

Institution: BRUNEL UNIVERSITY (H0113)
Unit of Assessment: 35 – Music, Drama, Dance and Performing Arts
Title of case study: ARTICULATED HEAD and EAR ON ARM: Alternate Anatomical Architectures
<p>1. Summary of the impact (indicative maximum 100 words)</p> <p><i>ARTICULATED HEAD</i> (2010-) and <i>EAR ON ARM</i> (2006-) reflect interconnected but different projects within Stelarc's research into alternate anatomical architectures. <i>The ARTICULATED HEAD</i> is the robotic embodiment of Stelarc's Prosthetic Head, a conversational agent that speaks to the person who interrogates it. It was a finalist for the Australian Engineering Excellence Awards 2010 and was exhibited at Powerhouse Museum, Sydney, for two years from January 2011, attracting an estimated 1.8 million visitors.</p> <p><i>EAR ON ARM</i> is the first instance of an artist having an ear surgically constructed and cell-grown on his arm and has been disseminated globally through museum, festival, and media representations. In 2010 <i>EAR ON ARM</i> was awarded the Prix Ars Electronica Golden Nica.</p> <p>Within the art and medical communities, both projects have been acknowledged as pioneering innovations in the conceptualisation and realisation of biotechnological and engineering-based art and media attention for the projects has brought the research to a worldwide public.</p>
<p>2. Underpinning research (indicative maximum 500 words)</p> <p>Stelarc is Professor of Performance Art at Brunel University's School of Arts. His artistic research explores alternate operational architectures, either virtual or bodily couplings with machine systems. His projects are about strategies for generating unexpected capabilities by combining biology and electronic media and, more generally, about issues of agency, embodiment and materiality.</p> <p><i>ARTICULATED HEAD</i> is part of a wider 'Thinking Head Project', one of three Thinking Systems Special Initiatives grants jointly funded by the Australian Research Council (ARC) and the Australian National Health and Medical Research Council (NH&MRC) between 2006 and 2011. The <i>ARTICULATED HEAD</i> system consists of an industrial robot arm (Fanuc LR Mate 200ic) with a 17 inch LCD mounted on the end effector. The LCD screen displays a 3D rendering of a head (Prosthetic Head) that resembles Stelarc. Damith Herath, Christian Kroos and Zhengzhi Zhang of MARCS Labs, University of Western Sydney, were the robot and programming team. The system also contains an array of sensors including auditory localisation, stereo vision and monocular vision that provide situational awareness for the robotic 'agent'. The complete system is driven by a novel 'attention model', an algorithmic implementation that emulates simple brain functions. Articulated Head is no longer a virtual entity, as was the Prosthetic Head that it was based on but is now an actual physical presence. The <i>ARTICULATED HEAD</i> is, therefore, a significant step towards the evaluation of more complex human-robot interactions and affords a multiplicity of methods to research these various interactions.</p> <p>The <i>EAR ON ARM</i> project constitutes a pioneering innovation in the field of performance art and bio-technology. Instead of applying standard cosmetic surgery procedures in response to cultural norms of beauty (cf. ORLAN's <i>Surgery Performances</i>, 1990-93), <i>EAR ON ARM</i> is concerned with the construction of a functional anatomical structure, using innovative applications of surgical procedures. Initially visualised on the side of the artist's head (<i>Extra Ear</i>, 1996), it was not until 2006 that the first surgical procedures were funded and carried out. The <i>EAR ON ARM</i> has required 2 surgeries thus far, performed by Malcom A. Lesavoy (F.A.C.S. Board Certified Plastic & Reconstructive Surgery, Los Angeles), J. William Futrell (Professor in Plastic Surgery in Pittsburgh/Chairman and co-founder of The GID Group, Inc), Sean Bidic (plastic and ear and hand reconstructive surgeon practising in New Jersey), and Wayne Morrison (senior staff of plastic surgeons at St. Vincent's Hospital, Melbourne). The research project has also involved collaboration between Stelarc and Jeremy Taylor (October Films, London).</p> <p>An extra ear has been constructed on Stelarc's forearm: a left ear on a left arm. A facial feature has been replicated, relocated and will now be rewired for alternate capabilities, not only to hear but to transmit. Excess skin was created with an implanted skin expander in the forearm. By</p>

injecting saline solution into a subcutaneous port, the kidney-shaped silicone implant stretched the skin, forming a pocket of excess skin that could be used in surgically constructing the ear. A second surgery inserted a Medpor scaffold with the skin being suctioned over it. The Medpor implant is a porous, biocompatible polyethylene material, with pore sizes ranging from 100-250 micrometers. This can be shaped into several parts and sutured together to form the ear shape. Because it has a pore structure that is interconnected and omnidirectional it encourages fibrovascular ingrowth, becoming integrated with Stelarc's arm at the inserted site, not allowing any shifting of the scaffold.

The *EAR ON ARM* remains a work in progress. Further surgical procedures are needed to lift the helix, creating a conch and growing a soft ear lobe with the artist's extracted adult stem cells. A small microphone will then be embedded in the ear which, connected to a wireless transmitter and server, will internet-enable the ear, allowing people in other places to listen to what it is hearing. The *EAR ON ARM* becomes a kind of internet organ for other bodies in other places to access and listen through.

3. References to the research (indicative maximum of six references)

Peer reviewed Journals

Abrahamsson, C., Abrahamsson, S. (2007). In conversation with the body conveniently known as Stelarc. *Cultural Geographies*, 14(2), 293-308. <http://dx.doi.org/10.1177/1474474007075364>.

Aceti, L. (2011). Inverse embodiment: an interview with Stelarc. *Leonardo Electronic Almanac*, 17(1), 128-137. [http://dx.doi.org/10.5900/SU_9781906897116_2011.17\(1\)_128](http://dx.doi.org/10.5900/SU_9781906897116_2011.17(1)_128).

Franco, E. (2011). Stelarc: Arte, Tecnologia, Estética e Ética. *Educação & Linguagem*, 13(22), 98-115.

Ingham, K. (2009). Art and the theatre of mind and body: how contemporary arts practice is re-framing the anatomo-clinical theatre. *Journal of Anatomy*, 216(2), 251-263. <http://dx.doi.org/10.1111/j.1469-7580.2009.01166.x>.

Kroos, K., Herath, D.C., Stelarc (2012). Evoking Agency: Attention Model and Behavior Control in a Robotic Art Installation. *Leonardo*, 45(5), 401-407. http://dx.doi.org/10.1162/LEON_a_00435.

Invited Keynote Speeches (selected)

Stelarc has presented the research in a number of keynote addresses:

2012 BIO ART- KRAKOW THEATRICAL REMINISENSES

Keynote: "Meat, Metal & Code: Engineering Chimeras"

6 October, Museum of Urban Engineering, Krakow, Poland.

2011 VIRTUAL FUTURES 2.0'11

Stelarc: The Body and the Artist

June 2011, University of Warwick

2010 BIOTOPIA: ART IN THE WETZONE

Keynote: "Circulating Flesh"

15 October- Auditorium, Utzon Centre, Aalborg, Denmark.

2010 SEAM 2010: AGENCY & ACTION

Keynote Prosthetic Head: "Split Body, Extruded Self & Circulating Flesh"

16 October- Seymour Centre, University of Sydney, Australia.

2010 SINGULARITY SUMMIT AU

Keynote: "The Cadaver, The Comatose & The Chimera"

12 September- RMIT Casey Plaza, Bldg. 10, Melbourne, Australia.

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2010 DRHA 2010: SENSUAL TECHNOLOGIES

Keynote: "Alternate Anatomical Architectures"

8 September- Lecture Theatre E, Brunel University West London, UK.

2009 TIME TRANSCENDENCE PERFORMANCE

Keynote Presentation: "Excess & Indifference- Alternate Architectures"

1 October- ACMI Auditorium, Federation Square, Melbourne, Australia.

Grants

Articulated Head: 3.4M Australian dollars awarded by the Australian research council for a 5-year research project solely based on Stelarc's *Articulated Head*.

4. Details of the impact (indicative maximum 750 words)

Between 2008 and 2013 *EAR ON ARM* and *ARTICULATED HEAD* have led to the introduction of new approaches to the integration of biotechnologies and cognitive science in the arts community, the promotion of a broader acknowledgement of, and engagement with, interdisciplinary work in the field of science and art by the general public (non-specialist audiences), and a medical case study in state-of-the-art biotechnologies offering a point of departure for new developments in Human Computer Interaction (HCI).

The impact of the projects in these areas is reflected in the following ways:

- (1) *EAR ON ARM* was awarded the Golden Nica award in the category Hybrid Art at the Ars Electronica Festival 2010, one of the most important prizes for innovation in art and technology.
- (2) *ARTICULATED HEAD* was featured in the Powerhouse Museum in Sydney, the leading science museum in Australia. The work was selected from the finalists of the Australian Engineering Award, to be exhibited for one year, but the duration of the exhibition was extended for another year due to the work's overwhelming popularity.
- (3) In 2009, the French-German culture television channel ARTE produced and broadcast a documentary about Stelarc's work, discussing the *EAR ON ARM* and *ARTICULATED HEAD* and their innovative significance in bio-art and engineering. Discovery Channel US has awarded an £180k production grant to produce a television documentary about *EAR ON ARM*.
- (4) The works' relevance within the arts community is further corroborated by the fact that curators have selected it for some of the most important exhibitions in the field of art and technology during the period 2008-2013: *sk-interfaces* (FACT Liverpool, 2008, and Casino Luxemburg, 2010); *Stelarc: Les mécaniques du corps* (Centre des Arts Enghien-les-Bains, 2009), *EVOLUTION HAUTE COUTURE: ART & SCIENCE IN THE POST-BIOLOGICAL AGE*, National Centre for Contemporary Arts Moscow (2008); *MEDICINE AND ART* at the Mori Art Museum, Tokyo, Japan (2010), *ARTISTS BODY* at Coreana Art Museum, Seoul, Korea, and *TELL ME TELL ME: AUSTRALIAN AND KOREAN ART 1976-2011* at the Museum of Contemporary Art Sydney and the National Museum of Contemporary Art, Seoul, Korea (2011).
- (5) Articles about *EAR ON ARM* and *Articulated Head* in prominent art magazines such as *Art Monthly Australia* (2012) and *Circa* (2010).

The work was brought to the attention of a worldwide general public through newspaper articles and radio and television features including ABC National Radio (Australia), *WIRED* Magazine, *The Sun*, *Guardian*, *Daily Telegraph*, CNN, Sky News, *New York Times*, *Der Standard* (Austria), and VG (Norway). This wide dissemination has facilitated a broad discussion about the relationship between art and bio-technology, contributing to a broader understanding of the concept of art in the context of technological development. There are numerous examples of lay-people's responses to the work on internet platforms and web searches on *EAR ON ARM* show that the research has been discussed on 24,700 websites (data collected from Google on 7 October 2013).

EAR ON ARM is also considered a pioneering experiment in state of the art medical procedures. In 2012, the methods used to construct Stelarc's *EXTRA EAR* were implemented in largely the same form when surgeons at Johns Hopkins University Hospital constructed a new ear for cancer patient

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Sherrie Walter on her arm. *EAR ON ARM* was recognized as a relevant precedent for this medical procedure.

Similarly *ARTICULATED HEAD*'s innovative significance in Human Computer Interaction was recognised in the Australian Engineering Excellence Awards 2010 and the work is seen as a model for further development of interactive technologies in different contexts (e.g. education, sports, healthcare and communication, etc.).

5. Sources to corroborate the impact (indicative maximum of 10 references)

Statements provided by the following contacts:

- A letter received from an assessor of the Ars Electronica Jury in 'Hybrid Art' (2007-2012), confirming Stelarc's award – the Golden Nica – on the basis of his impact on the media art circle and contemporary arts
- A letter received from Principal Curator at Powerhouse Museum, confirming the exhibition of The Articulated Head; all information regarding the duration, interests from the visitors and the number of visitors has been provided by the Museum.

Contactable:

- Surgeon, USA: The contact can corroborate the impact of the project in the field of medicine, in particular transplant surgery.

Arte (22 May 2009) television: <http://www.arte.tv/de/stelarc/2649368.CmC=2648754.html>

Art Monthly Australia (April 2012): <http://www.artmonthly.org.au/article.asp?contentID=1282>

CNN (2011) 'Ten Most bizarre tech stories of 2011' (No 1: Stelarc's *EAR ON ARM*):

<http://edition.cnn.com/2011/12/27/tech/web/bizarre-tech-news-2011/index.html?iref=allsearch>

Guardian (14/04/2009): <http://www.guardian.co.uk/artanddesign/2009/apr/14/performance-artist-ear-impant>

New York Times (13 April 2009): http://www.nytimes.com/2009/04/14/science/14corp.html?_r=0

Sky News (2009): <http://www.youtube.com/watch?v=NyhNGZvNMVY>

The Sun (12/01/2011): <http://www.thesun.co.uk/sol/homepage/news/2374755/Third-ear-wows-festival-goers.html>

Wired (2012): <http://www.wired.com/underwire/2012/05/stelarc-performance-art/>

Circa (2010): http://www.recirca.com/cgi-bin/mysql/show_item.cgi?post_id=5600&type=NewReviews&ps=publish

Other impact indicators:

1. *Ripley's Newsroom*, 'Strangest stories of 2011' <http://www.ripleysnewsroom.com/top11strangestories/>
2. *Wired*: <http://www.wired.com/underwire/2012/05/stelarc-performance-art/procet>
3. Footage of a procedure to construct an ear on the forearm of a woman; reference is made to *EAR ON ARM*: <http://www.youtube.com/watch?v=cm0CdUlrnR4>
4. *EAR ON ARM* is No. 5 in *Cracked!* '8 Most Horrifying Body Modifications': http://www.cracked.com/article_16853_the-8-most-horrifying-body-modifications.html
5. *Thingiverse*, 'Detournement #1 of McKenzie Wark's Guy Debord: Kac/Stelarc Remix': <http://www.thingiverse.com/thing:95311>
6. The ear project featured in the Canberra Times 'Dilbert' cartoon strip (21 May 2012) and through "Universal Uclick" in numerous other papers: <http://dilbert.com/strips/comic/2012-05/>