**Technical Workshop Plan**

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| **WORKSHOP TITLE** | Introduction to Wearable Tech: A Beginner's Workshop  |
| TECHNICIAN  | Elliott Hall |
| TARGET COURSES  | Open to all courses. Example of courses that finds this useful including:MA Fashion Futures, MA Artefact, BA/MA Footwear, BA & MA Jewellery, Sportwear, BA/MA Fashion Design Technology (Womenswear & Menswear) & MA Costume Design for Performances. |
| OPTIMUM CLASS SIZE  | 6-10 |
| DURATION   | Async: 15 MinsLive session: 3 hrs |
| PREP TIME / CLEARUP TIME  | 25 mins prep25 mins clean-up |
| RESOURCES REQUIRED  | Resources requires per station (per individual student or group):* 1 x Arduino Uno/Leonardo
* 1 x Breadboard
* 1 x USB-A to USB-B/Micro Cable
* 2 x 220Ω Resistor
* 2 x LED (Any Colour)
* 1 x Push-Button
* 1 x 16\*2 LCD w/ PCF8574 I2C Adapter
* 1 x Potentiometer
* 7 x Female to Male Jumper Wire
* 5 x Male to Male Jumper Wire
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| LAST UPDATE  | 17th January 2024 |

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| LEARNING OUTCOME SUMMARY   |
| This workshop introduces participants to the exciting intersection of technology and fashion through wearable technology and physical computing. It offers an entry point into understanding how wearable devices are designed, prototyped, and tested, blending creativity (showcasing examples of art/design based wearable tech projects) with technical skills (hands-on practical activities). Throughout there will be a mix of presentation and hands-on micro-activities – allowing students to learn individual key concepts such as, what is a breadboard and how to use it, the circuit and other fundamental principles. There is also a range of activities that include some more ‘polished’ final outcomes. This workshop also offers a unique opportunity for students to interact directly with the technician, providing a supportive environment for learning and addressing any queries.By the conclusion of the workshop, students will have achieved the following learning outcomes:* Understand what wearable technology is and its applications in various fields.
* Gain knowledge about microcontrollers and their role in wearable tech.
* Learn the basics of circuit design and assembly for wearables.
* Explore various sensors and actuators commonly used in wearable technology.
* Discover how to program and control wearable devices using simple code.
* Learn about downloadable libraries and their applications in wearable tech projects.
* See practical examples of how wearable technology can enhance artistic and fashion projects.
* Create example circuits and have them tweaked to the students desired outcome.

The learning outcomes will be achieved through the use of a Presentation, Object-Based-Learning, Micro-Activities & Supported Activities – to engage students through what can be a quite lengthy and information intensive topic. |
| DURATION  | TEACHING PLAN   | STUDENT ACTIVITY    |
| 15 mins(Async) | The Asynchronous content teaches students:* What is an Arduino Uno / Microcontroller?
* What is the Arduino IDE & How to use/navigate it?
* What is a circuit?
* What are sensors & actuators?

General Reference to getting the Arduino IDE ready for the workshop. [Link to async](https://artslondon.sharepoint.com/%3Au%3A/r/sites/LCFTech/SitePages/Introduction-to-The-Internet-of-Things-%28IOT%29--A-Beginner%27s-Workshop%281%29.aspx?csf=1&web=1&share=EfSp9_fAaslFh_cwP3q7stMBZGzNyqqI8h0EHCcmFs2W3Q&e=xFT5Vp) |
| WORKSHOP CONTENT |
| 15 mins (Sync in class) | The tutor makes an introduction to themselves, followed by asking them to introduce themselves; this helps to then curate the conversation of the workshop in a way that will be most beneficial to their work. The tutor will also ask about the pre-task activity and they have any questions.  | Students will engage with the tutor and to discuss the pre-task |
| 5 mins | The tutor will breakdown the outcomes of the workshop:1. What an Arduino or Microcontroller is.2. How to control an Arduino to your own will.3. Some Electrical 'Lingo'.4. How to wire up your very own circuit. 5. What downloadable libraries are & How to use them.6. Learned how Wearable Tech can be used in your work! | The students will view the presentation and will be engaged with by the tutor |
| 5 mins | The tutor to breakdown what ‘Physical Computing’ is. Giving examples and an Image of what a typical project could look like – Followed by a diagram of an Interactive system (Taking an input from the real world from a sensor, and how the computer is able to react to that with actuators or external connections such as API’s). | The students will view the presentation and will be engaged with by the Technician |
| 10-15 mins | The tutor will present visual/real examples of sensors that we can be used along with actuators, giving a brief explanation of their purpose.Real sensors will be handed out to students, with the tutor asking students what similarities or differences they can see between them.In addition, a working example/demo will be shown working / passed around the table. | The students will view the presentation - whilst also handling real example sensors to look at and engage with during a micro exercise. |
| 20 mins | The tutor presents the breakdown of what ‘Wearable Tech’ is – in the context of fashion and art. Giving examples of what a typical project could look like.These examples can include wearable tech in commercial use such as smart watches and sportswear, as well as including examples used in art-based projects | The students will view the presentation – with a few small videos of art projects. The students will be invited to share their opinions on the work displayed. |
| 10 mins  | The tutor presents the concept of a microcontroller including comparison between the types of microcontrollers available, and their use in wearable tech.  | The students will view the presentation while been handed a physical microcontroller to play with. |
| 15 mins | Students are shown a basic circuit, in multiple different forms, such as diagram, schematic & PCB. Through multiple different slides the circuit will gain in complexity making sure to ask questions and increase explanations in different area’s until every student is up to speed.Following the breadboard will be introduced to the circuit Lastly, bringing the Arduino into the schematic, and showing how it can be used to control/regulate the circuit. | Students engage with the tutor around slides, alongside interacting with physical objects. |
| 10-15 mins | Students are asked to open their laptops. The tutor checks if everyone has Arduino IDE installed correctly.Lastly recapping students on the ASYNC content, ensuring everyone is familiar with the buttons and structure of the code such as the difference between Loop() & Setup(). | Students follow along to a tutor led task. Questions are encouraged. |

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| 30+ mins | A series of separate activities, one after another.(All connected but also separate, to allow students not to get left behind and keep the group on track/task)* Arduino Blink (no additional hardware)
* Arduino Blink (Breadboard, Resistor and LED)

PWM Explanation* Arduino Fade (Breadboard, Resistor and LED)
* Arduino Input (Breadboard, Resistor and Button)
 | students will follow along with the tutor lead activity – including live demonstration to allow students to ask questions and have them answered in person for all students to see. This includes correcting and aiding students in common problems/ FAQ’s |
| 5 mins | Explanation of Libraries (With Clear & Fun Visuals) | The students will view the presentation |
| 30+ mins | Final Set of Activities to create a final outcome that can be personalised – students are encouraged to support each other to reinforce learning. The tutor will float around supporting students and answering questions as they arise. Then Activities have 4 sets of prewritten code collected from lcfdll.com in the following structure (visual diagrams on the board). Diagrams are shown on the screen at all times to allow students plenty of opportunity to play around with the circuit without losing their place in the activity.Hardware Configuration 1: (LCD Screen)* Code Activity 1
* Code Activity 2

Hardware Configuration 2: (LCD Screen w/ Potentiometer)* Code Activity 3
* Code Activity 4

Students are encouraged to change aspects of the code for themselves in a very approachable way. I.e. changing the technician’s name to their own, to make it personal. It is at this point students often take photos of their work as it has been personalised and believe this is a really integral moment within the workshop.Workshop Resources & Code: https://shorturl.at/uzJR7 | The students will follow along with the tutor lead activity (alongside individual problem solving often conferring with the person next to them) – including live demonstration to allow students to ask questions and have them answered. This includes correcting and aiding students in common problems/ FAQ’s |
| 5 mins | The tutor will show the other workshops available for Wearable Tech whilst giving context to how they could be connected to this current workshop – alongside the availability of drop-in sessions & consultancy to breakdown projects. | The students will view the presentation and engage in discussion with questions/asking students about their own work. |
| 5 mins | The tutor opens opportunity for a general Q&A or branch the questions in relation to their own work | Students are participating or listening to the Q&A – but are welcome to leave at this point. |
| End of workshop.  |

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|  ASSESSMENT METHODS   |
| The students will get immediate feedback from the activity in regard to if it works or not, everyone will have a working example by the end. Tutor led support will ensure that any issues are explained to increase learning outcomes and problem solving – using failure as an opportunity to learn. |

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| HYPERLINKS AND SUPPORTING LEARNING REFERNCES  |
| <https://artslondon.sharepoint.com/sites/LCFTech/SitePages/Wearable-Tech.aspx#workshops>Workshop Resources & Code: <https://shorturl.at/uzJR7> |

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| HEALTH AND SAFETY / NOTES  |
| There are no health and safety concerns for this workshop, there are no trip hazards and in the risk of an evacuation I can lead the group to the fire evacuation point. |

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|  REQUIREMENTS FOR A REMOTELY TAUGHT SESSION   |
| Online sessions are just not possible due to the requirement of physical equipment needed for the activities. However, in the case that teaching had to be moved online. Additional ASYNC information could be formulated with kits being sent out or loaned in some capacity. |