKES THE FORM OF THE FETISHIZED COMMODITY  
 ↳ DEMAND IS DETERMINED BY 3 DETERMINING SOCIAL & ECONOMIC FORCES  
 ↳ TREAT OF THE FETISH TO UNDERSTAND THE MATERIALITY OF THE OBJECT  
 ↳ HOW CAN IT BE CONTROLLED? (on human & material objects)

7 MAR 2022

15 MAR 2022

DEFINE POSITION

by adding a technology component, you can make objects/things that can compete affordance/feature-wise with modern tech but with the inherent added value that the human participation in the making process gives the design. Selling this type of tech craft could help fund artisans so they can continue to practice their craft.

incorporating Arduino tech and participating in the open-source community provides a modern way to share their traditional craft with a tech / coding generation and potentially inspire them to learn these skills to. This could help keep interest in artisan crafts alive.

in the future, we could look back to now and see making Arduino objects/things as a new type of traditional human-made craft (arguably seamstresses don't make their own fabrics anymore, so are the Arduino components the new fabric?)

PRIMARILY METHOD OPTIONS EXPERIMENTS

FRAMEWORK  
 SCALES  
 TECH LEARNING OR

A coo-coo clock that connects to your phone and you can set alarms, or that tweets the latest tweet each hour instead of coo-coo

Metalwork lamp controlled by your phone

Handmade wooden toys with a robotic element

E-textiles and needlework  
 ↳ Or basket weaving - like a laundry basket that gives you reminders

HUMANS MOULDED BY MATERIALS  
 ↳ MATERIALS THEY MOLD

WREED FANOUT  
 SENSUOUS  
 DESIRE - OBJECT OF SENSE - ↳ TO SUFFER

AESTHETICS  
 ↳ Materiality of human interaction with things

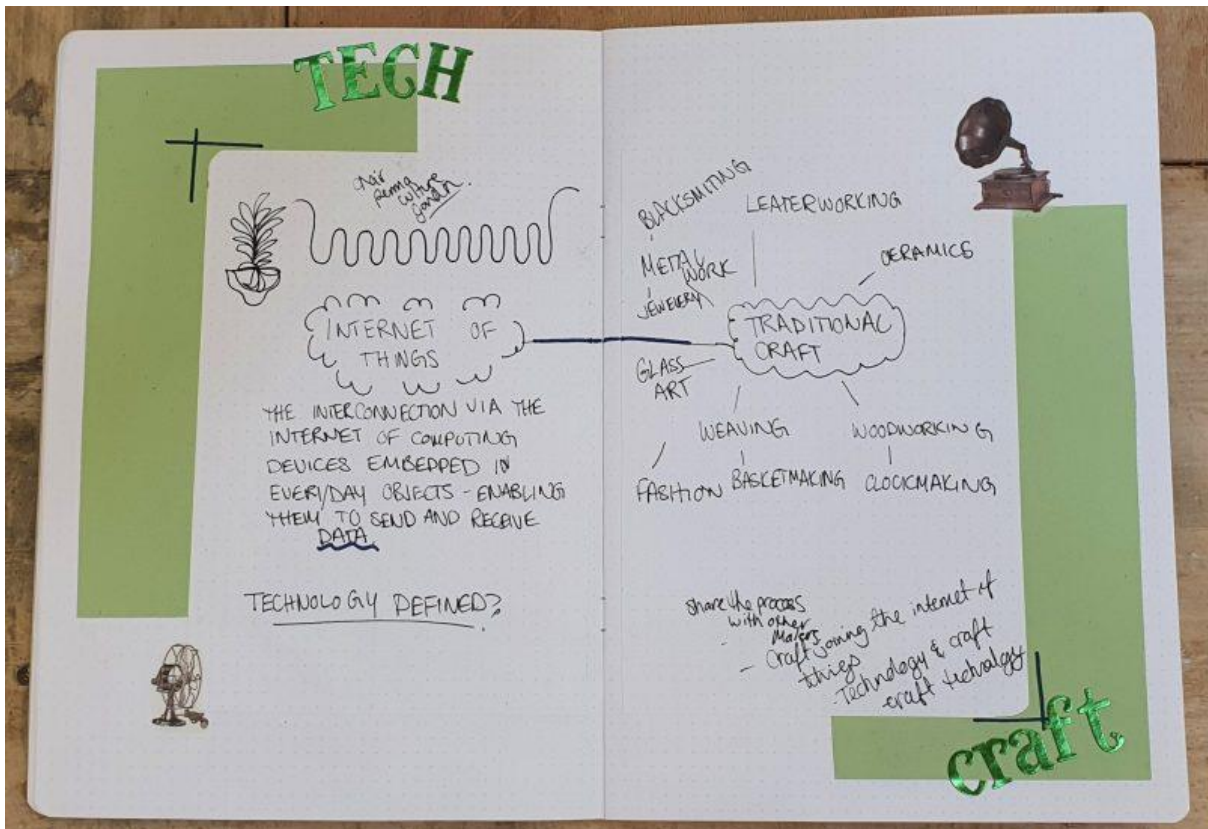
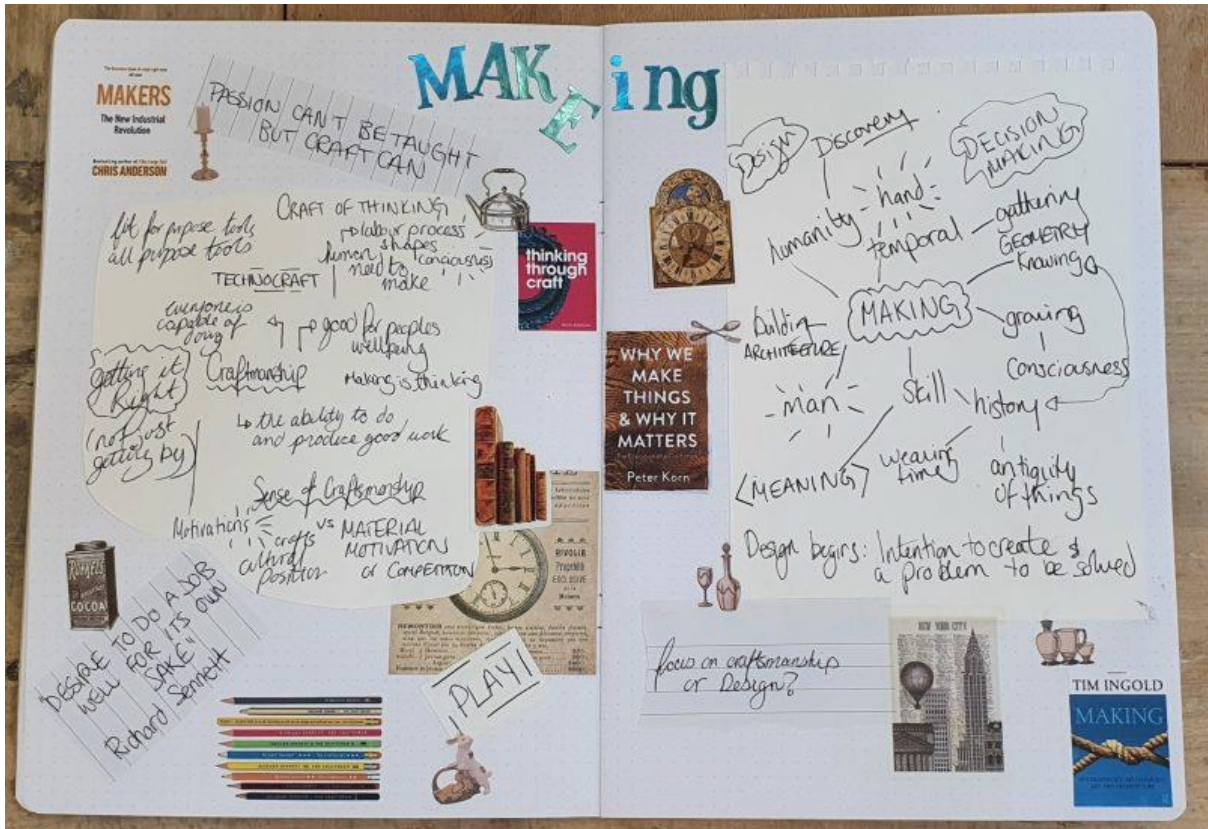
Visual oral  
 Perception  
 Sensory regimes

THE MATERIAL PROCESS OF MEDIATION OF KNOWLEDGE THROUGH THE SENSES.

Therapy  
 PRESTIGUE  
 STATUS  
 DESIGN RECORD

DECOR  
 MODERN FUNCTION VS RETRO APPEARANCE  
 FAMILY HEIRLOOMS

Culture core



## Ubiquitous Production & Control

Co-Design  
Interview  
Reddit?

Research through Design

Connection between physical & Digital worlds

Craft → internet of things

↓ sensors

↓ Feedback

↓ intelligent feedback

Information & Power

BigData

making decisions

What will the craft object afford you if tech is added (4IR)

# DATA

Haptics, Motion, Time  
Light, Sound, Objects  
Data, Information, Counting.

Housing Alexa?

Craft speaker

Blend vs. Partnership. (type of partnership)

# KNOWLEDGE

## CASE STUDY - SAMSUNG SMART BIKE

Maestro Giovanni Pellizzoli is a world famed frame builder who worked together with Alice Bioti, a young student of Samsung Maestros Academy to create the Samsung Smart Bike. They combined traditional craftsmanship with Arduino technology to create a one-of-a-kind bike with added features.

An Arduino board, a Wi-Fi + Bluetooth module, a battery, and a digital camera (located below the rider's seat) have been integrated into a model put together by Samsung Maestros Academy, which can be controlled via a Samsung smartphone. To further enhance visibility, the Smart bike rider can even adjust the beam's intensity. In addition, there is a built-in GPS system that shows you exactly where you're going. The phone's location is fixed at the handle of the bike, making it easy to access while riding.

Samsung's DNA is one that seeks to "launch people" and amplify their life's potential through the design of its products.

Craft techniques at Risk

Intangible Cultural Heritage

The goal of protecting traditional craftsmanship is to make sure that craft skills and practices are passed down from one generation to the next. Crafts are an important part of any country's cultural heritage because they show the culture and traditions of a certain area.

Samsung Smart Bike Features: curved frame that neutralizes dangerous vibrations caused by riding on rough city streets, four laser beams that create individual bike lanes, an integrated GPS system and a rear-view camera that streams a live video feed and riding data to the handlebar-mounted Samsung device. Images courtesy of Samsung Maestro Academy. (Daily Mail)

# GENERATIONAL

Next generation bike connecting the generations

- tech → Arduino controlled by Samsung smartphone

- Milan Design Show

tech company

Craft design

craftsmanship

"MADE IN ITALY"

# CROSS

**CODING as Art** Git hub

ART DESIGN CRAFT  
Making Coding

**art**

Hand (Tradition) **MAKING** Robot! (CNC, laser)

slow  
developing your making hands on approach develops the design  
- resolve (tech ability) from being hands on.

robotic design - why we love (or hate) everyday things

- objective, gain insight
- highlight or revealing what might be hidden

robotic  
Makes in the new industrial revolution  
con this include coders  
Does the definition of craft hold true despite the

4IR Technology in the process of craft.

Digital content grounded in the craft of wall art

built in digital plugs  
- projector button to project only while screen

Open source process  
- access to the process through exhibition of their work

discuss design intent design - depression anxiety the lighting lab ceiling

**data**  
Sisters in transistors

Can they make cottage industries with traditional making or do they need to embrace advanced manufacturing

**IR (Arduino) PROTO PIC**

flex sensor  
PIR sensor  
capacitive sensor (touch)  
air pressure sensor

15 APR 2022  
Subject: Re: Design Research Project introductions  
Date: Fri Apr 15 2022 17:08:53 GMT+0100 (British Summer Time)  
From: "Neil Foster" <neil@neilfoster.co.uk>  
To: "Dare, Francesca" <40410289@europe.nyu.edu>  
Hi Francesca,  
I am well thanks, and hope you are too.  
I think it would be better to discuss the responsive table lamp over the phone first, so I have a better idea of what the project entails. Also, if I am to be co-making anything I would rather be in the room making, where I know the equipment and tools etc. I hope that is okay.  
Feel free to give me a call on [redacted] on Tuesday and we can take it from there.  
Regards, Neil

BOARD  
POWER 1

TRADITIONAL CRAFT

INPUT Touchless

SMART

INTERNET OF THINGS

time on time off

DATA - preferences tracking  
power usage  
control from phone?

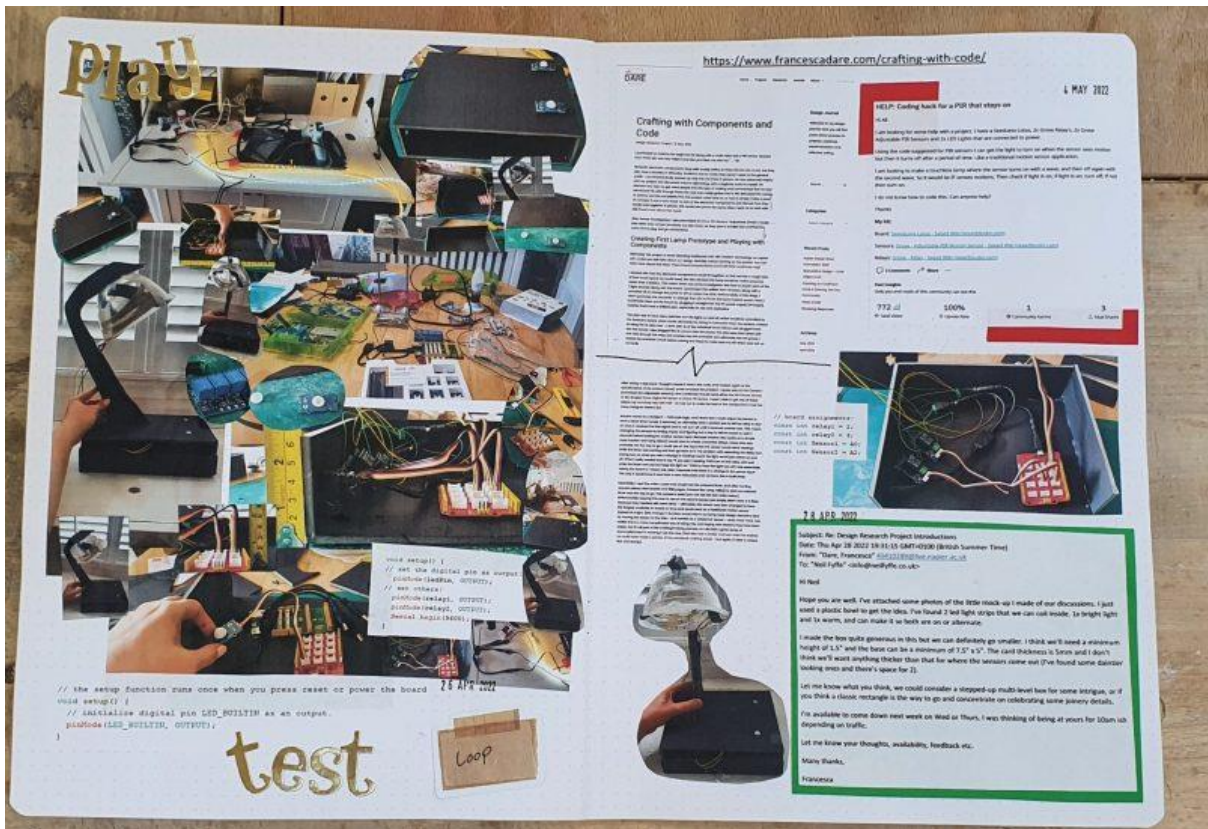
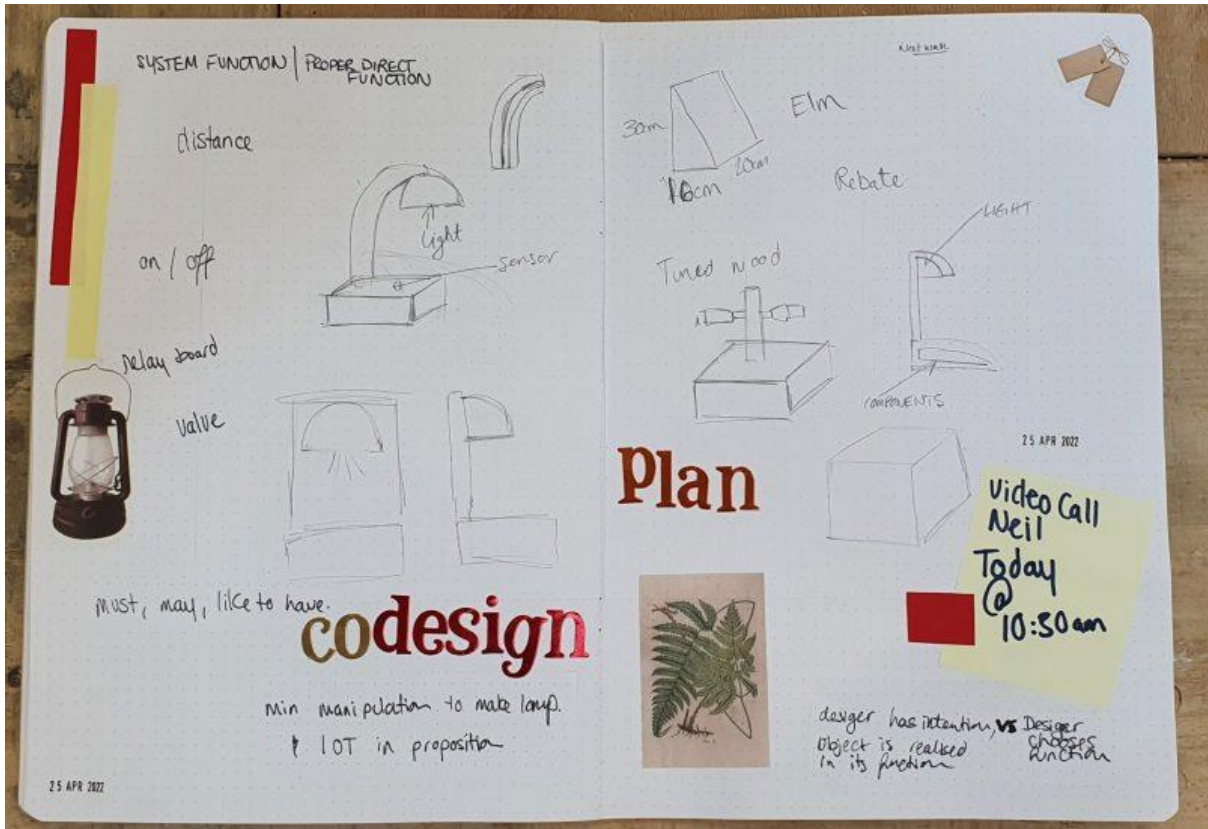
2	F	13:01
3	0	14:7
4	0	7:12
5		

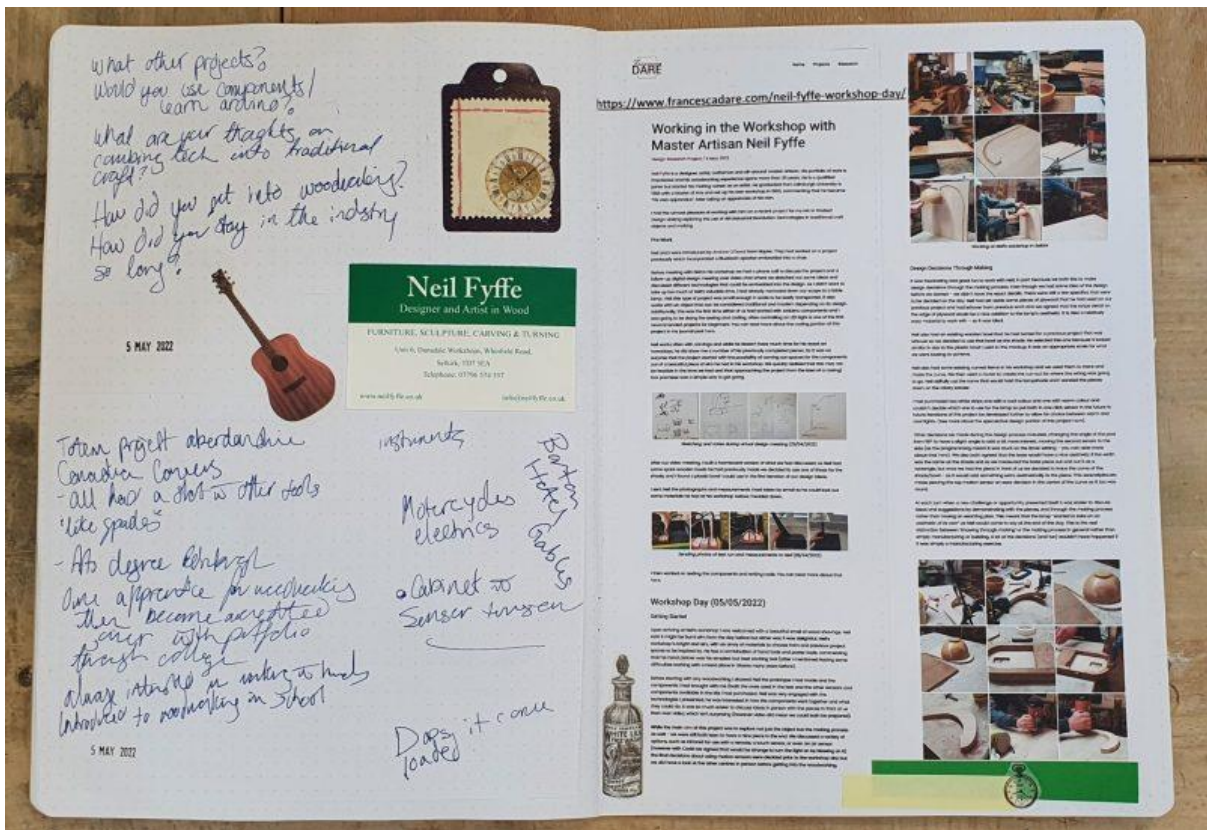
but - how much is outboard?  
interested to do the process himself

well he makes it may might look at it in the afternoon to his 15 APR 22

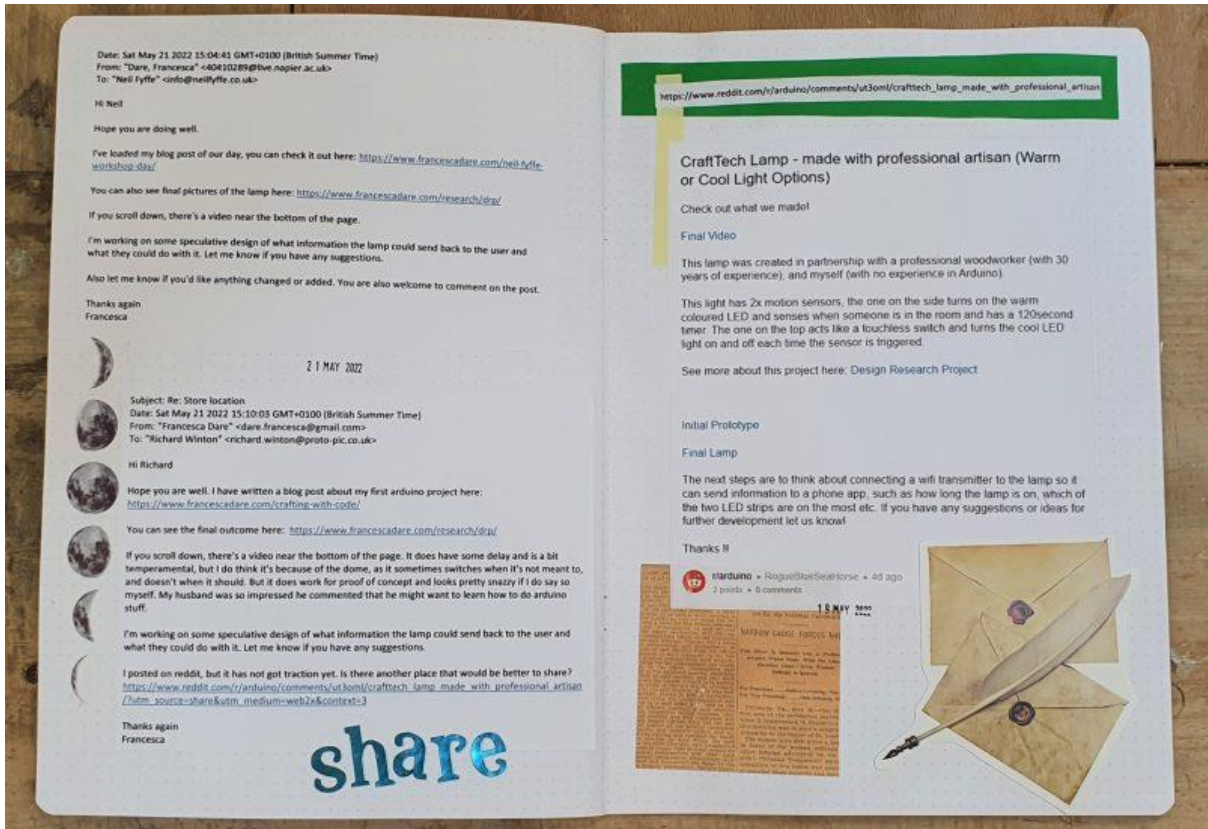
WhatsApp Making on Monday then follow up with in the workshop

25 APR 2022











## Appendix G: Online Project Page and Journal

<https://www.francescadare.com/research/drp/>

Copies shown below

## PROJECT WORKBOOK

This project has a corresponding physical and digital workbook comprising of a scrapbook and online journal available online at:

<https://www.francescadare.com/research/drp/#work>

These are also shown as copies below:

## PROJECT WEB PAGES

Recommended viewing of this project is on the project's web page available at:  
<https://www.francescadare.com/research/crp/>

The following pages are copies of the online versions included for project submission that have not been shown in the appendices.

The full module submission for DES11152 – Design Research and Practice is available at:

<https://www.francescadare.com/ma-product-design-making/>



DESIGN RESEARCH PROJECT

# Shining a Light on Craft & Technology



This project investigates the blending of traditional craftsmanship and making with open-source electronic technology. It explores the possibility of artisans embracing technology within their craft objects and speculates on the possibilities of connecting these craft objects to the IoT within the 4th industrial revolution.

## About

**Brief:** This Design Research Project investigates the role of culture, craft, and lore in the 4th industrial revolution, considering how we should maintain and promote activities that have supported societal advancement for centuries.

We were encouraged to explore this research project from many perspectives, including but not limited to storytelling; artisan making; material culture; textiles & fashion; paraphernalia; architecture; agriculture & diet; societal classes; and more. This investigation considers how these traditional activities can be made relevant to contemporary society and how human participation in the making process adds value to a designed outcome.

**Objective:** The aim for this design research was to investigate the role of making, craft, and technology in contemporary society by exploring the value of blending traditional craft with modern electronics using a trans-disciplinary process.

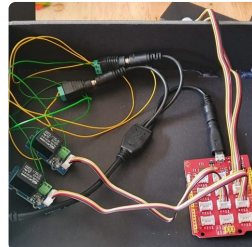
**Methods:** Case Study, Co-Design, Speculative Design

**Stakeholders:** Artisans, Craftspeople, Designer Makers, Programmers, Researchers, Educational Professionals, Craft Consumers

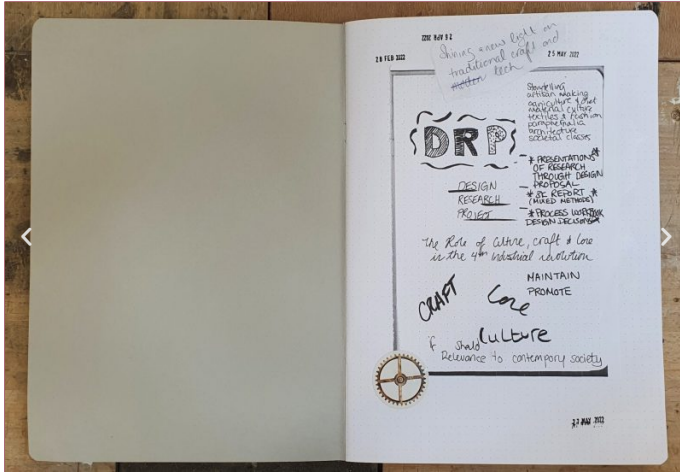
## Project Development

This project started with an investigation into the existing literature on craft, culture and the 4th Industrial Revolution. Once I decided on the direction of the project being about the blending of craft and modern open source technology, I was connected with artisan Neil Fyffe and we started working further on this project.

Read more in my Journal posts below and view my workbook to see how this project developed and progressed.







## Project Scrapbook

Click on the slider arrows to scroll through images of my design research project workbook presented through the method of scrapbooking. Click on the image to open larger version.

This workbook/scrapbook details my thoughts, notes, process and development of this project.

## Journal Entries

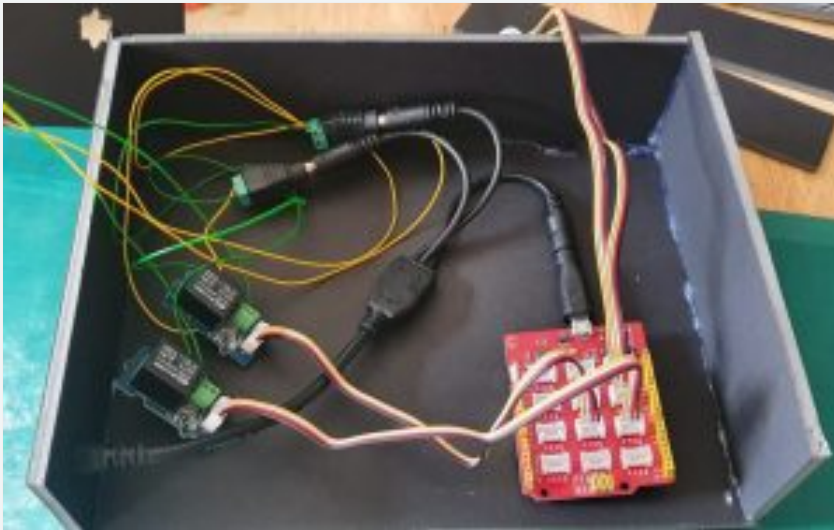
Below are my design journal entries concerning this project which make up the online components of my project workbook.



### Case Study – Samsung Smart Bike

Technological advancements in cycling over the last few hundred years have mostly come from the frame construction and use. Today's...

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### Crafting with Components and Code

I purchased an Arduino for beginners kit along with a multi-relay and a PIR sensor. Richard from Proto-pic was very...

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### Working in the Workshop with Master Artisan Neil Fyffe

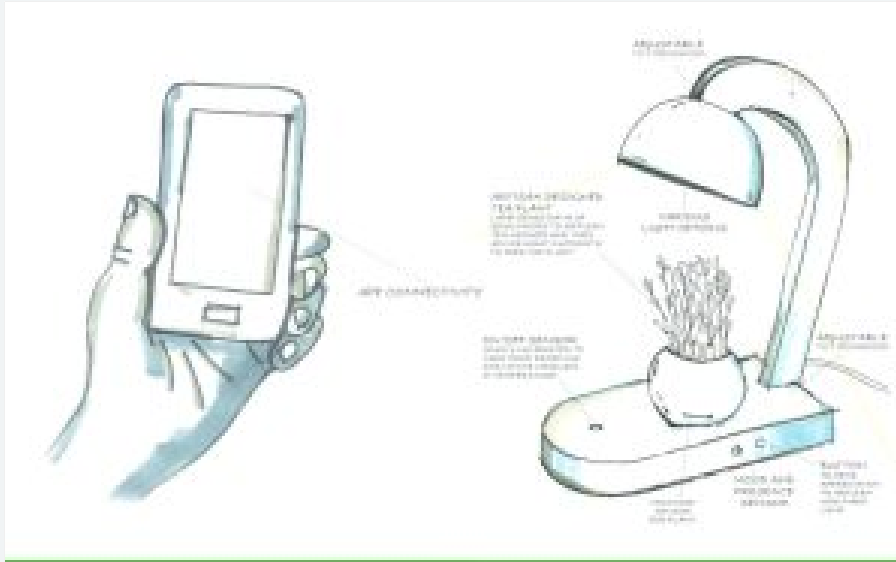
Neil Fyffe is a designer, artist, craftsman and all-around master artisan. His portfolio of work is impressive and his woodworking...

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### Finishing Our CraftTech Lamp and Sharing Online

Once we had completed what we could during our workshop day (see post about working with Neil Fyffe), I completed...

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### Speculative Design – Craft Object & IoT

Speculative design practice allows for the design of objects that aren't currently possible, but are plausible in a future world...

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### Napier Design Show Submission 2022

The Napier Design Show is scheduled for the 26th of May 2022 where this project will be shown. Please check...

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DESIGN RESEARCH PROJECT REPORT

# Shining a Light on Craft & Technology: Blending Tradition and Electronics in Crafted Objects

## Acknowledgements

I would like to thank Neil Fyffe for collaborating with me on this project and being such a great design partner. I would also like to thank Richard [last name] from Proto-pic who helped me with gathering components, discussing the technical parts of the project and providing me with a new board without charge when I blew the original one purchased. Finally, I would like to thank the staff at Napier University who have helped and supported me and this project.

## Keywords

Craft, Making, Co-Design, Speculative Design

## Introduction

When we think of traditional artisans, we often think of someone working with their hands to create something tangible. This object might be a piece of furniture, a pottery bowl, or a painting. Creating these objects requires skill, patience, and often years of experience. However, in recent years we have

seen the rise of technology that can produce objects at a fraction of the cost and time (Anderson 2012). For example, 3D printers can now create objects that are almost indistinguishable from those created by traditional methods (Shahrubudin et al. 2019).

But the value of the hand is undeniable. Arguably information gained through the touch of the hand is more reliable than information gained through the eyes (Sennet 2009). The eye can give misleading information, and there is something about working through a problem with your hands, moving the materials, playing like when you were younger that just isn't the same regardless of your skill for imagination. Think about the expressions "get a grip", or "come to grips with something"; these expressions evoke images of the hand, even in reference to conceptual ideas. These expressions represent the "evolutionary dialog between the hand and the brain." (Sennet 2009, p.151)

In the past, such as medieval age workshops, the master would teach the apprentice. Today the lines are even more blurred. Just with the definition of craft evolving to include less traditional materials, so it the process of learning craft and making itself. Modern technology has changed how craft is perceived, made and potentially craft objects themselves.

## Aims

This research project aims were to investigate the role of making, craft, and technology in contemporary society by exploring the value of blending traditional craft with modern electronics using a trans-disciplinary process.

Due to the scope and nature of the project, this qualitative research will not reach overarching conclusions, but aimed to add to existing understanding and knowledge, as well as gain insights into the process of craft making in the context of the 4th industrial revolution and beyond.

Specifically, this project looked at the use of electronic components and open-source coding (such as Arduino) within traditional crafts (making and objects) and explored the technologizing of craft objects and connecting them with the internet of things.

**Research Questions:** *How can traditional crafts be made relevant in contemporary society? To what extent should traditional craftspeople embrace the technology of the 4th industrial revolution in their objects?*

## Approach

This qualitative project takes an affirmative stance to the research questions and was conducted within an interpretivist paradigm, recognising the complexity of socially constructed multiple realities (Rehman and Alharthi 2016) and the influence the researcher has on the project (Grix 2004, p.82).

This project follows the belief that there can be multiple interpretations to a phenomenon, and the affirmative stance taken is not mutually exclusive. There is value in the view that traditional crafts can, and perhaps should, be preserved without modern influences.

## Context

In this project, I use the terms craft and craftspeople as anyone can be a craftsman (or craftsperson), and the terms reflect "a more inclusive category than the artisan" (Sennet, 2009, p. 144). Sennet (2009) argues that people regress inward when the material things or work in their lives no longer provide them with mental engagement. There is a strong argument that making provides added value and meaning the human experience that other types of work or entertainment cannot (Sennet 2009; Korn 2017). Something about craftsmanship brings people together; it's less about advanced skill (which is often associated with preserving craftsmanship), and more about the act of creating and investing in the work for creating's sake.

However, some might argue that low skilled craftspeople are easily replaced by machinery. Sennet does comment that it becomes problematic when robotics and machinery try to "replace high-cost skilled labor" (2009, p.106), this is one of the ways where technology can become a threat to the preservation of the culture of crafts and making.

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*"Highly specialized skills represent not just a laundry list of procedures but a culture formed around these actions."*  
(Sennet 2009, p.107)

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What differentiates craftspeople from machinery is that they see and experience the world differently and are shaped by experiences (Korn, 2017). Tactile information makes a strong imprint on the mind as we cannot shut off sensory intake (Korn 2017). Like Sennet(2009), Korn believes that craft and making is social, that "the transmission of information from one person to another a physiological process, comparable to that of a virus." (Korn 2017, p.110). Even so, many craft practices are considered at risk, endangered or even extinct (The Heritage Crafts Association 2021). Craftsmanship is important part of keeping culture and heritage alive (Conservation & Heritage Journal 2022) and it is currently at risk.

It's not all bad news. Technology has created a new type of makers—a product of the 4<sup>th</sup> industrial revolution (Anderson 2012). This revolution includes rapid changes in technology, society, and politics from the digital age. We are now more connected than ever, and have greater access to advanced machinery, such as 3D printers, laser cutters, CNC machines and open-source design and electronic components (Anderson 2012). Access to these types of technologies has changed how objects can be made and manufactured, and by who. These new ways of making have their communities to, and so, from a social aspect, are reflective of traditional crafts. People connect with each other to help with projects such as those made with Arduino, not for financial gain, but because of their interest in making for the sake of doing a job well done (Anderson 2012). In Chris Anderson's book "Makers: The New Industrial Revolution" (2012), he describes a story of allowing a programmer access to update one of the files they had been working on, only to discover later that they had gone in and corrected flaws in the code in other areas. This above-and-beyond approach is the same motivation that Sennet (2009) describes in his book "the craftsman", sometimes external motivators are not fulfilling enough, and we make because we can.

While new types of makers have been born, traditional artisan work has regularly been under fire. "In the nineteenth century steel industry; skilled artisans faced two potential futures because of technological change: deskilling or dismissal" (Sennet 2009, p.107), and this is still true across many industries today. The difference is that the threat to traditional crafts are not just from the prevalence of machinery and automation but from a reducing interest from younger generations to take up craft work (Eurobest 2014). Very few projects combine making traditional craft objects with modern technology; however, the Samsung Smart Bike from the Samsung Maestro academy is one notable example. The Italian-made bike is interesting and the aims of the project in promote cross-generational learning and an interest in craft making.

Another example of cross-generational learning is Music Hackspace's "Build an interactive textile instrument" (Topley 2022) course. This "practice-led" course teaches how to combine traditional needle felting with Arduino and e-textiles to create an interactive instrument. Arduino is an open-source platform for electronics (both hardware and software) that are intended to be easy-to-use. Arduino boards read inputs, such as a finger on a button, and turn them into outputs like turning on an LED (<https://www.arduino.cc>)

When looking to the future, it's important to remember that objects aren't just the things themselves, things we have in our homes to look at or just to have, they have value from a heritage perspective, human hand craft, and also the affordances they give us (Gibson 1979). Keeping these perspectives in mind when thinking about combining technology within craft objects is a way to enhance their value, not to take away from it.

## Methods

### Case Study

This research project started with a case study using an example of a traditionally crafted object blended with Arduino electronic components and digital design. Case study is a popular method of qualitative research (Hyett et al. 2014) and is focused on a single, bounded subject or event. Case studies can explore and describe processes and/or outcomes. As Hyett et al. pointed out, "case selection is a precursor to case analysis, which needs to be presented as a convincing argument" (2014, p.6). For this research question, I used the Samsung Smart Bike as an example of traditional craftsmanship meeting electronic technology. More specifically the Samsung Smart Bike used an Arduino board connected to a Wi-Fi and Bluetooth module.

### Research Through Design (Co-Design and Speculative Design)

Building on the study of the Samsung Smart Bike, I used research through design (Frayling, 1993) as an additional method of investigation. Examples of how research through design can be achieved include (a) 'action research' where the designer / researcher keeps a note of the step-by-step process of studio work and creates a resulting report to contextualise the work; and (b) development work such as, "customising a piece of technology to do something no-one has considered before and communicating the results" (Frayling 1993, p.2).

This project included working with an expert artisan to make a craft object with integrated electronic components, as well as documenting the process, prototypes, drawings, videos, observational notes, and other artifacts (Koskinen et al. 2012; Stappers and Giaccardi 2017). This qualitative method allows for conversations and learning through making to provide a diverse development of understanding and this method "for making give[s] people – designers and non-designers – the ability to make 'things' that describe future objects, concerns or opportunities" (Sanders and Stappers 2014, p.6).

Creating a speculative design (Dunne and Raby 2013) based on the object created allows for the exploration of futures where this type of object becomes integrated into our lives but also future technologies. Speculative design asks the "what if" questions without venturing into a complete fantasy (Auger 2013). "Speculative design is not only to encourage contemplation on the technological future but can also provide a system for analysing, critiquing and re-thinking contemporary technology." (Auger 2013, p.12). The speculative design component of this project is based on the created object from the co-design – it is an exercise in exploration of the future, giving the opportunity to push the idea of craft objects blending with modern and advanced technologies.

### Scrapbook as Method

Frayling's (1993) idea of keeping a design diary was expanded for this project into a scrapbook. Scrapbooking is not a well published research method, but Walling-Wefelmeyer argues that it is a "specific theoretically informed methodology ... in response to the voice of self, experience, and truth which is frequently elicited and constructed in qualitative research" (2020, p.4).

This 'approach to knowing' (Walling-Wefelmeyer 2020) allowed for the documentation of the design process, as well as other secondary sources. The documentation consists of a physical scrapbook as well as digital components, linked together. This method engages the scrapbooker in making sense of the collected items and data. Like collage as method, which "form and content reflect the juxtaposition of individual ideas, realms of thought, texts, images, and other creative works, and the conversation that develops between them" (Vaughan 2005, p.41), and bricolage which describes research bricoleurs as "pick[ing] up the pieces of what's left and paste them together as best they can" (Kincheloe, 2001, p. 681). This method allows for flexibility in the research documentation, expression, and interpretation.

## Results and Interpretation

### Samsung Smart Bike Case Study

A case study was carried out for the Samsung Smart Bike and published online in full (see [Appendix A: Journal Post – Samsung Smart Bike](#)). It was discovered through this research that the Samsung Smart Bike came out of Samsung Maestro Academy, which was an online platform designed to connect Maestros with students. It was described as "Samsung's first digital platform for aspiring younger generation to connect with the legendary handcrafting masters through Samsung technology, preserving the future of "Made in Italy" and fostering a new generation of Italian artisans." (Samsung Newsroom 2014). Despite searches online, and on a Samsung phone, it appears that the platform is either no longer available at all, or not available outside of Italy. As the publications were from several years ago, it seems likely it is no longer active. Perhaps, despite its Cannes Lions awards (Samsung Newsroom 2014) and initial media attention, there was not enough demand for the service. Unfortunately, there is no readily available information as to what happened to it.

This case study however, concentrated on the Samsung Smart Bike – which was a success in receiving 'buzz' (Eurobest 2014). The bike was created by Maestro Giovanni Pelizzoli is a world famed frame builder who worked together with Alice Biotti, a young student of Samsung Maestros Academy to create the Samsung Smart Bike. They combined traditional craftsmanship with Arduino technology to create a one-of-a-kind bike with added features (Huddleston 2014; NerdsChalk Staff 2014; Samsung Maestro Academy [no date]). The bike features included: a curved frame (that neutralizes dangerous vibrations caused by rough city streets), four laser beams (that create individual bike lanes), an integrated GPS system, and a rear-view camera. Additionally, the bike has a live stream of video and riding data to the handlebar-mounted Samsung device (Zolfagharifard 2014; Samsung Maestro Academy [no date]).

The overall goal of the project was also to help with the preservation of handcrafts in Italy, Samsung believed that creating a success story of cross-generational project success with the use of technology would help motivate younger generations to take up handcrafts, a lot like the co-design portion of this project.

### Research Through Design & Co-Design

This project involved working with an expert artisan in developing a craft and electronic technology blended object. I worked closely with Neil Fyffe, a local craftsperson who specialises in using native timber in carving, woodturning and specialist joinery (<http://www.neilfyffe.co.uk/>). I documented the co-design and making process online ([Appendix A: Journal Post – Neil Fyffe](#)).

Before working with Neil, I focussed the scope of the project by deciding to co-design a responsive lamp. This scoping balanced the project's potential vs. the time and skill available. As this was my first Arduino project, I also documented learning how to build and code the components ([Appendix B: Journal Post – Crafting with Components](#)). Neil had previously worked on a project building-in Bluetooth speakers but did not have much involvement with the electronics portion of that project and did not witness how the components fit into the piece. He simply made insets for the pieces to be housed. In this project, I did the coding and most of the assembly in collaboration with Neil. I shared the prototype stages and brought all the components with me for our workshop day.

We each approached the design from different perspectives. Initially Neil had a large piece of elm that he was thinking we could carve out spaces for the components, similar to his previous work. Although Neil loves wood carving, like other artisans (Korn 2017) Neil rarely has time to work on his carving work as he spends more time on paid work (Korn, 2017, p. 149).

Together we explored various component options and general restrictions and decided a box-like shape would be more suitable. Again, however, we thought differently about box construction. I would have approached box-building from the idea of 6 pieces, but Neil suggested we create a cut-out from a thicker piece of wood. This design approach used more of the natural strength of the wood and allowed for easier attachment of the lighting arm.

The electronic components also influenced the design of the lamp at various stages of the design-making process. As we got into a making rhythm, we made decisions and revisions throughout the making process. In fact, our process was much more collaborative and organic than designing and then sending plans to an artisan to create. We worked together through numerous changes as we attended to various details and Neil commented that the lamp “started to take on an aesthetic of its own”. The design started to show influences from both of us, and we had a laugh over how the construction of the base had a slight instrument feeling to it; Neil commented that his wife would say he is “obsessed with guitars making.” It was easy to see this influence come through.

Neil was interested in the electronic components and, as the day went on, he started to think of other scenarios where he could incorporate some of the design-making ideas we had worked with (such as a display box with a light on opening or a wardrobe). When I asked directly if he would consider using electronics in future projects, he said that he would be “keen to, but not the coding.” I agree. Throughout the making process of this project, I flip-flopped on my view that traditional artisans should be learning Arduino to support their craft. Working with Arduino was not as easy as I expected, especially the coding. The assembly of the components was very tactile and experimental—something I could see as more likely to be taken up by traditional artisans. However, the coding was a different type of crafting. This project shows that making with components could be considered a type of contemporary craft, and coding an art. The object we created also has significance to both of us due to the personal investment in the making process. For me it reminds me of the day, but also is a special object because of my hand in the process. Perhaps this is because, while the purpose of this research project was more interested in the process and being in with workshop with Neil, we both couldn't help wanting to make something nice out of the experience. Perhaps it is as Richard Sennet says in his book, that the craftsman “represents in each of us the desire to do something well, concretely, for its own sake” (2009, pp.144–145).

Technological objects made in conjunction with a traditional craftsman will inherently have more value due to the skill require in their production, and the human element the object captures compared to mass-produced, or even small batch manufactured items. Selling these types of objects could help keep craftsmanship alive, but also working alongside craftspeople will help as well. “The history of the workshop shows ... a recipe for binding people tightly together” (Sennet 2009, p.80), and this was definitely the case for me, by the end of the workshop day I felt like I knew much more about Neil than if we had spent the time doing something else.

## Research Through Design (Speculative Design)

Another component of this project was the development of a speculative design based on the crafted object. After completing the co-design portion with Neil, I used the made lamp to inform the speculative design. We spoke briefly about what possible functions the lamp could have once connected through Wi-Fi to a phone or a computer, but the speculative design process was completed on its own (without collaboration with an artisan).

The speculative design ([Appendix C: Journal Post – Speculative Design Lamp](#)) includes an interactive lamp with features such as; various light options, human presence, mood, and temperature sensors, adjustable lamp arm, app connectivity, button to send artisan(s) who made the lamp appreciation, and an artisan monitored tea plant (mood details are sent to an artisan grower and they recommend nutrient packs to feed the plant and influence your tea – and your mood) with built in moisture sensor. The app will include monitoring of your mood, tea plant, light usage, and preferences, as well as information on how the lamp was made, information about its creators, and the history of the object (as this could become an inheritable piece).

This design has some features that are possible with today's technology and some that are not. It does still however have that craft component. The idea is to imagine a future that isn't worried about the possibility of youth getting into crafts because it is part of their everyday and technologically advanced lifestyles.

## Scrapbook

Joe Kincheloe says, “There is nothing simple about conducting research at the interdisciplinary frontier” (2001, p.690). This project was no exception. The creation of a scrapbook (and supplemental digital ‘scraps’) was an effective method of gathering and expressing data ([Appendix D: Project Scrapbook](#) and [Appendix E: Online Project Journal](#)). Instead of a randomized collection of data, the scrapbook helps tell the story of the research in a visual manner. The process of creating and compiling the scrapbook, using my hands, gluing, selecting visual elements, data stories, and layouts, gave a new perspective and better understanding of the collected data. It was an effective way to reflect on the process, and do some of the “thinking” required “through craft” (Adamson 2020).

## Conclusions and Recommendations

This co-design project spanned disciplines and generations – creating interests on both sides. More projects of this nature could help keep traditional crafts and heritage alive through younger generations, as well as exposing older generations to new possibilities of making and community.

Due to the limited information available, the case study of the Samsung Smart Bike was not as in-depth as I would have preferred. Ideally, a robust case study performed closer to the project's completion would have included interviews with Maestro Giovanni Pelizzoli, Alice Biotti and others involved in the project.

(Eurobest, 2014) wanted to gain a better understanding the Samsung Smart Bike project on Italy's attitudes towards craftsmanship long term. (2012) I did reach out to an online Reddit group, but received no response on my post. This lack of traction was disappointing, and future research could dig deeper into community connections.

I did connect with the community when speaking with Richard from Proto-pic. Richard shared his enthusiasm and assistance without hesitation (see more on [Appendix B: Journal Post – Crafting with Components](#)).

After completing the project, I shared it online, again with limited traction ([Appendix D: Journal Post – Sharing Our CraftTech Lamp](#)). This lack of traction could mean there is little interest in craft objects being blended with Arduino components. Perhaps my newness to the community and my lack of knowledge of the best ways and places to share, contributed to the lack of interest.

Through the speculative design process, I explored possible futures and pushed the idea of blending technology with craft objects. Due to the time restrictions to this project, it was not possible to include artisans in the speculative design portion of this research. However, including an artisan in speculative design could benefit further research projects. I would be interested in taking this approach and incorporating an analysis of their views of the future of their craft.

The use of multi-methods for this research project was valuable, although a mixed-method may be more effective in understanding broadly the feelings of artisans using components in their work. Combining quantitative methods such as large surveys and statistics about the criticality of crafts in the UK with interviews, co-design, and speculative design (as used in this project) would create a more robust research project. This area needs more research and for this work to be done with various other artisans. I also recommend getting a group of artisans together to discuss their viewpoints and explore the idea of blending crafts and technology with experts.

The scrapbooking method in this project effectively combined multiple methods, ideas, and concepts. This combination allowed the pieces to come together and tell a story of the research visually compared to other methods. (2020) I recommend the scrapbooking approach as a unique and viable research method for further research on this topic.

#### DESIGN RESEARCH PROJECT DOCUMENTATION

## More...



### Additional Images

Click on the slider arrows to scroll through images of the final light.

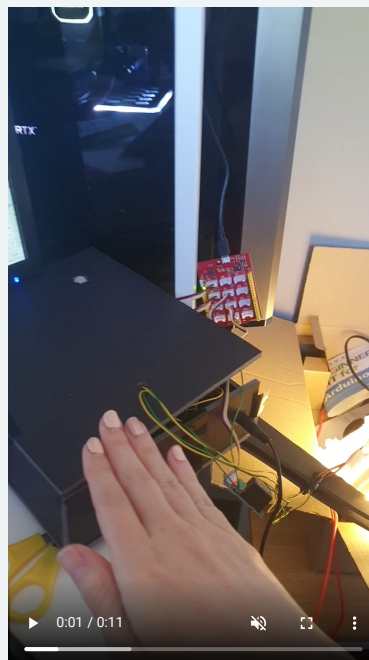
This light is designed to work on a desktop. The side sensor turns on the warm colour LED when it senses someone in the vicinity and has a 120second timer. The sensor on the top turns on the cool LED when it is triggered, and off again when it is triggered again.

### Project Videos

This video shows the functionality of the light in testing and the final object.

Read more about the process of creating this project in my [Design Journal](#) posts.

- Crafting with Components and Code
- Working in the Workshop with Master Artisan Neil Fyffe
- Finishing Our CraftTech Lamp and Sharing Online
- Speculative Design - Craft Object & IoT



## Reddit Posts

**HELP: Coding hack for a PIR that stays on**

Hi All

I am looking for some help with a project. I have a Seeduino Lotus, 2x Grove Relay's, 2x Grove Adjustable PIR Sensors and 2x LED Lights that are connected to power.

Using the code suggested for PIR sensors I can get the light to turn on when the sensor sees motion but then it turns off after a period of time. Like a traditional motion sensor application.

I am looking to make a touchless lamp where the sensor turns on with a wave, and then off again with the second wave. So it would be IF senses motions, Then check if light is on, if light is on, turn off, if not then turn on.

I do not know how to code this. Can anyone help?


Thanks

**My kit:**

Board: [Seeduino Lotus - Seeed Wiki \(seeedstudio.com\)](#)

Sensors: [Grove - Adjustable PIR Motion Sensor - Seeed Wiki \(seeedstudio.com\)](#)

Relays: [Grove - Relay - Seeed Wiki \(seeedstudio.com\)](#)

 [r/arduino](#) • RogueBlueSeaHorse • 23d ago  
1 points • 2 comments

**CraftTech Lamp - made with professional artisan (Warm or Cool Light Options)**

Check out what we made!

[Final Video](#)

This lamp was created in partnership with a professional woodworker (with 30 years of experience), and myself (with no experience in Arduino).

This light has 2x motion sensors, the one on the side turns on the warm coloured LED and senses when someone is in the room and has a 120second timer. The one on the top acts like a touchless switch and turns the cool LED light on and off each time the sensor is triggered.


See more about this project here: [Design Research Project](#)

[Initial Prototype](#)

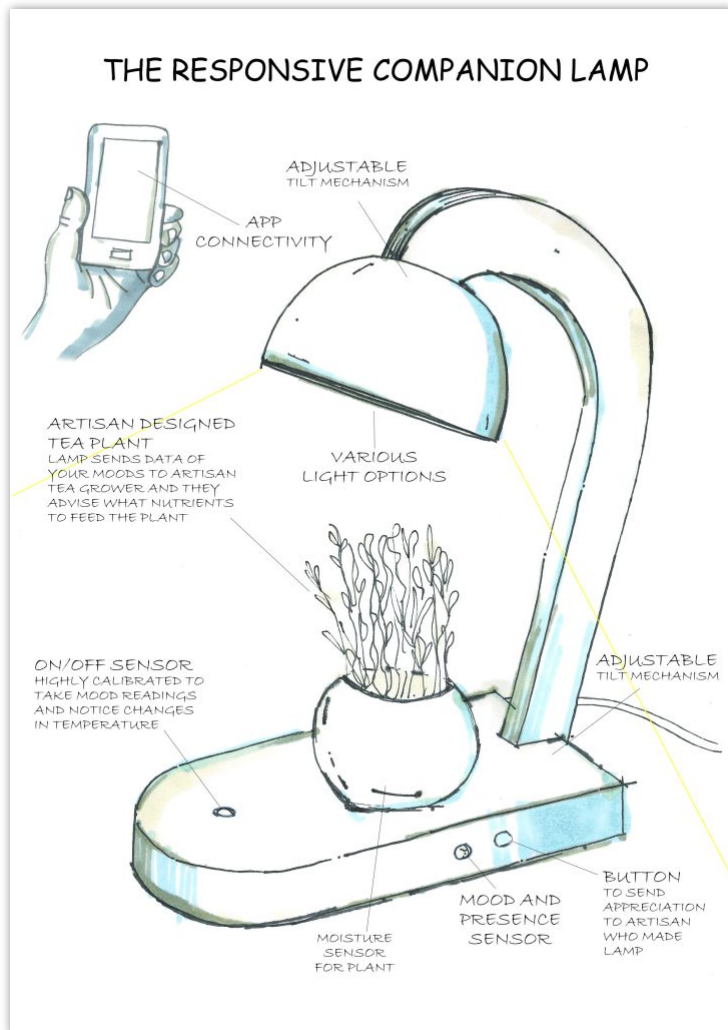
[Final Lamp](#)

The next steps are to think about connecting a wifi transmitter to the lamp so it can send information to a phone app, such as how long the lamp is on, which of the two LED strips are on the most etc. If you have any suggestions or ideas for further development let us know!

Thanks !!

 [r/arduino](#) • RogueBlueSeaHorse • 7d ago  
2 points • 0 comments

## Speculative Design





## References

- Adamson, G. 2020. *Thinking Through Craft*. London: Bloomsbury Visual Arts: Bloomsbury Publishing Plc.
- Anderson, C. 2012. *Makers: The New Industrial Revolution*. London: Random House Business Books.
- Auger, J. 2013. Speculative design: crafting the speculation. *Digital Creativity* 24(1), pp. 11–35.
- Conservation & Heritage Journal 2022. *Craftsmanship is key to keeping heritage alive*. [Online]  
Available at: <https://www.consandheritage.co.uk/articles/craftsmanship-is-key-to-keeping-heritage-alive>  
[Accessed: 26 May 2022].
- Dunne, A. and Raby, F. 2013. *Speculative everything: design, fiction, and social dreaming*. Raby, F. ed. Cambridge, Massachusetts: The MIT Press.
- Eurobest 2014. *2014 PR: Samsung Smart Bike*. [Online]  
Available at: <https://www2.eurobest.com/winners/2014/pr/entry.cfm?entryid=2497&award=101&order=7&direction=1> [Accessed: 25 April 2022].
- Frayling, C. 1993. Research in Art and Design. *Royal College of Art Research Papers* 1(1)
- Gibson, J.J. 1979. The Theory of Affordances. In: *The Ecological Approach to Visual Perception*. Dallas, London: Houghton Mifflin
- Grix, Jonathan. 2004. *The foundations of research*. Basingstoke: Palgrave Macmillan.
- Huddleston, T.J. 2014. *Samsung's Smart Bike, the ride of the future?* [Online]  
Available at: <https://fortune.com/2014/06/12/samsung-smart-bike/> [Accessed: 19 May 2022].
- Hyett, N., Kenny, A. and Dickson-Swift, V. 2014. Methodology or method? A critical review of qualitative case study reports. *International journal of qualitative studies on health and well-being* 9(1), pp. 23606–23606. doi: 10.3402/qhw.v9.23606.
- Kincheloe, J.L. 2001. Describing the Bricolage: Conceptualizing a New Rigor in Qualitative Research. *Qualitative Inquiry* 7(6), pp. 679–692. doi: 10.1177/107780040100700601.
- Korn, P. 2017. *Why we make things & why it matters: The education of a Craftsman*. London: Vintage.
- Koskinen, K., Zimmerman, J., Binder, T. and Redström, J. 2012. Constructive Design Research. In: Roumeliotis, R. and Bevans, D. eds. *Design Research through Practice: From the Lab, Field and Showroom*. Waltham, MA, USA: Morgan Kaufmann Publishers, Inc. (Elsevier)
- NerdsChalk Staff 2014. *So Smart Bike is Samsung's next smart project?* [Online]  
Available at: <https://nerdschalk.com/smart-bike-samsungs-next-smart-project/>  
[Accessed: 23 April 2022].
- Rehman, A.A. and Alharthi, K. 2016. An introduction to research paradigms in distance education. *International Journal of Educational Investigations* 3
- Samsung Maestro Academy [no date]. *Samsung Smart Bike Design Story*. [Online]  
Available at: [https://design.samsung.com/global/contents/s\\_bike/](https://design.samsung.com/global/contents/s_bike/)  
[Accessed: 23 April 2022].
- Samsung Newsroom 2014. *Cannes Lions: Was Samsung Maestros Academy award worthy? Yes, totally*. [Online]  
Available at: <https://news.samsung.com/global/cannes-lions-was-samsung-maestros-academy-award-worthy-yes-totally>  
[Accessed: 25 May 2022].
- Sanders, E.B.-N. and Stappers, P.J. 2014. Probes, toolkits and prototypes: three approaches to making in codesigning. *CoDesign* 10(1), pp. 5–14. doi: 10.1080/15710882.2014.888183.
- Sennet, R. 2009. *The Craftsman*. London: Penguin Books.
- Shahrubudin, N., Lee, T.C. and Ramlan, R. 2019. An Overview on 3D Printing Technology: Technological, Materials, and Applications. *Procedia Manufacturing* 35, pp. 1286–1296. doi: 10.1016/j.promfg.2019.06.089.
- Stappers, P.J. and Giaccardi, E. 2017. Research Through Design. In: *The Encyclopedia of Human-Computer Interaction*. 2nd ed. Hershey, PA, USA: Idea Group Reference, pp. 1–94.
- The Heritage Crafts Association 2021. *The HCA Red List of Endangered Crafts 2021 (Categories of Risk)*. [Online]  
Available at: <https://heritagecrafts.org.uk/redlist/categories-of-risk/>  
[Accessed: 25 May 2022].
- Topley, S. 2022. *Build an interactive textile instrument*. [Online]  
Available at: <https://musichackspace.org/events/build-an-interactive-textile-instrument-2/>  
[Accessed: 14 March 2022].
- Vaughan, K. 2005. Pieced Together: Collage as an Artist's Method for Interdisciplinary Research. *International Journal of Qualitative Methods* 4(1). doi: 10.1177/160940690500400103.
- Walling-Wefelmeyer, R. 2020. The Methodological Potential of Scrapbooking: Theory, Application, and Evaluation. *Sociological Research Online* 26(1). doi: 10.1177/1360780420909128.
- Zolfagharifard, E. 2014. *Want your own cycle lane? Samsung's smart bike uses LASERS to project lines on a road and stop motorists getting too close*. [Online]  
Available at: <https://www.dailymail.co.uk/sciencetech/article-2659240/Want-cycle-lane-Samsungs-smart-bike-uses-LASERS-project-lines-road->

stop-motorists-getting-close.html  
[Accessed: 25 April 2022].

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