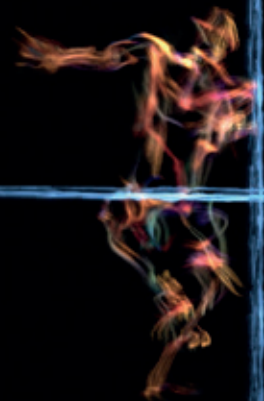
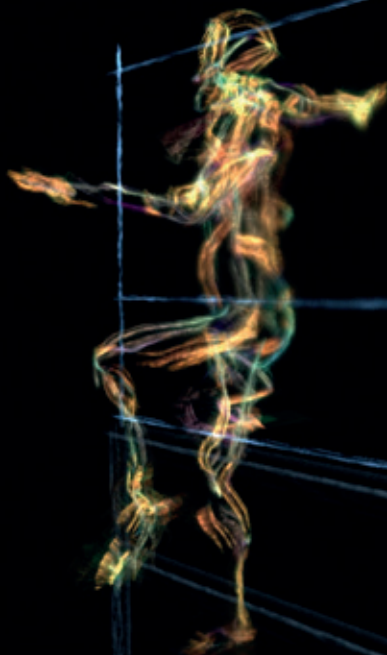




Corporeal Computing: A Performative Archaeology of Digital Gesture

School of Arts and Department of Computing
2 - 4 September 2013



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Welcome

We are delighted to welcome all participants to the Corporeal Computing conference, co-hosted by the School of Arts and the Computing Department, University of Surrey.

Increasingly, human-computer systems involve the capture and interpreting of motion in high-level 3+D environments, for more embodied interfacing across a number of social and cultural settings. This digitized form of 'physical thinking' bears upon a number of emergent narratives and discourses relating to the performance and performativity of body-machine systems. This conference brings together computer scientists, cultural theorists, digital media artists and artists in the movement arts (dance, theatre and digital music), to discuss the use of motion responsive and motion-calculative systems in digital live performance.

We have put together an exciting programme of papers, demonstrations, forums, and performances, with world-leading practitioners and scholars. The event is a truly international gathering, with participants from over fifteen countries.

We would like to thank the Institute of Advanced Studies (IAS), the EPSRC Funded MILES (Mathematics and Modeling in Life and Social Sciences) project and the School of Arts for their generous support. We hope that you enjoy the conference, and that these excavations in the field of 'corporeal computing' make a fruitful contribution to the integration of new technology and human embodiment in a cross-disciplinary effort between computer science and the performing arts.

Organisers:

Nicolas Salazar Sutil, School of Arts, University of Surrey

Paul Krause, Department of Computing, University of Surrey

With thanks to Mirela Dumic from the Institute of Advanced Studies and David Hockham, our Production Supervisor, for their invaluable assistance.

*Cover images courtesy of Paul Kaiser
(After Ghostcatching, 2011, OpenEndedGroup with Bill T. Jones)*

Programme

Venue: Ivy Arts Centre

Opening and Paper Presentations: The Main Theatre

Performances / Installations / Screendance: See details in the Programme.

Registration / Coffee / Lunch / Reception: The Ivy Foyer

Day 1

- 08.30 - 09.30 **Registration and Coffee**
- 09:30 - 09:40 **Welcome: Phil Powrie (Dean, Faculty of Arts and Human Sciences)**
- 09:40 -10:40 **Keynote Presentation by Paul Kaiser (OpenEndedGroup)**
- 10:40 - 11:40 **Archaeologies of Digital Performance**
Oskar Schlemmer's programmatic gesture – Sally Jane Norman
CODA, a stereoscopic computer choreography after Stravinsky's Rite of Spring
Martine Epoque and Denis Poulin
- 11:40 -12:00 **Coffee Break**
- 12:00 -13:00 **Corporealities and Materialities I**
Placing the body in virtual reality – Sita Popat
Blended bodies and notions of materiality in live-digital dancing – Kerry Francksen
- 13:00 -14:00 **Lunch**
- 14:00 -15:00 **Keynote Presentation by Mark Coniglio (Troika Ranch)**
- 15:00 - 16:30 **Tools and Technologies I**
I-CARE-US – Fernando Nabais
The TKB project: creative technologies for the multimodal annotation of performance composition and documentation – Stephan Jürgens
Kinect: organising movement between measuring, calculating and perceiving – Irina Kaldrack
- 16:30 – 16:45 **Coffee Break**
- 16:45 - 18:00 **Round Table Discussion**
Mark Coniglio, Paul Kaiser, Kirk Woolford, Tom Calvert (with Sita Popat)
- 18:00 - 19:30 **BBQ Dinner** (venue depending on weather, tbc)
- 19:30 - 21:00 **Live Art Installations/ Performances**
Electrode, by Daniel Ploeger (UK), Dance Studio
Moments in Place, by Kirk Woolford (UK/US), various locations
NEX, by Cia Proyecto Uno (Spain), Studio 3
After Ghostcatching, by OpenEndedGroup (Paul Kaiser, US), Studio 2
- 21:00 **Reception**

Day 2

- 09:30 - 10:30 **Keynote Presentation by Tom Calvert**
- 10:30 - 10:45 **Coffee Break**
- 10:45 - 11:40 **Corporealities and Materialities II**
Transgressing the sonified body – Daniel Ploeger
Hacking the body – Camille Baker and Kate Sicchio
- 11:40 - 12:30 **Gesture and Haptics**
Conversation with phones – James Charlton
Haptics and particles (demo) – Doros Polydorou and Tychonas Michailides
- 12:30 -13:30 **Lunch**
- 13:30 - 14:30 **Keynote Presentation by Kirk Woolford**
- 14:30 - 15:30 **Data, Visualisation, Motion**
Modulation in interactive video installation – Nic Sandiland
MoveEngine – movement values visualized – Henner Drewes
- 15:30 - 15:45 **Coffee Break**
- 15:45 -16:30 **Performance / Lecture**
Perfect Paul: on freedom of facial expression – Arthur Elsenaar
- 16:30 - 17:30 **Forum 1 Cyborgs and Ghosts**
Laura Karreman and Seok Jin Han present and chair
- 17:30 -19:00 **BBQ Dinner** (venue depending on weather, tbc)
- 19:00 - 21:00 **Screendance session (Main Theatre)**
Structured Light (Short) by Sebastian Melo (Chile)
CODA by Martine Epoque and Denis Poulin (Canada)
- 21:00 **Reception**

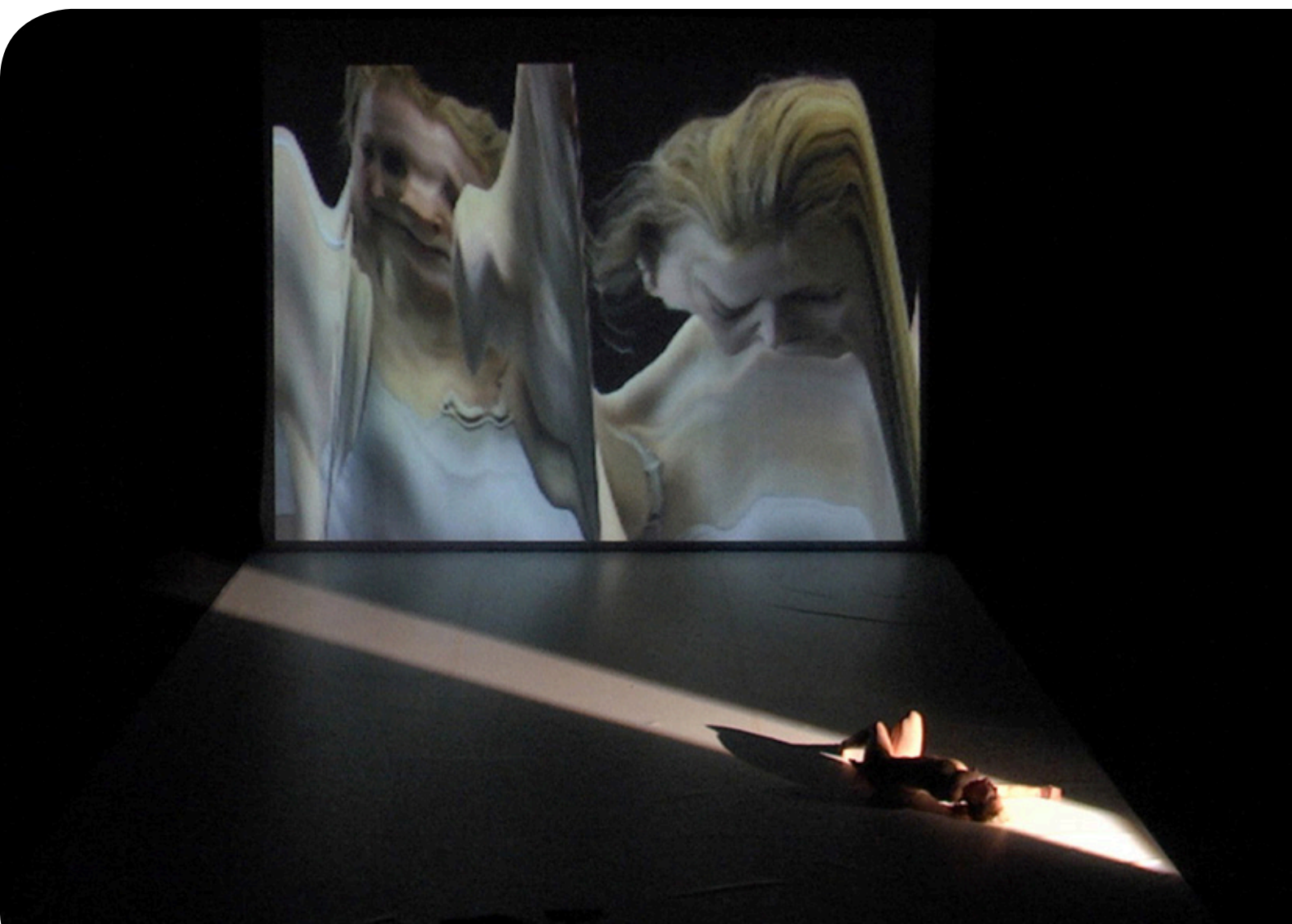
Programme

Day 3

- 08:30 - 10:30 **Current Approaches in Digital Laban Studies**
Panel 1 (8:30)
Intentional and behavioral movement in virtual worlds: A Laban Movement Analysis approach – Leslie Bishko
How to make human animation more alive - Viewing human animation through the lens of Laban Movement Analysis – Sandra Hooghwinkel
- Panel 2 (9:30)**
Movement archaeologies: digging for meaning in new landscapes of movement data – Thecla Schiphorst, Karen Bradley, Karen Studd
Can affective movement be quantified? A Laban-based approach – Sarah Jane Burton, Ali-Akbar Samadani, Rob Gorbet, Dana Kulic
- 10:30 - 10:50 **Coffee Break**
- 10:50 - 12:00 **Corporealities And Materialities III**
Exploring the capacity of embodied, spontaneous interfaces to support creativity – Michael Neff
Behavioural coding and segmentation: Signifying practice and value production in technology – Wangi Lee
- 12:00 -13:00 **Lunch**
- 13:00 - 14:00 **Forum 2: Digital Feminism**
Margaret Jean Westby and Legacy Russell present and chair
- 14:00 - 14:15 **Coffee Break**
- 14:15 - 15:15 **Tools And Technologies II**
Materialising Acts: Exploring movement data for digital interaction through the Sync application – Lise Amy Hansen
Sensor based motion capture in balletic dance – Corinna Spieth-Hoelzl
- 15:15 -17:15 **Performances (+ Q & A's with artists):**
REACH by Mindbeat 2, Dance Studio
VISIONS FROM CHAOS I by Compañia 3º Corpo (Brazil), Main Theatre
- 17:15 **Coffee**



Flatland, by C8 (Salazar-Sutil + Melo + Worgan). Choreography by Sarah Rogers and Angelina Jandolo



The Evolution of Software for Dance

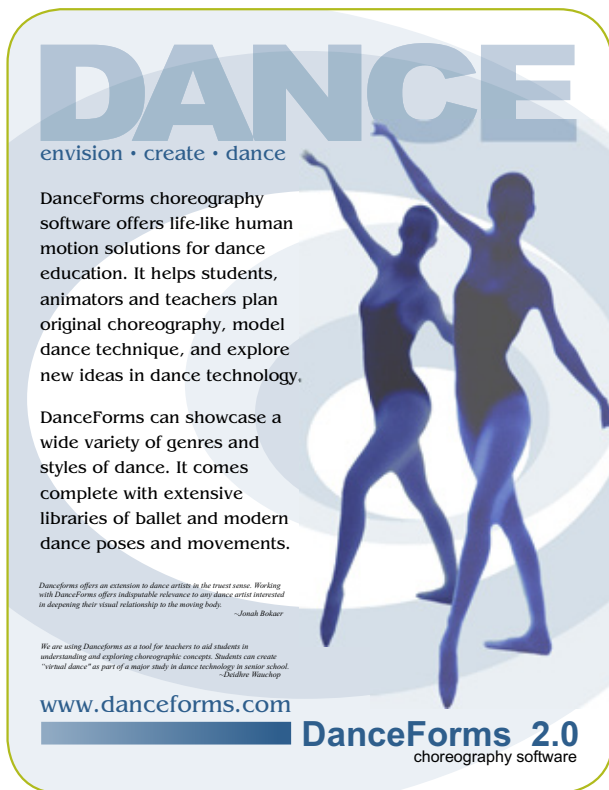
Thomas Calvert, Credo Interactive Inc., Canada

Ideas about using computers to support movement in general and dance in particular go back to early suggestions from Bell Labs scientist Michael Noll (1967) and choreographer Merce Cunningham (1968). But it was a long time before really usable tools evolved. What was the impetus to use digital technology? Probably the most important was visualization – the ability to see an animation of a dance and view it from different angles and perspectives. But that begs the question of how the movement should be represented and stored. The classical way to represent movement is notation – perhaps 80 movement notation systems exist worldwide. The best developed and best known are Labanotation (1926), Benesh Notation (1948) and Eshkol-Wachman Notation (1958). But scores using these notations were written on paper and were not machine readable so early computer applications concentrated on ways to create notation scores on the computer. Editors exist for all of these systems but probably the best known is LabanWriter developed by Lucy Venable and her colleagues at the Ohio State University (1987).

The obvious next step was to animate notation scores. In spite of many prototype systems, starting with Wolofsky in 1973, a comprehensive and robust system to achieve this has eluded us – including the LabanDancer prototype developed by the DNB and Credo in 2002. In the 80's our Graphics Research Lab at Simon Fraser University began a creative collaboration between choreographers and computer scientists in order to design software for composing dance. While choreography focuses on creative compositional strategies for human movement, developing software requires abstraction and representation of algorithms and procedures. We developed a software interface to compose and edit dance. We began with a set of 'poses' (or keyframes) representing still shapes that could be recombined or edited by shifting relationships in time and space. The result was a choreographic authoring system implemented on an Evans and Sutherland workstation, initially called Compose (1989), then Life Forms (1992) and now DanceForms (2005). In 1989, through some happy coincidences, Merce Cunningham became a master user guiding the evolution of the system. An SFU spin-off company, Credo Interactive, was formed in 1995 to further develop and market DanceForms. The software is available for the Mac OS and Windows and we are currently developing a version for the iPad. It is now used by individual choreographers to compose dance, by schools and universities to teach dance and by many animators as a tool for human figure animation.



In this presentation I am concentrating on robust software developed for a wide community. Over the span of this evolution there have also been numerous impressive applications of computer graphics and related technologies to live performances, artistic installations and other creative endeavours. But that is rather different from production software. A considerable effort is required to keep production software working as computer platforms and operating systems evolve. But new hardware and software does present new opportunities – for example we are exploring the use of the iPad tablet in teaching dance. What else does the future hold for software that supports dance? Motion capture studios have been around for decades but were very expensive – the development of inexpensive consumer products like Microsoft Kinect promise to allow almost everyone to capture live movement and store it. With this choreography and teaching can adopt new strategies.



DANCE
envision • create • dance

DanceForms choreography software offers life-like human motion solutions for dance education. It helps students, animators and teachers plan original choreography, model dance technique, and explore new ideas in dance technology.

DanceForms can showcase a wide variety of genres and styles of dance. It comes complete with extensive libraries of ballet and modern dance poses and movements.

Danceforms offers an extension to dance artists in the virtual sense. Working with DanceForms offers indispensable relevance to any dance artist interested in deepening their visual relationship to the moving body.
-Jonah Bokar

We use DanceForms as a tool for teachers to aid students in understanding and exploring choreographic concepts. Students can create "virtual dance" as part of a major study in dance technology in senior school.
-Debbie Wanchop

www.danceforms.com

DanceForms 2.0
choreography software

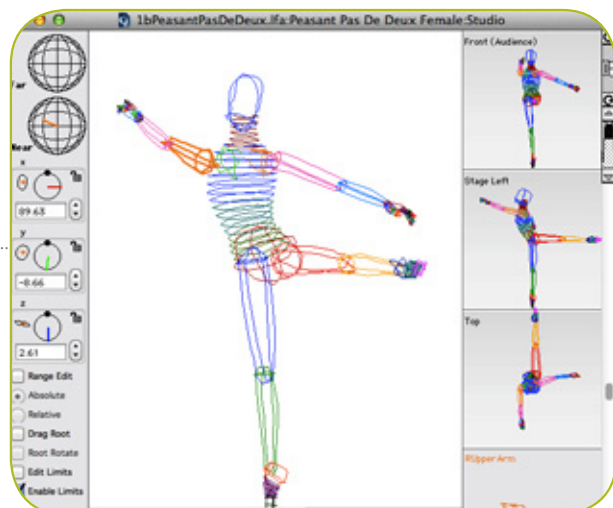
Dr. Tom Calvert is Emeritus Professor in the School of Interactive Arts and Technology at Simon Fraser University, Surrey, BC, Canada. He has degrees in electrical engineering from University College London (B.Sc.), Wayne State University (MSEE) and Carnegie-Mellon University (Ph.D.). At SFU he has held faculty appointments in Kinesiology, Computing Science and Engineering Science as well as Interactive Arts and Technology. He held a number of administrative positions including that of Vice President for Research and Information Systems from 1985 to 1990. In 1997 he took leave from SFU to become Vice President for Research and External Affairs at the new Technical University of BC where he had a leadership role in creating a new curriculum that focused on distributed learning. In 2002 TechBC was merged with Simon Fraser and he became Acting Director of the new SFU School of Interactive Arts and Technology from 2002 to 2004. His research interests focus on computer animation and human computer interaction. His interest in human figure animation has resulted in the *Life Forms* system for human figure animation



DanceForms 2.1

2003-2012

and the *DanceForms* system for dance choreography. These are now developed and marketed by SFU spin-off company Credo Interactive Inc. of which he is CEO (www.charactermotion.com). He is the author or co-author of over 200 publications. Dr. Calvert is a registered professional engineer in British Columbia and a Fellow of the Canadian Academy of Engineering.



Keynotes

Reflection vs. Intervention: The Past and Future of New Media Performance

Mark Coniglio, Troika Ranch, Germany

For twenty years we've delved into the potential of interactive performance. But where have we come in that time? In the nascent days of this field, the expectation for many was that the inclusion of interactive media would lead to new art forms, as digital technology provoked fundamental changes in our compositional practice. Yet, at this late date, a survey of the field shows that this has not happened in a significant way.

In this talk Mark Coniglio – Troika Ranch artistic co-director and creator of the software Isadora – will offer a reflection on past practice in the field of media-intensive dance, and propose a potential future in which computer technology will significantly impact creative practice and push us in new directions.

Using examples from his twenty-year history with Troika Ranch, he will propose and contrast the concept of a “digital reflection” with that of a “digital intervention”; the former functioning as an enhancement and confirmation of existing modalities of creation, the latter serving as a game-changing imposition to tried-and-true ways of working. He will argue that rigorously embracing the structures inherent in computational technology will push us towards a compositional practice that is as unexpected as it is compelling.



Iconoclash Photography

Recognized as a pioneering force in the integration of dance and media, composer/media artist Mark Coniglio creates large-scale performance works that integrate music, dance, theater and interactive media. A native of Nebraska, Mark received his degree in music composition in 1989 from California Institute of the Arts where he studied with electronic music pioneer Morton Subotnick. From that early time, Coniglio's artistic practice has included the creation of custom interactive systems that allow performers to manipulate video, sound, and light in real-time. His first technological breakthrough came in 1989 when he created MidiDancer, a wireless system that allowed a performer to interactively control music. His passion for giving control to the performer led him to create the award-winning software Isadora®, a flexible graphic programming environment that provides interactive control over digital media. Mark's writings about new media in performance have appeared in numerous books and journals, including “New Visions In Performance”, “La Scena Digitale: Nuovi Media Per La Danza” and Movement Research Journal. He relocated from New York to Berlin, Germany in 2008.

Troika Ranch performs “loopdiver”
Photo Credit: Alexandra Matzke



Keynotes

On the Particularity of Minds and Bodies (real and virtual)

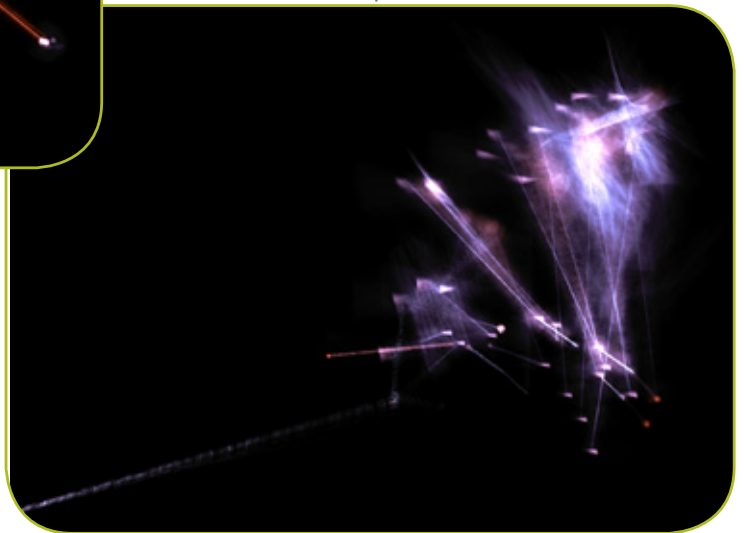
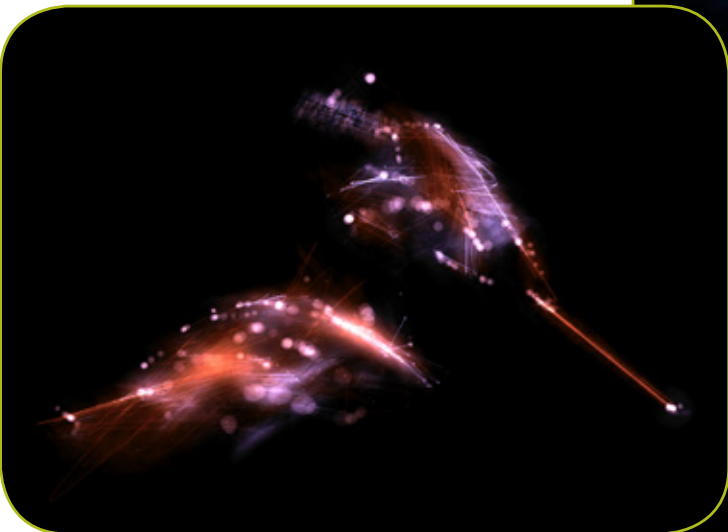
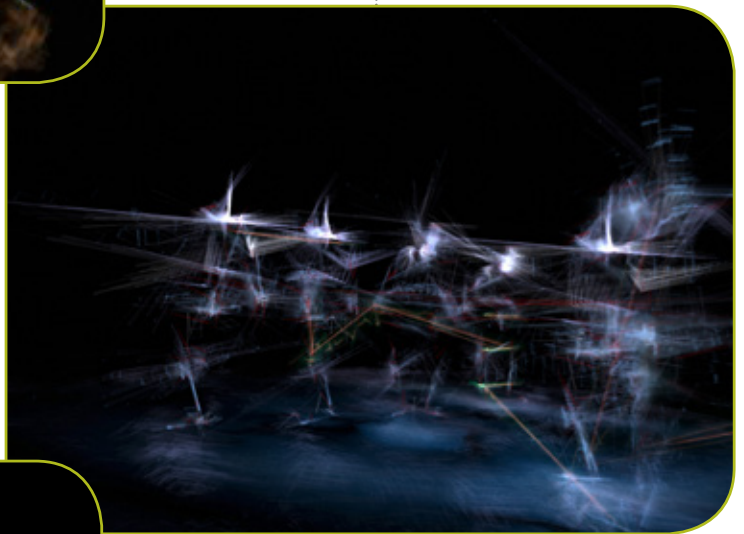
Paul Kaiser, OpenEndedGroup, US

Paul Kaiser of digital arts collective OpenEndedGroup will examine artworks that engage the intelligence arising from specific bodies and their particular ways of moving. Examples will mainly be drawn from projects with directors and choreographers that originate in their own performances rather than from those they set on their actors or dancers. The projects will range from works created in the mid-90s to the present day with such collaborators as Merce Cunningham, Bill T. Jones, Trisha Brown, Wayne McGregor, William Forsythe, and Robert Wilson. Kaiser will also discuss the particularity of virtual bodies — software constructs that manifest themselves only on screens or in projected beams of light.

OpenEndedGroup's imagery mostly defies conventional seeing, for their digital rendering is distinctly nonphotorealistic and evokes instead drawing and painting. Even so, their process does often incorporate lenses, but of unusual sorts, such as infrared for motion capture or paired cameras for stereoscopic 3D capture. But all this is as a means to an end, which is to evoke what the mind's eye sees. Kaiser will convey some of their working process and rationale in the course of his talk.



Paul Kaiser's work is all about drawing, but he himself cannot draw; often entails dance, though he has neither dance ability nor training; increasingly explores complex spatial arrangements in 3D despite his having no sense of direction (getting lost as often in virtual spaces as in physical ones); and relies on highly advanced code of which he can neither program or even read a single line. Despite but also because of these limitations, Kaiser has created a significant body of work for stage, gallery, screen, and public space with his two colleagues, Marc Downie and Shelley Eshkar, in OpenEndedGroup, with work presented in such venues as Lincoln Center, the New York Film Festival, the ICA Boston, the Hayward Gallery, Sundance, EMPAC, BAM, the Festival d'Automne, Sadlers Wells, the Barbican, and many others. A few honors have rewarded such work: in 1996, Kaiser was the first digital artist to receive a Guggenheim Fellowship, and in 2008 he received the John Cage Award from the Foundation for Contemporary Arts. In the field of dance, Kaiser has collaborated with Merce Cunningham, Trisha Brown, William Forsythe, Bill T. Jones, and Wayne McGregor in works both for stage and museum. OpenEndedGroup www.openendedgroup.com



How Far Above the Machine: Frameworks and Encoded Movement

Kirk Woolford, University of Sussex, UK

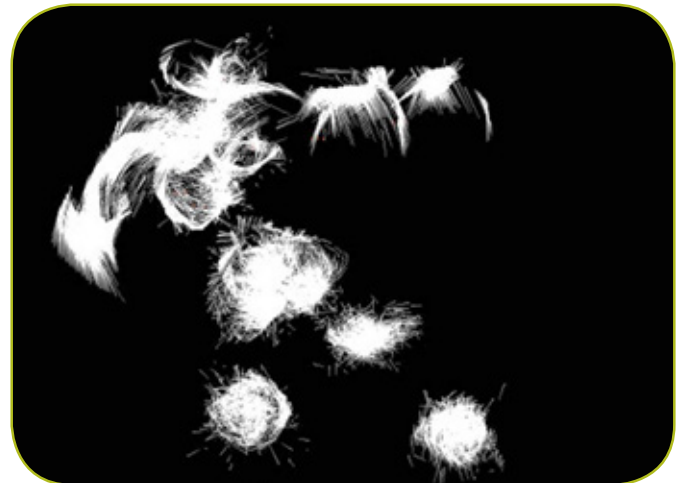
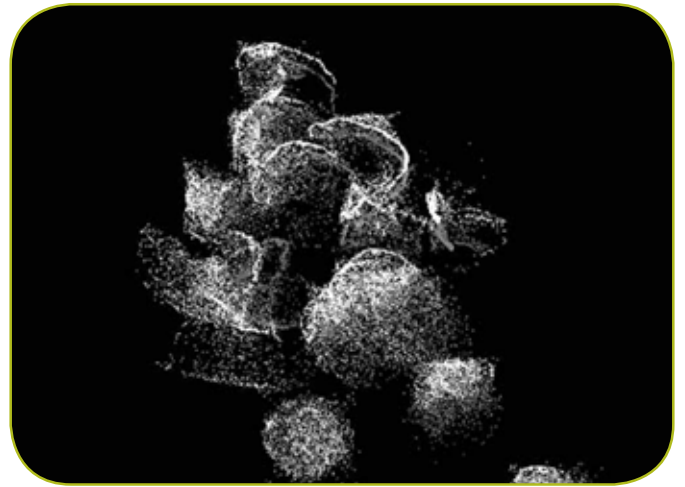
A traditional first computer graphics programming assignment from the mid-1980s was to have students light a single pixel on screen. The challenge was to do this without using any graphics libraries or BIOS calls. This required students to understand assembly code, CRT timing pulses, Front and Back Porches in order to time the signals correctly to hit every the same pixel every refresh of the screen. However, 21st Century computers are far more complex and very few people can afford to invest the time needed to understand their tools in such depth. In 2013, students are far more likely to be given a framework allowing them to code at high level of abstraction from the machine executing their code. As students develop their skills, layers of the framework are stripped away to bring them deeper into coding or closer to the machine. This approach to coding has transformed the creative arts by making enabling people to learn to program faster. But what are they programming?

This question is brought to the foreground by the massive interest in “full-body” or “natural” interaction following the release of Microsoft’s Kinect camera. Shortly after the Kinect’s formal launch, Primesense, one of the original developers of the Kinect, released their OpenNI framework. Over the following year, hundreds of developers released libraries built on top of OpenNI. Thousands if not millions of programs have been built on top of OpenNI, but only a handful do any more than dress up the original code with new graphics. Has OpenNI been an effective tool kit if the projects built with it have been so similar? Have the majority of developers using OpenNI been primarily interested in experimenting with the technology? When developers present their resulting kinetic experiments, should Primesense be credited as a collaborator? Is Primesense the author of the work? Is Primesense the Artist?

This presentation will explore relationships between tool makers and tool users through Dance and Technology projects created by Kirk Woolford in collaboration with Diller+Scofidio, Susan Kozel, igloo and others over the past 20 years. It will ask to what extent early projects developed with low-level tools celebrated technologies and complexity of development and whether newer projects using game engines and high-level frameworks have moved significantly beyond the demos created by the original tool makers.



Kirk Woolford is a researcher/practitioner who works closely with digital and creative industries. Kirk initially studied Computer Science before discovering digital photography experiments in the mid 80s, and moved to Chicago to study at IIT’s Institute of Design. He has spent more than 20 years working with digital and interactive media while balancing academia, industry, and cultural institutions. Kirk has taught in Design, Media Arts, Fine Art, and Choreography programs in Germany, Holland, the US and UK. Kirk’s research is practice-led. In addition to working on industry projects, he creates personal, creative, interactive experiences and performances as a method of exploring ideas and testing technologies. These explorations have been shown internationally at galleries, festivals and performance venues including Shanghai eArts, ARCO Madrid, Art Cologne, P.S.1. (MoMA), Venice Biennale, Ars Electronica, ISEA, and SIGGRAPH. In his explorations, Kirk has collaborated with Diller+Scofidio, Charleroi Danses, igloo, Carlos Guedes, Susan Kozel, Frederique Flamand, Fabrizio Plessi, Stelarc, and others.



Hacking the Body

Camille **Baker**, Brunel University and Kate **Sicchio**, University of Lancaster, UK

Hacking is a much-misused term, typically connected to controversial computing practices (Levy, 1984; Jordan, 2008; Thomas, 2001). However, traditionally the 'hacker' sub-culture also referred to a technical elite whose prowess was displayed through the imaginative re-purposing of consumer electrical equipment. Within this context, a 'Hack' is defined to be "a material practice that produces differences in computer, network and communications technologies" (Jordan, 2008:12), but must also display some degree of domain specific technical excellence. While hacking may be seen as re-purposing or subverting data, code or other information, it can also be seen as a re-understanding of what is possible and "...open up a vital window into possibilities, sensibilities and ethics of twenty-first century cultures and societies" (Jordan, 2008:15). Specifically, hacker ethics are concerned primarily with sharing, openness, collaboration, and engaging in the hands-on imperative. 'Hacking the Body' uses the open, solution-driven, hands-on ethos as its main definition and driving principle of authoring creative works. We use the concept of 'hacking' to re-purpose and re-imagine internal signals from the body to: (1) explore how internal physiological data can be harnessed to 'hack' the experiential states of the body; then to inform, (2) how performers and artists can take this data to develop new methods for performance and choreography creation. The resulting works will be site-specific performances, mobile installations, and participatory performance experiences, using biofeedback sensing and actuating devices, smartphones, motion-sensing/ tracking interfaces (e.g., Xbox Kinect), audiovisual or gaming technology, and augmented reality (AR) tools, to develop 'hacking' software for interactive performances. We use hacking culture and theory as a theoretical framework to connect technology and performance ideologies and critically examine key thinkers and practitioners from both domains, offering a new slant on how 'the body' is a rich source of experiential knowledge to be harnessed for publicly shared interactive artworks.

Intentional and Behavioral Movement in Virtual Worlds

Leslie **Bishko**, Emily Carr University of Art + Design, Canada

A key distinction regarding believable character movement in animated and interactive virtual worlds is the difference between intentional and behavioral movement. Intentional movement communicates a character's emotions, and satisfies an impulse, whereas behavioral movement reflects reactive or survival reflexes that project motivated action, yet feel empty or automatic. For example, a character's gaze and kinetic sequencing of body movement can be coded to procedurally follow a moving target. The elements that can't be coded are what the character thinks while tracking a target, or how he feels about his circumstances, or even why he is tracking to begin with. This paper explores intentional and behavioral movement through animation and acting principles, and the methodology of Laban Movement Analysis (LMA), an established framework for observing, describing, and interpreting movement and what it communicates. LMA describes movement parameters through five categories: Body: posture, gesture, and patterns of coordination. Effort: intention manifested as qualities of movement. Shape: the changing form of the body in relationship to others. Space: the structural language of how movement forms in space. Phrasing: units of movement language. LMA articulates what intentional movement looks like, and how we are empathically attuned to it. LMA's strength and value lies in its open framework for observing communication, as opposed to a closed formula that limits the interpretation of movement to literal definitions. As a theory of movement, it offers practical and innovative solutions towards designing authentic, intentional, believable, expressive and characterized movement in virtual worlds that is perceived as meaningful through the process of empathic attunement. By using the movement framework that LMA provides, we can create character movement with deliberate attention to what makes movement authentic, intentional and believable.

Can Affective Movement Be Quantified? A Laban-Based Approach

Sarah Jane **Burton**, Sheridan College, Canada

Ali-Akbar **Samadani**, Rob **Gorbet**, Dana **Kulic**, University of Waterloo, Canada

Human beings are movers, even before birth. We move to discover the world, to try to understand it, and to reach out to communicate with our environment, including other living beings. Intentions and feelings are expressed through gestural movements. Are there ways of analyzing expressive movements across cultures, within a culture, and/or within specific personal patterns? Is it possible to find movement qualities that generally accompany a specific emotion? Can this seemingly innate capacity to express oneself through movement and to interpret the movements of others be analyzed and translated into mathematical equations or algorithms? This paper describes our efforts to begin to answer some of these questions. Over the past year, we've been working as an interdisciplinary team of engineers, actors, and dancer/choreographers to explore whether we can determine what it is about particular movements that conveys specific emotions. Within a motion capture environment, a professional actor reproduced prescribed motions, imbuing them with different emotions. These data were analyzed in two ways: novel machine learning techniques were developed to reduce the high-dimensional data to a much lower number of salient features, and Laban coding by a CMA was compared with automated quantification of relevant Laban dimensions. The results suggest that machine learning can be used to accurately identify a greatly-reduced subset of the motion capture data necessary to accurately identify which emotion the actor was conveying, and hence which part of the data contains the emotional content. Also, there was a strong correlation between results from the automatic Laban quantification and the CMA-generated Laban quantification of the movements. As we continue to make progress in answering the broader questions, we see great potential for these results in fields including interactive art, animation and performance theatre training.

Exhalent Gestures: Inter-subjective Agency and Digital Materiality

James **Charlton**, Auckland University of Technology, New Zealand

This paper proposes that deficiencies in contemporary understandings of the digital impose a mimetic modality in the form of digital media. It suggests that this deference to analogue media prevents engagement with digital materiality in the ontological terms established by Lewis (1971). Drawing on Kirshof's 2009 reading of Latour's Actor Network Theory and Marks'; phenomenological analysis of tactile cinema, it explores the role of the body in constituting digital materiality. It argues that gesture in the sense defined by Agamben (1992), becomes a structural object; a network of relationships in a shared agency between subjects that Young (2011) defines as gestural inter-subjectivity. As structural objects, inter-subjective gestures are seen as inhabiting all actants simultaneously, and are thus capable of bi-modal existence. While remaining phenomenologically analogue, the body co-constitutes digital materiality through inter-subjective gesture. Using the researcher's recent performative artworks form and TradeAir - the paper explores how through inter-subjective gesture the body is capable of overreaching itself while remaining embodied (1). In these works, gesture-driven stereolithographic systems and exhalant actuators become a way of decentering the self that is discussed by Turkle (1995) in regards to human/computer interfaces (2). The gestural experience is one that diminishes the dualistic opposition of body and technology, drawing them together in a schema of the exchange that locates the digital epistemologically. Inter-subjective gesture is proposed as a means of translating between embodied experience and material agency within a network of relations in order to actualise digital materiality.

MoveEngine – Movement Values Visualized

Henner **Drewes**, Folkwang University of Arts, Germany

Movement-oriented animation Engine (MovEngine) is a software library, which was originally developed within the project “Visualizing Dance Archives”, conducted at Salzburg University from 2008 until early 2013. One of the objectives in this project was to create a computer application which aids research in constructing dance through animated movement sequences. The software allows movement content to be transferred from a variety of historical sources into a visual, three-dimensional representation and facilitates the exploration of possible variations in the movement material. This unique and innovative tool provides the possibility to access referential material on dance and to transfer / translate the referentiality into visuality, thus revealing the motoric and kinetic aspects of the material. While the goal of this project was focused on historic research, the employed technical approach may also be applied in a variety of other contexts, e.g. in creating learning tools and automated animated visualization of movement notation scores. On the one hand, this flexibility is accomplished by a highly modular design of the software. Through this, complex tasks are grouped and divided into manageable parts. On the other hand, MovEngine gains a high degree of flexibility by extending traditional key frame animation techniques with a system of movement orientated instructions, which are based on principles of movement analysis as known from systems of movement notation. The implementation of MovEngine is still in progress. During the Visualizing Dance Archives project the core functionality of moving and synchronizing free extremities in space according to Eshkol-Wachman Movement Notation principles has been completed. As the main upcoming task, weight transfers e.g. from one leg to the other should be implemented, allowing the animation of steps and moving in space. Despite its current developmental status with its limited features, the advantages of the approach can be already observed in the results of the Visualizing Dance Archives project and in the experimental application of MovEngine as a research and learning tool in movement studies at Folkwang University of the Arts in Essen. This paper outlines the key features of MovEngine by describing the role of movement notation principles in the generation of animated movement.

Perfect Paul: On Freedom of Facial Expression

Arthur **Elsenaar**, Royal Academy of Art, Royal Conservatoire, The Netherlands

Perfect Paul is a sequel to my (in)famous Huge Harry lecture/ performance in which a digital persona lectures on computer to human communication. This new lecture/ performance, in a highly condensed fashion, will present the results of my recently completed doctoral artistic research entitled: “Facial Hacking: The Twisted Logic of Electro-Facial Choreography.” This research is investigating the externally controlled human face as a site for artistic expression. By means of systematic computational methods the research has mapped the space of possible facial movement patterns (dynamic face space) with the aim of unveiling unique choreographic facial patterns. This systematic approach has been successful and the research has uncovered unsuspected facial movement patterns. These unique facial choreographic patterns have subsequently been categorized and named in a special choreographic language: “The Language of Facial E-motion”. An important observation made about the face under digital instead of neural control, is that the face behaves according to the capabilities of the controlling agent; i.e. the digital controlled face exhibits high temporal accuracy, is extremely consistent in its movement and has an amazing stamina. All capabilities the human neural agency notoriously is not very good at. In this lecture Perfect Paul will demonstrate in a live computer versus human showdown the superior qualities of digital versus neural facial control and will come to the conclusion that the human neural brain is underutilizing the expressive potential of the human facial hardware.

CODA, The Finale of NoBody Dance: A Dance Without Body

Martine **Époque** and Denis **Poulin**, Université Québec à Montréal (UQAM), Canada

CODA is an experimental film set on the last 9 minutes of the music *The Rite of Spring*, by Igor Stravinsky. Based on their choreographic paradigm of 'dance without body' (Époque, Poulin 2004), and the unit of dancer motion signatures, this stereoscopic dance film emerges as a re-mediatization and aesthetic reworking of Stravinsky's masterpiece, via the utilization of the digital technology of motion capture. The goal, according to the authors, is to transcend the perception of dance movement by freeing it of a body, and at the same time, by freeing it from the history that this physical body carries with it. Entirely made of particles from motion-captured movement, the images of CODA tie the technological to the choreographic in a tight hybridization. The authors argue that in such a research and creation process, dance movements are the starting point for the laying down of unconventional choreographic and film production techniques. The presentation concludes with the artist-researchers' explanation of the aesthetic quest and thematic content behind this work as an evocation of a much more expansive historical dilemma; that is, the dramatic events caused and suffered by humanity and the Earth in a digital-era context.

Blended Bodies and Notions of Materiality in Live-Digital Dancing

Kerry **Francksen**, De Montfort University, Leicester, UK

Addressing the conference themes relating to 'physical thinking' and 'digital embodiment', this paper is a consideration of how new technologies can begin to open up a fresh perspective on the ontological resonances of live-digital 'sensing bodies' (Manning 2007,2011) as they move in media-rich environments. In an attempt to re-conceptualize the art of making movement; or to consider what 'physical thinking' might be in such domains, the author aims to present a personal perspective of the potential for 'live' and 'digital bodies' to interact. This interaction in turn demands a materiality, which takes account of what Stamati Portanova discusses as 'the creativity of digital technology deriv(ing) from the abstract but very peculiar potentiality that stands behind materiality, namely the idea to cut things (into bits, pixels, points, or dots) and recombine them, ad infinitum' (2013:8). In this context, the dancer is negotiating her way through movement-making as both a live and digital 'being' via real-time processing technologies. This process begins to open up a potentiality for movement choices to be conceived as something which is born out of a materiality that is at once both 'bits' and 'points' of 'matter'. This provides a very different way of questioning 'digital-physical thinking'. As Kozel writes: 'Performance does indeed have the power to ignite, not just spaces, but also an ontological sub-stratum of being' (2007:66). By considering the interstices of live and digital gestures as they blur the boundaries between 'bits, pixels, points or dots' in live-digital dance performance, Manning's concept of 'sensing bodies in movement' (2007,2011) is used as a methodology for rethinking what 'an ontological sub-stratum' might be in such domains. This paper foregrounds the dancer's experience, which is drawn from the author's own embodied practice of moving in media-rich environments, as a way to engage more critically with those 'perceptual processes' (Vaas Rhee 2010). This becomes particularly poignant from the perspective of the dancer who is attempting to negotiate and experience this type of work in an embodied sense.

Cyborg, Agency and Humanity in digital performance

Seok Jin **Han**, University of Surrey, UK

In digital performance posthuman embodiment is represented in a variety of forms ranging from a mediated or virtual counterpart of a human performer to a cyborg, which is the merging of a human

body and a machine. While computer-generated representations in the form of digital doubles emerge through the physical/virtual interface, the cyborg is created through the bionic interface where technologies mechanically intervene in the human body. The cyborg as the part-organic, part-technological being is grounded on cybernetics, a field of study that insists on the modification and augmentation of the human body through communication and control systems of the machine. The advent of cybernetic organisms implies not merely the extension of the human body but also the transgression of ontological boundaries between the human/nonhuman and the organic/technological. The cyborg has been often considered monstrous, uncontrollable, and feared. The concept of the cyborg as Other has roots in the Western imaginations of monsters, automata, and robots as ubiquitous figures which have been long pictured as a threat to the human race in literature and science fiction. The cyborg and its precursors provoke anxiety about the loss of moral agency and the violation of the human's ontological status. In this paper, I intend to not judge technology itself as good or bad. Calling into question technology placed outside the realm of human, I instead will look into the intertwining of human and technology in terms of intimate incorporations of technologies into human beings. Adopting a posthumanist approach to technology and its constitutive role in being in the world, I will examine Australian Dance Theatre's *Devolution* (2006) which presents the co-existence of organic and metallic performers. The work will be analysed in terms of how the artists represent the relationships between robotics and humans and how dancers actually become cyborgian figures when robots merge with their bodies. In doing so, I will address ethical and political questions on cyborg subjectivities in relation to a displacement of a commonly held sense of human agency and morality.

Materialising Acts: Exploring Movement Data for Digital Interaction Through the Sync Application

Lise Amy Hansen, The Oslo School of Architecture and Design (AHO), Norway

How may we reveal the expressive and communicative possibilities that are particular to movement data? The distinct relational structures of data drawn from physical movement contain both corporeal and computational qualities. These qualities become apparent through dynamic visualisations of movement data, as we communicate through how we move. Stern describes such dynamics as vitality: 'We intuitively evaluate their [people's] emotions, states of mind [...] what they are likely to do next, as well as their health and illness on the basis of the vitality expressed in their almost constant movements' (2010: 3). Conceptualizing such dynamics for digital interaction is complex: 'we can observe it with the human eye, but methods to extract such information are still in their infancy' (Bevilacqua 2007: 27). Yet to creatively work with movement data, we engage with it conceptually, as a material informing the processes of making as well as the final artwork. Sync is a digital application designed to dynamically visualize movement data. It allows for a visual reading and identification of movement data. The Sync graphic user interface presents a variety of choices for marking x-y-z points (representing joints on the body) as well as the scope, density and the length of history of these. Through these choices one sets the parameters that shape the algorithms that in turn visualize the movement data (and re-present the movement). Through repeated visualisations of movement data, the variations in the visuals reveal the possible materializing processes of data. Thus, the nature of the materializing process of data comes to expression through the variety of ways the data may be called upon. This informs how we may creatively draw on movement data and by extension, movement, in shaping digital interactions.

How to Make Human Animation More Alive - Viewing Human Animation through the Lens of Laban Movement Analysis

Sandra Hooghwinkel, Moving Technology

In this presentation Laban Movement Analysis is used to analyze the movements of human characters in animation films. Laban Movement Analysis (LMA) is a method or 'language' for observing, describing, analyzing, recording and understanding human movement, which originates from the work of Rudolf Laban. Current computer techniques have pushed the boundaries of what is possible in terms of computer animation. But even though nature, backgrounds, lighting and environments often look very realistic, the characters often don't, especially not in the way they move. The movements regularly seem mechanical and disconnected, fragmented and lacking synthesis. Sandra Hooghwinkel believes it is movement that makes characters in animation films look 'alive' as well as believable – or not. In her research she analyzes and describes in LMA terms what she thinks is lacking in modern character animation, both functionally and expressively. From her LMA analyses of characters in different kinds of movies (classic animation, 3D computer animation and motion capture), she focuses on some key aspects in the animations that could be addressed much more consciously. Sandra believes that LMA can help identify authentic and believable movement in animation. She also believes that an in-depth understanding of movement through LMA could be of great help to the development of new tools used for making animation films.

The TKB Project: Creative Technologies for the Multimodal Annotation of Performance Composition and Documentation

Stephan Jürgens, Nova University of Lisbon, Portugal

This paper describes the TKB project (A Transmedia Knowledge-Base for the performing arts), an international research project running in Portugal since 2010 at the New University of Lisbon. We will describe two original software applications developed in the framework of this project: the Creation-Tool, a video annotator designed as a digital notebook for multimodal real time annotation to support the creative process in the performing arts; and the Knowledge-Base, an archival platform functioning as an open and collaborative resource for the analysis, documentation and transmission of performing arts. We will also explain the collaboration process between choreographers, cognitive linguists and software programmers during the iterative design and test phases of the Creation-Tool. By trying to converge methodologies from Cognitive Linguistics, New Media and Performance Studies, thus attempting to achieve a rich interdisciplinary dialogue, we show how video annotation techniques (audio recordings, text notes, touch-pen drawings, customizable marks and icons, object-based motion tracking and hypermedia notes annotated to a maximum of two live video streams) can contribute significantly to analytical processes of performing arts (re)creations and to their online dissemination. Our presentation will include a case study discussing the use of the Creation-Tool in the process of producing I-Care-Us by Fernando Nabais and Stephan Jürgens, a digital live performance for flying robot (re-programmed Parrot's AR.Drone 2 quadrotors) and human performers, to be premiered in 2013. We will critically reflect several forms and modalities of multimodal video annotation in the context of a (mutually inclusive) seven-phase model of the development cycle of a digital live performance work, which distinguishes collaborative working hours (e.g. rehearsal time) from individual working hours (time spent individually working on the project, away from the studio).

Kinect Organising Movement Between Measuring, Calculating and Perceiving

Irina Kaldrack, University of Basel, Switzerland

This talk presents findings collected during the research project “Measuring, Calculating, Perceiving: Media Assemblages of Motion Recognition”, carried out at the University of Basel, and which examined Kinect, Microsoft’s Xbox-Controller. Specifically, I analyse the relation of bodily movement, experience and media resulting from playing Kinect. The focus of the analysis is the discursive and implicit knowledge corresponding to this relationship. Through an examination of different sort of Kinect games on the level of technological transformations as well as on the level of experience and actual bodily movement, I argue that bodily movement becomes an antecedent imitation of the represented situation, a spatialisation in the mode of stimulus-response. Bodily movement realises as successful mix of the virtual and the corporeal in synchronising the “technological order” of movement (which can be described as an overlapping of controls, imaging and measure) with its “experiencing order” (which is better described in terms of quality, adequacy and exactness. I expand on how these different orders of movement interfere in crossing different technological, epistemic and praxeological traditions of movement. Finally I discuss the implications of this kinectian programming of the bodily movement for critical approaches in digital performance art.

The Dance Without the Dancer: Motion Capture and Dance Visualization

Laura Karreman, Ghent University, Belgium

Aptly referred to as ‘ghostcatching’ by OpenEndedGroup, motion capture shows dance movements while the dancing body is no longer there. This paper discusses the ‘hauntology’ of the dancer’s body in motion capture imagery and explores how motion capture technologies may be employed to highlight qualities of dance that may remain hidden when ‘merely’ watching the dance itself. In contrast to video recordings, three-dimensional motion data allows the viewer to watch dance movements from any perspective. The result is an uncommon perspectivisation of the dancing body, which is often simultaneously experienced as alienating and insightful by dancers themselves. At the same time, due to the abstraction and ‘quantification’ of movement that occurs during the process, motion capture is often understood as a reductive way to represent the dancing body. Certainly, it is true that the moving ‘point-cloud’ in which the dancer’s body is transformed cannot convey an expressivity that equals live dance. But the growing tendency to represent dance in similar ‘movement-generated imagery’ does suggest that these visualizations manage to express at least some aspects that have already proven their significance to dance research and practice.

Behavioural Coding and Segmentation: Signifying Practice and Value Production in Technology

Wangi Lee, Centre for Cultural Studies, Goldsmiths College, UK

This paper suggests behavioural coding and segmentation as the core methods of data process and analysis of cutting-edge technological firms. This is a method thanks to which users' sensory and physical movement is translated into interactive data for technical (re)configuration. With behavioural coding, users' movement, experience and sensation is turned into technologically engineered signifying practice, which is then narrativised into value discourse and performative strategies of product development and marketing activity. Each movement of user acts as a condition of performativity in digital technology in proportion to the collective information, and the performativity embodies its function with the communication of the movement enabling continuous technical (re)arrangements. In digital environments, technology firms should be approached as strong interpretive apparatuses by which user behaviour is incessantly registered, decoded and encoded. The collective behaviour accumulated then becomes information for segmentation of users that provides product platforms and market forecasts. Segmentation is a critical operation to articulate the signifying practice of behavioural coding into identificatory categories in which identification of user groups and differentiation of product ranges are guided and structured. By closely examining actual segmentation processes through behavioural coding in developing latest digital products such as smart TVs, this paper observes the current stage of technological development as the symbiosis stage of corporeal gestures and technical performance and development that leads to market advantage through differentiated technology. For technology firms, the two value transcoding functions of behavioural coding and segmentation enable action and cognition in value production, as well as a transformation of social relations with insinuation of qualitatively different criteria of individual performance in necessitation of technological change. Such process presupposes de-differentiation of users by containing them within different social positions, and a de-politicization of the social subject.

I-CARE-US (DEMONSTRATION)

Fernando Nabais, Nova University of Lisbon, Portugal

I-CARE-US is a performance for aerial robots and human performers that addresses complex issues in the field of Human-Robot Interaction, social robotics development and Robot Theatre. How can a robot acquire social capacities, such as evaluating the context of an interaction, make decisions according to the circumstances, or interact with a human being in a responsive way? The field of theatrical robotics lends itself to researching these complex questions, as it provides particularly favorable conditions: 1. Theatre venues today allow for precise control over every aspect of the environment (space, light, sound, objects, video projection, performative action etc.). 2. Contemporary performers are highly trained and skilled professionals who can contribute creatively to the exploration of interaction systems and strategies. 3. The methodologies used by choreographers and theatre directors offer many interaction techniques with animate and inanimate performance elements that constitute an important body of knowledge to be applied in the context of human-robot interaction. Although this performance intends to provide research results in the different aforementioned areas, it has been guided by the creative development of a stage performance, with its narrative and dramaturgy as a starting point to analyze and dissect aspects of robotic behavior and HRI. Furthermore, this work focuses on the development of autonomous credible performative behaviors for the aerial robots that may graduate them from automatic to truly autonomous performer agents. To achieve convincing expressive behavior (particularly in the appearance constraint of quadricopters), research into areas such as Ethology has been undertaken. The focus of this research is the analysis of bird behavior

and its computational modeling. Futurist Aerial Theatre: Flight as an Artistic Expression of States of Mind, the Manifesto by Italian artist pilot Fedele Azari provides also an important frame of contextual and practical reference that has been explored.

Exploring the Capacity of Embodied, Spontaneous Interfaces to Support Creativity

Michael **Neff**, University of California - Davis, US

The majority of computer interfaces -- typified by the mouse and keyboard -- are disembodied. Yes, some physical movement is required in their use, but this is largely because the more "ideal" brain-machine interfaces remain elusive. The body is not employed in a meaningful way that involves a majority of muscle groups and generates a sense of embodiment for the user. And yet the body is a powerful tool for interacting with the world, performing actions while also sensing experiences through tactile and kinesthetic feedback and proprioception. Certain fields in the arts and athletics, such as theatre, actively involve the body as a tool for exploration. Can computational tools benefit from this approach? More specifically, can computer tools designed to actively support a sense of embodiment and spontaneity act to increase the creativity of the users? Is embodiment beneficial in Creativity Support Tools? This paper will summarize an ongoing research effort aimed at answering these questions. Beginning with a review of embodied practice in the arts, it will examine why embodiment may be beneficial in creative exploration. This will be followed by a summary of definitions of creativity and an examination of different ways of measuring it, including both analyzing the artifacts created by the user and exploring their subjective experiences while using the tools. The Creativity Support Index (CSI) [1] is a survey instrument we employed in our research that was designed to evaluate the subjective factors linked to creative engagement. The paper will conclude with a summary of user experiences with two tools designed to support creative engagement through embodiment. The first system [2] allows users to interactively generate animation of a cat using a 3D interface. The second compares 3D and traditional interfaces for basic drawing, editing and animation tasks. Results from the CSI suggest that embodiment may increase factors related to creativity.

Oskar Schlemmer's Programmatic Gesture Research

Sally Jane **Norman**, University of Sussex, UK

Oskar Schlemmer's "Triadic Ballet" (1922) deploys what he calls "the mathematics of the body" in kinaesthetic space. Its choreography is built from the diverse corporeal behaviours induced by geometries and materials of the dancers' costumes: these sophisticated kinetic sculpture-like accoutrements literally turn their wearers into "mobiles". Schlemmer's drawings of the dancers' floor traces for a 1936 reconstitution feature vigorously sketched, thematically coloured renderings of movement patterns which bring to mind Renaissance court ballet traditions referenced in his writings, as well as recent experiments using digital tools to develop new movement notation systems. Overall, this emblematic work deservedly stands as a milestone for theorists and practitioners of dance and performance, yet the ways the "Triadic Ballet" sits within Schlemmer's broader opus can offer further and deeper insights for scholars working on performativity, inscriptive modalities, and programmatic approaches to gesture. In his iterative movement across drawing, painting, relief and embossed work, free-standing sculpted masses, kinetic sculptures, and dancing bodies, Schlemmer constantly interrogates the expressive affordances of variously dimensioned media. Beyond being torn between the exuberance of the Dionysiac and the rationality of the Apollonian,

as noted in his diary, his reflection on the human body's ability to organically generate its own dynamics ("Egozentrische Raumlineatur" schema, 1924), or to obey pre-existing calculated trajectories ("Figur und Raumlineatur" schema, 1924), encapsulates contemporary visions positing the environment and the living organism as a tightly intertwined, reciprocally determined entity. This paper proposes to draw on concepts including Gilbert Simondon's individuation, Francisco Varela's embodied mind, and Karen Barad's agential intra-action, and on the author's longstanding engagement with motion capture, to set Schlemmer's artistic programming and instantiation of gestural dynamics in a wider contemporary perspective.

Transgressing the Sonified Body

Daniel Ploeger, Brunel University, UK

Since the 1990s, electronic sensor devices have become cheaply available on the consumer market. Consequently, an increasing number of artists have started to explore the use of digitized body signals to control electronic sound synthesis and transformation. Although this approach to sound performance also raises questions concerning the politics of body representation, most writing on sound in performances with biosignal sensors has focused on technological innovations and aesthetic considerations. I propose a cultural critical approach to performance technologies, which acknowledges the wider cultural connotations of the sound and the technologies used to generate it. Drawing from Eric Clarke's concept of the cultural affordances of sound in combination with theories in cultural studies of technology, I suggest that the methods of biosignal sonification in work by Tanaka and Stelarc can be read as what art critic Lorne Falk has called 'Technologically Correct': the approach to the body in interaction with technology appears to be driven by a quest for originality in context of a technologically deterministic ideology. I then consider several sensor-based performance practices that transgress this notion of the technologically correct: American singer and performance artist Pamela Z. uses a muscle sensor to trigger sound recordings of everyday technologies, thus undermining futuristic fetishizations of the technologized body. In Mona Hatoum's *Corps Étranger* (1996), the immersive sound originating from medical diagnostic equipment evokes associations with Kristeva's abject rather than the clean cyborg celebrated in technologically correct body representations. Similarly, the use of a technology for the treatment of faecal incontinence to control digital sound synthesis in my own work *ELECTRODE* (2011) renders my body akin to the grotesque body representations of the Middle-Ages and early Renaissance described by Mikhail Bakhtin.

Haptics as means of communications in dance performances -- Demonstration

Doros Polydorou, Cyprus University of Technology, Cyprus and Tychonas Michailidis, Birmingham Conservatoire, Birmingham City University, UK

Interactive art works that fuse the physical and the digital rely on the communication between the user of the interface and the system. Most interactive choreographic installations and performances are more interested in issues which explore either the relationship of an individual or a group of performers with technology. However, technologies are rarely used to enhance the relationship between the performers themselves. In this demonstration we attempt to exhibit a way to create a corporeal link between performers, by giving them the ability, through haptic feedback, to become aware of each other's actions in the space. The proposed haptic feedback which comes in the form of vibrations, examines the tactile experience of the performers as means of communication. Such communication can be further enhanced through the data from the performer's movement as they reflect in real time to control sound and visuals.

Papers

The aim is to enable performers to have a creative corporeal link between one another as well as to better understand and experience and truly embody the digital technologies.

In addition the audience can experience such collaboration and personal experience of the performer through a particle stream that visualizes the intensity of the felt vibrations as the particles focus and release accordingly. We propose three different scenarios of the relationship:

- 1) Co-exist:/Collaboration/Play: The performers are in a state of collaborative union, playfully co-existing inside a cloud of particles. Vibrations are sensed along the body as the particles get attracted to their bodies.
- 2) Competitiveness: The performers are in a constant struggle for attention, longing for the stream of particles to surround them. Only one performer has the attention of the cloud at any given time and vibrations are felt on the body of the other one.
- 3) Intimacy: The performers are close to each other, touching each other. Vibrations are felt on their own bodies emulating the sense of touch, causing also a stream of particles to be emitted when vibrations are active.

Placing the Body in Virtual Reality

Sita **Popat**, University of Leeds, UK

This paper addresses notions of site and place in site-specific performance that incorporate virtual reality or digital environments. It considers how 'site' might be defined in such works. Over the past two decades, the practices and study of virtual reality have become increasingly absorbed within wider human-computer interaction perspectives that also address mixed realities, such as mobile systems and ubiquitous computing. In these kinds of realities, new media technologies are incorporated into everyday spaces and activities in such a way that they become a part of the lived environment. Such perspectives highlight a philosophy of 'embodiment and situated action' (Coyne 2010) that is familiar to the dancer and resonates with site-specific practices. The work of igloo performance company (dancer Ruth Gibson and computer programmer Bruno Martelli) combines dance with digital worlds to create works that suggest site-specificity. However these works problematize notions of site through complications in relationships between virtual representation and physical location. 'Vermillion Lake' (2011) was inspired by the artists' travels in the Canadian Rockies. The visitor enters a full-scale replica of a trapper's cabin to find a wooden rowing boat, in which she can row on a virtual lake. The physicality of the rowing action translates into motion through the virtual world, creating a sense of what Slater (2009) terms 'place illusion', where there is 'a strong illusion of being in a place in spite of the sure knowledge that you are not there'. Slater argues that this experience of place is further enhanced by the 'plausibility illusion' brought about by the direct relationship between physical action and the uncontrolled yet direct responses in the virtual world (i.e. as one rows the boat appears to move through the water and the scenery changes). The site of this virtual lake is unique to the artwork since it is the artists' representation of the qualia of the Rockies, and the visitor experiences the illusion of place in the virtual world whilst being in the space of the gallery. Arrivals, departures and pathways become critical to the ways in which these simultaneous spaces are encountered (Ingold 2000). This is further complicated by the fact that this virtual environment could be projected simultaneously in multiple galleries all over the world, since it is computer code. Notions of place and non-place (Augé 1995) are inevitably invoked. Curator Richard Ducker (2010) argues that in igloo's work 'there is no separation between the site & the

represented'. What does site mean in this type of work, and how can space and place be defined in virtual and mixed realities.

Digital Dualism and the New Glitch Feminist Manifesto

Legacy Russell, Goldsmiths College, UK

This presentation will focus on what I have coined as "Glitch Feminism". The word glitch is oft delegated to the realm of slang. Urban Dictionary defines it as "an error in a structured system"; Dictionary.com defines it as "a defect or malfunction in a machine or plan". In a society that conditions the public to find discomfort in the errors and malfunctions of our sociocultural mechanics a "glitch" becomes an apt metonym. Glitch Feminism, however, embraces the causality of "error", and turns the gloomy implications of glitch on its ear by acknowledging that an error in a system that has already been disturbed by a myriad socio-cultural constructs, may not be an error at all, but rather a much-needed erratum, a correction to the "machine", and, in turn, a positive departure. A Glitch Feminist acknowledges the value of visibility, and the revolutionary role that digital practice has in expanding the construction, deconstruction, and re-presentation of the female identifying corpus. We acknowledge that the rigidity of digital dualism ("In Real Life" pitted against "Away From Keyboard", coined by cyber-theorist Nathan Jurgenson) needs to be retired, as it plays into binaries of real/virtual that parallel the socialized assertion of the existence of male/female. Glitch Feminism is for all bodies that exist somewhere before arrival upon a final concretized identity that can be easily digested, produced, packaged, and categorized. Glitch Feminism is feminism for a digital age of liminality, a heralding of virtual agency, a blooming of particularity and selfhood.

Modulation in Interactive Video Installation

Nic Sandiland, Middlesex University, UK

The proposed presentation locates itself within dance technology. Its focus: interactive video installation where the viewer moves within and affects the work through their motion. In contrast to many works using embodied interactivity (Frieder Weiss Pixelman 2009, Blue Flow 2010; Klaus Obermaier Dancing Houses 2011-12; Camile Utterback Text Rain 1999) this presentation is concerned with cinematic imagery as distinct from computer-generated graphic imagery. In particular, it aims to examine the nature of the relational interplay between the responsive movements of the viewer and screen-motion. Two forms of movement in film are addressed: 1) the movement of performers within a pre-recorded video film; 2) movements of the video camera within the film e.g. tracking/panning/hand-held shots. Digital technology is constantly offering new techniques through which the viewer can physically engage with and affect (or modulate) screen-motion: movement that has traditionally been sealed away and unresponsive to the viewer's presence. Modulation, a technique commonly associated with electronic music, presents a way of combining one dynamic with another (in the case of music this might result in vibrato or pitch-bend). This presentation will address the use of modulation using digital interactivity as a method to interconnect live motion and screen-motion. Through reference to previous works by Nic Sandiland (Remote Dancing 2004-9, Orbital 2010) the presentation seeks to address the following: to question the traditional nature of a cinematic mise-en-scene (Kolker 1999) and seek to expand this beyond the cinematic frame by creating intermedial environments that acknowledges the viewer's motion/screen-motion as part of the compositional whole. To question the nature of the composite movement arising from the modulation of screen-motion with live motion.

Movement Archeologies: Digging for Meaning in New Landscapes of Movement Data

Thecla **Schiphorst** and Kirstin **Carlson**, Simon Fraser University, Canada + Karen **Bradley** and Karen **Studd**, Laban/Bartenieff Institute of Movement Studies, US

While movement is ubiquitous, digital movement data is proliferating through a plethora of sensing technologies including mo-cap, the kinect, wi-mote, vision systems, EMG, fmri, solar sensors and mobile phone technologies including GPS, GSR, and gyroscopes. How can we construct meaningful interpretations of this tremendous volume of body-data by using representative models that reveal the felt experience living deep within the data? How can we dig for movement meaning in the cultural and somatic landscape of technological design and use? The proposed paper describes five workshops, which were followed by a week-long intensive 'residency' program, devised from the MovingStories research project (www.movingstories.ca). The work was conducted by an interdisciplinary set of researchers including computer scientists, cognitive scientists, psychologists, dance artists, and movement analysts. The goals are to prime interdisciplinary researchers by developing a common language for movement understanding. This was implemented through a combination of experiential and theoretical sessions combining epistemologies of practice from both movement and technology design. The title 'Movement Archeologies: digging for meaning in new landscapes of movement data', references the challenges of representing embodied movement knowledge within computational models. Our process explores 'archeological' strategies for creating shared lived understanding of movement experience and movement models. We describe emerging methods for mapping movement, technology and computation. We are interested in the bodily experience tacitly embedded within computational knowledge representation. We focus on how Laban Movement Analysis provides a framework for mapping between movement and its rich personal and cultural meanings. This was accomplished by scaffolding movement components of Body, Effort, Shape and Space to develop a greater articulation within computational models for movement. The results are a series of methodological insights that resulted from the workshop processes and that contribute to techniques that support embodied technology design.

Sensor Based Motion Capturing in Balletic Dancing: Pedagogical Considerations

Corinna **Spieth-Hoelzl**, Dance Institut, Munich, Germany

We work with motion capturing to measure postures in classical ballet technique (for example the relationship between the use of turn-out and the alignment of the pelvis) and use real time audio-feedback to generate movement patterns during the choreographic process. This feedback supports the dancer to become aware of the individual embodied movement patterns. Furthermore, several layers of communication can be articulated, as, for instance, between choreographer and technology, dancer and technology or between human body and sensor based digital media. In the field of pedagogy, the same setup is used as instructional tool. The following fundamental problem statements are observed: How can the correct alignment of the pelvis in relation to the turn-out be studied? Which tools can help the classical ballet dancer control the correct alignment of the pelvis in relation to the turn-out for the individual body during the professional dance career in order to avoid injuries? To answer these questions, we developed a wearable sensor system fixed on the dancers back, knees and feet. This setup consists of several sensor boards for 3D motion capturing and pressure sensors on the dancer's feet. The data is transferred and visualized with a laptop computer. With this setup we measure the position of the legs, back and relative angles between the lower back and the knees and the weight distribution on the feet. After a short

calibration phase with the teacher, the positions and angle changes are measured during the execution of the positions. Finally the data will improve individualized tuition and training progress monitoring. First measurements prove the technical setup fitting the needs for objective investigation. A study will be conducted with a dance class with approximately 10 dancers.

Choreographing Digital Computing: A Case Study of Black Magic/White Magic

Margaret Jean **Westby**, Concordia University, Canada

I aim to present current theoretical feminist discussions in Computing and Science and Technology Studies through an analysis of two different variations of an artistic performance. How does agency play a part in the dynamic dance of entanglements of human and non-human phenomena? In regards to a technical system having agency, sociologist Judy Wajcman writes: "never merely technical: its real-world functioning has technical, economic, organizational, political and even cultural elements" (2004:35). Furthermore, she boldly remarks that to achieve an "emancipatory politics of technology", one must think beyond "hardware and software; it needs wetware- bodies, fluids, human agency" (35). Therefore, what can the process of choreography and movement creation that focus so intuitively with the body provide to our discussion of agency, computational materiality, and interdisciplinary collaborative practice? In an analysis of Black Magic/ White Magic, the paper addresses what strategies were created, what methodologies were used, and what possibilities are achieved for interdisciplinary collaboration. The first performance took place as part of Lab Phenomena in Montreal, Quebec on May 5, 2013 and the other variation is taking place as part of the Tactical Magic Festival in Australia in June 2013. The work is a dance and sound performance about intimate, ritualized, and creative relations to personal computers and operating systems. Through a poetic, ironical, and humorous glance at daily gestures, aesthetics, rituals, power and fragility that are at stake in these complex relationships, I am interested in the way different strategies emerge with digital technologies through these female performers (myself included) in the process and execution of the work. How does this suggest different ways of revealing computational processes in choreographic choices through a feminist perspective? How does this suggest different ways to re-enchant computer mediated modus operandi?

Performances / Installations / Screendance

AFTER GHOSTCATCHING

OpenEndedGroup (Paul Kaiser), US
2, 3, 4 September (Studio 2)

A re-envisioning of *Ghostcatching* (1999), *After Ghostcatching* is built up from a larger sampling of the motions and vocalizations of Bill T. Jones captured for the earlier work. It explores the themes of disembodiment and identity with the new possibilities opened up by 3D projection and a custom 3D renderer created in the OpenEndedGroup's Field software. *After Ghostcatching* (2010) is as much about touching with the hand as it is about seeing with the eye. A disembodied dancer is rendered as a moving hand-drawn sketch – and that sketch moves in a projected 3D space that can seem so close as to let the viewer reach out and touch it. Though the work's imagery comes entirely from a computer simulation, it bears an unmistakable human trace – that of dancer Bill T. Jones, abstracted from his physical body via a process of optical motion capture that preserves his movement but not his likeness. *After Ghostcatching* was commissioned by SITE Santa Fe for its biennial show *The Dissolve*, curated by Sarah Lewis and Daniel Belasco. It was exhibited there from June 2010 till the end of the year, and has since been presented at the Sundance Film Festival, the Utah Art Center, and the Film Society of Lincoln Center. In fall 2011, *After Ghostcatching* was exhibited at the Boston Institute for Contemporary Art and the Nelson-Atkins Museum in Kansas City. A 5 screen, 2d version is on display inside Barclays Center, Brooklyn, and a set of radically expanded excerpts are shown on the 3,000 square-foot "Oculus" LED marquee in front of the stadium complex.

2 September

ELECTRODE

Daniel Ploeger (UK)

An Anuform® anal electrode connected to a modified Peritone EMG sensor registers the activity of my sphincter muscle. Anuform® and Peritone are readily available medical devices for the treatment of faecal incontinence problems. I fake the orgasm of an anonymous subject who took part in an experiment into the nature of the male orgasm in 1980. I attempt to replicate the subject's sphincter muscle contraction pattern, which was registered during masturbation and orgasm in the experiment. I repeatedly perform the same pattern. The data is projected onto a screen in the form of graphs, and is used for digital sound synthesis with Xenakis' GenDy algorithm.

MOMENTS IN PLACE

Kirk Woolford (UK/US)

Moments in Place is a series of site-specific virtual performances which ask visitors to consider the movement qualities of different locations in the city of Brighton. Visitors to the Brighton Digital Festival had to download an iOS or Android app from the project website and follow it to locations in the city (starting in front of Lighthouse). Each of the performances were recorded on site using portable motion capture systems. When the audiences' phones are pointed at the location of a performance, the performance is rendered in 3D allowing the audience to walk around and explore the relationship between the performance and location.

NEX

Cia Proyecto Uno (Spain)

Interactive space acting as a “living organism”, 4m x 4m, configured by numerous antennas assigned with acoustic and upward/downward movement parameters through electronic and digital systems and sensors to capture image and motion. The presence and interaction of one or several subjects with the environment results in the transformation and modification of the physical, acoustic and visual space. The installation proposal arises from the idea of connection and disconnection, subject/object. Following the development of the creative process initiated as part of the NEX interdisciplinary project that explores the connections between movement, sound and image, we consider the action and interaction as communication concepts in the social environment. Society and culture owe their existence to communication and communicative interaction in which preferably culture is manifested as an organizing principle of human experience. Interaction is understood as the reciprocal action between two or more agents regardless of who or what initiates the process of interaction: what matters is that at the end there is always a transformation of the state of participants.

Supported by the Author Foundation.

3 September

STRUCTURED LIGHT

Sebastian Melo (Chile)

Structured Light is a short video film that takes as a starting point Bruce Nauman’s *Walking in a Exaggerated Manner Around the Perimeter of a Square* to explore the movement of a performer through a studio space recorded by means of a video camera and a depth sensor (kinect). I am mainly concerned with how the affordance of the depth sensor breaks the fixed point of view of the video camera through the interpolation of any point of view, not only the actual camera standpoint. In this set-up the performer becomes aware of a technological eye that not only perceives from a fixed point of view, but from an ambient or pervasive perspective. The process of determining the spatial structure of a scene is produced by a projected light pattern and by reading back the distortion of the reflected pattern. In this way, the physical space is mapped as a grid of distances that can be turned into an algorithm, susceptible to analytical operations. In sum, the process of scanning a body by means of structured light is a way of effectively translating the physical presence of the body into a digital pattern. The process of recording movement through a depth sensor is considered here as “the act of making something discrete rather than continuous” (Hayles, 2010) and consequently functional to the purpose of building a database from where a narrative will potentially emerge. For this purpose, the open source software (RGBD toolkit) is used to manipulate the depth sensor data in a timeline that combines visual image and depth data. If a traditional non-linear video editing software (such as Final Cut, Premiere, etc) allows a video sequence to be manipulated frame by frame through sequential cuts, then the process of editing depth sensor data makes visible the discontinuity at the edge and reveals the border itself as a possibility of encounter. Structured Light presents the tension between a physical body and its computable pattern as an entangled interface in which human and machine build a space of negotiation. For instance, the relationship between the digital parsing system and the dancer is not a blended or amalgamated composite, but a distributed system, an intermediation used to describe the increasingly complex and entangled intersection between body and digital form. In this system, as Hayles argues, ‘the full expression of human capability can be seen precisely to depend on the splice rather than being imperilled by it’. The division between the human and the digital realm is taken into

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account as the critical creative element, thus negotiating the boundary in terms that are productive for either side.

Credits:

Director: Sebastian Melo, Choreography: Nicolas Salazar-Sutil, Performance: Joop Oonk, Sound Design: Andrés Silva

CODA

Martine Epoque and Denis Poulin (Canada)

(See paper abstract)

4 September

REACH

(Mindbeat 2)

REACH is an improvised performance exploring a digital mediation between dancer, musician and visualiser, via gestures (or physical thinking). The artists can't see each other, but communicate through a mediation of forms (sonic, kinetic and visual), performed through a gestural feedback instrument controlled by the musician and through a Kinect-based instrument controlled by the dancer. The mediation becomes a third character, which only the audience can see, through which the artists can reach out (or in), and maybe find each other.

Credits:

Performers: Annelie Nederberg and Angelina Jandolo, Developer: Chris Kilding, Media art: Sebastian Melo
Concept and direction: Nicolas Salazar Sutil, Matthew Sansom and Paul Krause

VISIONS FROM CHAOS I

Compania 3º Corpo (Brazil)

Visions from Chaos I is the first part of the trilogy *Visions from Chaos* that has a theme on the poetics of chaos. It is a project involving dance, visuals and interactivity. The project consists of a choreographic presentation plus the projection of visual compositions through a project of interaction developed exclusively for the trilogy that also involves the generation of graphic images guided by the integration of a Kinect connected to a computer through the application Pure Data. The live action is done by an OSC controller installed on an Ipad remotely connected to the computer. Computer generated images are processed through OpenGL which ensures smoothness and realism of movements and transitions.

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