

Ilias Bergström

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Research Interests

Real-time computer graphics, human computer interaction, virtual reality, media technology, enactive & embodied knowledge, visual music, mapping of multimedia control data, digital musical instrument design, programming as art/creative code, skilled artistic performance, spatial audio, music perception & psychology, research methodology, philosophy of science.

Current employment

2010-Ongoing **Post-doctoral researcher, Event Lab, UB (Barcelona, Spain)**

I am responsible for carrying out scientific experiments in which computer graphics, computer audio and virtual reality are applied to psychology and neuroscience. This involves experiment design, implementing the technology that makes them possible, conducting them, and statistically analysing, interpreting and disseminating the experiment results. Throughout, I collaborate with as well as advise Masters and PhD students in their research. I've also gained experience in preparing a proposal for FP7 EU project funding. I have been involved in the following scientific research projects:

- **VR-Hyperspace**, an FP7 3-year EU project, in which my involvement is for 24 man-months. Its aim is to carry out fundamental research and development leading to a paradigm shift in relation to aircraft passenger comfort. Bringing together neuroscience, psychology of perception and virtual reality technologies, we use positive illusions to enable passengers to feel well, in an extended or alternative space, able to carry out a variety of activities and still feel comfortable while in a physically limited space.
- **Melomics**, a 3-year INNPACTO Spanish national research project, in which my involvement was for 18 man-months. My research was on using real-time algorithmic music composition technologies, in an experiment that examined its combined use with biofeedback, and an experiment that examined using music as an anxiolytic in a VR fear of heights experience.

Finally I am involved in the Art/Science project **Music and Brain in Unconscious waves**, funded by the Swiss Agalma Foundation; a continuation of my PhD research, on using real-time audio-visual media technologies in live artistic performance. I am involved for 12 man-months.

Education

2007-2010 **PhD, University College London (UK)**

Thesis: *"Soma: live performance where congruent musical, visual, and proprioceptive stimuli fuse to form a combined aesthetic narrative"*

Besides conducting my own research, I have also technically supported several additional projects. During my PhD studies, I have gained expertise in the following research areas:

Human Computer Interaction research and evaluation; Enactive knowledge / Embodied cognition; Digital musical instrument design and evaluation; Visual music; Spatial/binaural hearing & audio technology; Design research; Virtual Reality; VR Presence research; Programming as art/creative code; Real-time computer graphics programming.

2002-2003 **MSc VIVE (Vision, imaging and virtual environments), University College London (UK)**

Thesis: *"Visualizing music in real-time using MIDI information as input: Exploring the art of Lumia"*

- 2000–2002 **BSc Computer Science, specializing in visualization, University of Växjö (Sweden)**
Thesis: *“Plug-in development for object oriented applications”*
I also attended a six month evening course on music production and audio engineering at Växjö University, in parallel with my daytime studies.

Work experience

- 2003-2006 **Software engineer, developing design and analysis applications for civil engineers at Computer Control Systems, Athens, Greece**
Role: I was the lead developer for two applications, and had an important role in the development of another three. **Skills:** Working in C# and C++, I employed modern software development practices, such as object orientation, design patterns, and code revision control, while emphasizing code reuse. **Teamwork:** I closely collaborated with civil engineers and software engineers. I also successfully enacted a knowledge transfer agreement between CCS and a collaborating company. **Initiative:** I identified the opportunity for creating an application framework and was assigned the task to complete it. It was used on three projects, significantly accelerating their development.
- 1996-1998 **Paid internship position at the Foundation of the Hellenic World's virtual reality department (while in high school)**
I created 3D reconstructions of ancient Greek buildings, as well as modern architectural visualizations, with Softimage|3D on Silicon Graphics computers.

Publications

- 2014 ***“Soma: live performance where congruent musical, visual, and proprioceptive stimuli fuse to form a combined aesthetic narrative”***, Ilias Bergstrom, Beau Lotto, Leonardo Journal (submitted for review)
“OSC-Namespace and OSC-State: schemata for describing the namespace and state of OSC-enabled systems”, Ilias Bergstrom, Joan Llobera, New Interfaces for Musical Expression, NIME'14, June 30 – July 3, 2014, (submitted for review)
“Heightening the experienced posture comfort through virtual embodiment illusion and avatar posture manipulation”, Ilias Bergstrom, Konstantina Kilteni, Mel Slater (in preparation)
“Music's influence on anxiety responses: a study in a fear of heights virtual reality experience” Sofia Seinfeld, Ilias Bergstrom, Ausias Pomes, Mel Slater, Francisco Vico, Maria V. Sanchez-Vives (in preparation)
- 2013 ***“Using music as a signal for biofeedback”***, Ilias Bergstrom, Sofia Seinfeld, Jorge Arroyo-Palacios, Mel Slater, Maria-Victoria Sanchez-Vives, International Journal of Psychophysiology
“Drumming in immersive virtual reality: the body shapes the way we play”, Konstantina Kilteni, Ilias Bergstrom, Mel Slater, IEEE Transactions on Visualization and Computer Graphics 19 (4)
“Creative coding practice: bringing together existing conducts and introducing code-bending”, Ilias Bergstrom, and Beau Lotto, Leonardo Journal (in press)
- 2009 ***“Mutable Mapping: gradual re-routing of OSC control data as a form of artistic performance”***, Ilias Bergstrom, Anthony Steed and Beau Lotto, ACE'09 Conference Proceedings
- 2008 ***“Harnessing the enactive knowledge of musicians to allow the real-time performance of correlated music and computer graphics”***, Ilias Bergstrom and Beau Lotto, Leonardo Journal
“Mother: making the performance of real-time computer graphics accessible to non-programmers”, Ilias Bergstrom and Beau Lotto, (re)Actor3 Conference Proceedings

Exhibitions, performances and talks

- 2011 **LottoLab Installations at the London Science Museum**
Several interactive installations I have been involved in developing (see below) were permanently exhibited at the London Science Museum. 2010 **Invited talks, at Queen Mary University, and at Thames Valley University**
I presented talks and demonstrations on my PhD research.
- 2009 **Beau Lotto's TED talk features software I developed**
My PhD supervisor's TED talk featured several software applications that I developed during my PhD studies.
Talk at the "Seeing Sound" Symposium, Bath Spa University
I presented a talk and demonstration in relation to my PhD research.
Several live audio-visual performances at various venues in London
Live generative computer graphics performances using all custom written software, accompanied either by sequenced playback of my own music, or music performed by live musicians.
Installation at "The Brain Unravalled" exhibition, Slade Research Centre
I took part in creating the LottoLab Studios' Soundwall installation.
Installation at "Passing Through" exhibition, James Taylor Gallery
Interactive multimedia installation created in collaboration with Sam Walker and Beau Lotto.
- 2008 **"Synesthetic Podium" Installation, at UCL Institute of Ophthalmology**
Interactive multimedia installation created in collaboration with Beau Lotto.

Skills

- Languages Fluent English, Swedish and Greek, intermediate Spanish and Italian
- Programming I am a proficient programmer in C++, Java, C#, Max/MSP/Jitter, Pure data, and have extensive experience programming computer graphics using the OpenGL framework. I'm proficient in working with the C++ JUCE and QT frameworks, and have, experience in working on several large scale software development projects, employing object orientation, design patterns, multithreading, UML and revision control. Finally, I have initiated and maintain a successful GPLv3 open source project, and also develop several software applications for live audio-visual performance on my spare time.
- Research I have learned to design, implement, conduct analyse and report scientific hypothesis-testing experiments, involving a range of designs and methods. To conduct statistical analysis of experiment results using SPSS and Matlab software, both involving subjective and objective measures. This also includes experience in working with participants' electrophysiological responses.
- Music A red thread throughout my life has been my great passion for music of all genres. I am a self-taught drummer, percussionist, synthesizer player and audio engineer. I have experience with playing in groups, and of composing music with others as well as alone. I also present a monthly internet radio show, where each episode treats a specific musical subject.
- Arts I have always had the urge to create images and animations. I am mostly self-taught, but have also attended a half year course in free-hand drawing. My preferred medium is program code, creating interactive real-time installations and performances. I'm highly proficient in a wide array of software for creating animated images and sound, both real-time and rendered.
- Learning I continuously pursue new knowledge, and greatly enjoy reading books on the topics of history, politics, economics and philosophy, as well as art history and practices. The above, always in addition to the steady stream of technical literature which my interests and work demand I read to keep up with modern developments.