

HACKING THE BODY

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Abstract

Hacking the Body is a proposed collaborative research project that explores using the concept of 'hacking' to re-purpose and re-imagine internal signals from the body through DIY biosensors and soft circuits. This paper outlines definitions of hacking and how these apply to workshops exploring how to create these sensors.

Key words: hacking, DIY, biosensors, soft circuits

Hacking the Body

This paper discusses the emerging project *Hacking the Body*, a collaborative research project that uses the concept of hacking to create artworks with technology. It will explore definitions and methods of hacking and then look to examine how these ideas may adhere to the first Hacking the Body workshop which took place in Sydney at ISEA 2012 [1].

The possibilities for 'hacking' for more expressive, live and performative artworks have given artists with the flexibility to learn or teach themselves programming a huge advantage and 'canvas' for art making in the digital and electronic domain. Many artists are now finding new ways to create their work using open-source tools to make custom software and apps for performative, generative or database projects that take advantage of emerging technological affordances.

Hacking the Body is a proposed collaborative research project that explores the use of the concept of 'hacking' to re-purpose and re-imagine internal biofeedback signals from the body. The project is two-fold: (1) it explores how internal physiological data can be gathered and harnessed to understand the experiential states of the body, and then (2) it explores how we as artists will 'hack' to discover new methods for creating artworks, using sensing systems and audiovisual technology. This aims to result in works such as site-specific performances, mobile installations, and participatory performance experiences. The first portion of this research is exploring DIY sensors and the collaborative ethos found within hacking by sharing crafting meth-

ods through workshops. The first of these workshops will be discussed later in this paper.

Hacking as a Dialogical Methodology

Hacking is a much-misused term [2] [3], typically associated with controversial technical practices of 'cracking' into systems and causing damage or stealing financial or sensitive information. However, as one looks further beyond this representation, many other definitions of hacking begin to emerge. Key themes of repurposing, DIY and open source, and collaboration become important, and it is these concepts we aim to utilise within the *Hacking the Body* project.

Jordan defines hacking as "a material practice that produces differences in computer, network and communications technologies" [4]. In a similar vein Jordan defines hacking in the following terms: "As part of this practical capacity, the very nature of hacking – turning a system against itself – is the processing of using existing code, comments, and technology for more than what the original authors intended" [5]. However, these ideas of repurposing, subverting, and re-understanding what is possible or intended, do not only apply to technology. von Busch and Palmås [6] argue that hacking is also applicable to culture and social systems. Wark states, "Whatever the code we hack, be it programming language, poetic language, math or music, curves or colorings, we are the abstracters of new worlds. Whether we come to represent ourselves as researchers or authors, artists or biologists, chemists or musicians, philosophers or programmers, each of these subjectivities is but a fragment of a class still becoming, bit by bit, aware of itself as such" [7]. Therefore hacking is not a form applicable just to technology, but extends to a transdisciplinary discourse around methods for achieving change.

Once hacking is considered beyond the domain of technology, it can start to be considered as a methodology for changing or repurposing using a low level approach, in contrast to a top down rewrite or remake of a system. *Hacking the Body* uses an open, solution-driven, hands-on ethos as its main driving principle for authoring creative works. von Busch and Palmås discuss how hacking can change data or a system, and state "As I see them they are operating at a low level, using existing infrastructure and power of a system to tinker, twist

and modulate it after their own will. Building on the existing system with local patches and modifications. Adding small operational programs to the toolbox and presenting them with a journey of the same stream. Bending flows of power, but keeping the current on" [8]. The information may not change but instead the intention or use of this information is developed, subverted or re-conceptualised. Data drives new concepts, objects or possibilities that were not originally intended. *Hacking the Body* asks how the data of the body can be developed into new artworks or new possibilities.

It is this bending and flowing that not only is repurposed when hacking, but also provides a space for dialogue. The dialogue emerges between the previous system, technology or object and a new purpose, understanding or use: "Hacking is in a dialogic form, not in dialectic opposition. Not to operate with its object as an opponent or foe, but as a field of gravity. Not regarding a system of belief as opium, but as a path of liberation, using it as a trampoline, as a line of flight and a force of gravity" [9]. A hack evolves from one reference point and this point is recognisable throughout the hacking process. The analogy of the trampoline is useful when considering *Hacking the Body*. We are not changing the body physically within our hacks. We are taking information from the inside body and creating a trajectory outwards (or in some cases back to the body) in the form of artworks. The biofeedback data is the gravity that brings us back to the body and grounds the hack in a biotechnological system. We are not creating new bodies by hacking, but new artworks by using information from the body that is usually implicated for measuring well-being or health.

Another dialogue that occurs in hacking is with peers: "Hacker knowledge implies, in its practice, a politic of free information, free learning, the gift of the result in a peer-to-peer network" [10]. Hacking is not a solo practice. There is an open culture and sharing ethos. Hackers build their new creations based upon previous work and keep this open for new developments by others. Hacking involves sharing skills, techniques and knowledge as well as considering the freedom of these to be fostered by others. Hacking becomes a dialogue between hackers where new approaches are born and this collaborative ethos is part of the methodology of hacking.

Beyond the practicalities of redirecting the functionality of technology, some hacking is also underpinned a transdisciplinary ethos. As Coleman suggests “Hackers have constituted an expansive pragmatic practice of instrumental yet playful experimentation and production. In these activities the lines between play, exploration, pedagogy and work are rarely rigidly drawn” [11]. This is key to the methodology in *Hacking the Body*, where participatory performance and exploration ‘user workshops’ are key to working with technology and the body. For example, at ISEA 2013, workshops in DIY biosensors using soft circuit electronics were conducted where artists made their own sensors from crafting techniques. There was a sharing of knowledge across disciplines where experimenting and playing were encouraged.

We use the term hack to represent the ideas of repurposing and collaborating, and the use of DIY and open source technologies within art practice. A hack uses an existing system or technology but aims to produce something different within that system, producing a dialogical methodology where the past is in conversation with the new. The idea of hacking the body uses these concepts to make digital art that utilises these concepts as well as data from the body.

Previous Approaches to Hacking the Body and Biofeedback Artworks

There are many other examples of artworks that may be considered to have utilised hacking and biofeedback data. Thomas [12] has explored the term ‘hacking the body’, but unlike our dialogical approach outlined above, Thomas sees this concept in terms of by opposing forces. By arguing that the body and performance are in constant change and that code is static, Thomas claims that there is a binary presented and that the body presents a site of resistance for hacking. This approach to hacking the body is in conflict with the dialogical methodology within our work. It sees hacking as a way of transgressing the codes of the body, whereas in our proposal the codes of the body can work with DIY technologies to create new artworks.

Within artistic practice, *Hacking the Body* draws on existing performance and electronic arts endeavors that engage with biosensors and the body. Many of these focus on performativity and mak-



Figure 1: Stretch sensor made by participant in Hacking the Body Workshop at ISEA 2013, Sydney, June 9, 2013. © Kate Sicchio & Camille Baker

ing work which draws on biofeedback. For example Donnarumma [13] uses a magnification of muscle signals to produce live sound compositions, very much drawing of the tradition of artists such as Tanaka [14]. Other projects look to more participatory performance methods. Schiphorst [15] and Kozel [16] used wearable technologies in the WHISPERS project to capture participants’ breath and heart rate within performative installations and participatory artworks. Khut [17] has developed various artistic applications for working with different biosensors, including making games that require participants to focus on their breath to control visualisations. Baker [18] also used various biofeedback sensors within MINDtouch, a participatory performance work that worked with people online and in-person wearing biofeedback sensors. The project focused on trying to uncover any new understandings of the sensations of ‘liveness’ and ‘presence’ that may emerge in participatory networked performance, using mobile phones and physiological wearable devices. It attempted to link diverging areas of media art with performance practices through its approach of using biofeedback sensors as the interface to mobile video technologies. Baker’s research very much indicates where we aim to bring *Hacking the Body*, and further developments for our research may include interfacing the sensors with mobile technologies and creating participatory events.

Workshop @ ISEA2013

Our approach to *Hacking the Body* involves using DIY methods to create biofeedback sensors that will then read different information from the human body, reflecting the dialogue between systems (such as the code of the body) and repurposing to create new artworks. This was explored within the *Hacking the Body* workshop conducted in Sydney, June 9, 2013. This day long workshop had twelve participants who were interested in a range of media art practices. The workshop aimed to create a soft circuit sensor that could be utilised within a performative setting and could respond to biofeedback. The workshop had two main parts – brainstorming and conceptualising interactions with soft circuits and then constructing the sensors from crafting techniques. Three examples of sensors were proposed as starting points for participants: a crochet stretch sensor, a thread stroke sensor, or a fabric press sensor. The stroke and press sensor focused on touch and movement of the body, while the stretch sensor could be worn around the ribs to measure breath through movement of the rib cage. Within this workshop the movement was simply translated to LEDs to demonstrate a transfer of information from the physical body to an electronic object. This was done with the use of conductive fabrics and threads and small button batteries. For example, the stretch sensor was created by using conductive yarn

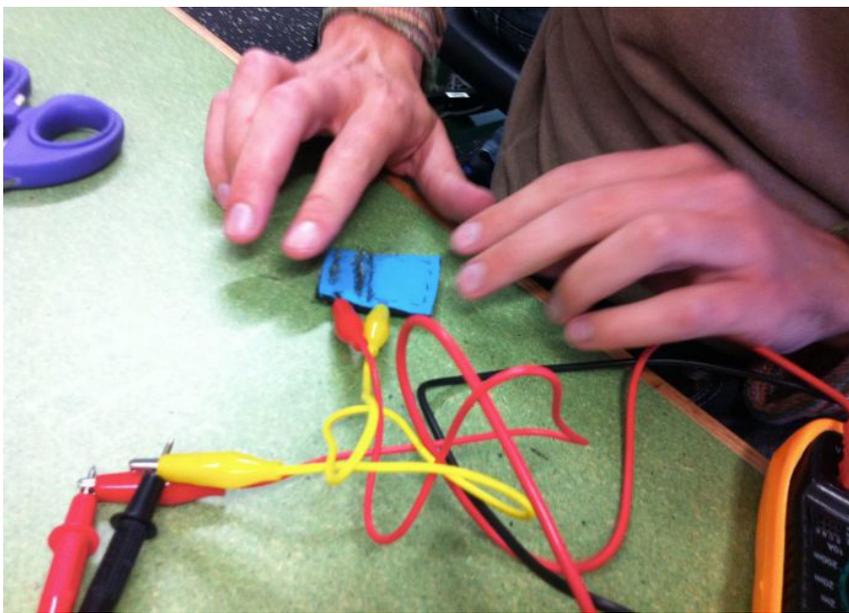


Figure 2: Press sensor made by participant in Hacking the Body Workshop at ISEA 2013, Sydney, June 9, 2013. © Kate Sicchio & Camille Baker

and cotton yarn. The resistance of the conductive yarn changed when stretched to light up the LED.

The stroke and press sensors acted as switches. The stroke sensor consisted of a mixture of conductive thread and normal thread sewn to two different patches of conductive fabrics. When the conductive threads touched the circuit was closed and the LED turned on. The press sensor used neoprene with a small hole as a way of separating two piece of conductive fabric that would then touch when pressed. These sensors were simple approaches and comprised low level technology that could translate information from the body.

This first workshop explored the ideas from the definitions of hacking including ideas of repurposing, collaborating, and the use of DIY and open source technologies, as discussed earlier, whilst presenting work that is in the lineage of artwork with bio-sensing. The workshop used the ideas of repurposing in several ways including the repurposing of bio-feedback, such as breath, and also the repurposing of crafting techniques within working with electronics. The techniques used were DIY, such as crochet and sewing, and the technology was open source and shared within the group.

The dialogical aspect of hacking was presented through the sharing of skills with participants, but also by creating low level technologies that would interface with the body. For example, the stretch sensor could be used to detect breath if worn on the ribs, and a function of the body therefore controlled the resistance of the sensor. The use of the sensor could be further developed to

create a visualisation that may have an impact on the use of breath of the body wearing the sensor. This potential is opened up in the *Hacking the Body* workshop.

The collaborative part of hacking existed within the sharing of skills and the knitting/sewing circle that emerged during the workshop. Everyone sat around, helping each other learn and build their new sensor, using techniques not associated with technology. The hope of a workshop like this, that participants will continue working with these skills in new contexts, reflects the open and free nature of hacking. An example of this happened during the workshop in Sydney where one participant took the initiative to not only use the conductive materials provided to create a soft circuit, but also utilised a piece of ham from a sandwich. She introduced a new material into the system and brought the project to a new place that we had not intended. This meant that not only did she create her own hack of the workshop, but also it demonstrated the openness of the work and how there is still places for this work to be developed.

Since ISEA, workshops for *Hacking the Body* have developed the soft circuit crafting to include arduino based Lily pads or Flora micro-controllers. This allows for more possibilities for dialogue and repurposing of the information gathered through the sensors from the body. New artworks using this data to create visualisations on mobile devices are the next stage in this emerging project.

Summary

Hacking the Body aims to provide a vision for hacking in reference to participatory and process driven works, while expanding the use of emerging biosensing and wearable technology. *Hacking the Body* explores the concept, ethos and practices associated with computer hacking in the context of repurposing, collaborating and using open-source approaches. Exposing the human form and physiological states in more scintillating and engaging ways will connect the inner body network to the wider global communications network, by hacking to create a dialogical 'code'. By not only creating artworks but also sharing in an open way through workshops, we aim to demonstrate how our DIY bio-sensing is hacking the body.

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