



Prof. Perttu Hämäläinen
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Mission: To positively impact public health through *intelligent exergames and digitally augmented sports* that promote physical activity and movement skill learning.

Education and degrees awarded

Doctor of Science in Technology, 10 May 2007, Helsinki University of Technology.
Major: Interactive Digital Media. Contact: kirjaamo@aalto.fi, +358 9 47001

Master of Arts in New Media, 13 Dec 2002, University of Art and Design Helsinki UIAH. Major: Interaction design.

Master of Science in Technology, 8 July 2001, Helsinki University of Technology.
Major: Signal processing.

Other education and skills

I have a mixed design and science background, my skills ranging from optimization, computer vision, machine learning, and signal processing to game design, full-body interaction, and sound design. I programmed my first computer game when I was 9 years old. In addition to new media, I've been involved in various theatre and short film productions.

Related to my current field of movement AI and exergames, I have *intimate knowledge of human movement* from practicing nearly 20 sports and movement arts, e.g., modern dance, capoeira, karate, taekwondo, hand balancing, ring gymnastics, rock climbing, and medieval swordmanship.

Linguistic skills

Finnish (mother tongue)
English (fluent)

Current position

Tenure Track Assistant Professor in computer games, Aalto University, since 1.4.2012. I lead a game research group and supervise games education.

Previous work experience

2006-2012 R&D Director/CTO, Virtual Air Guitar Company. I led a team of researchers working on real-time computer vision technology and related game innovations.
2004-2012 Co-founder, R&D Director, Animaatiokone Industries Co-op.
2002-2006 Doctoral candidate, Helsinki University of Technology, Telecommunications Software and Multimedia Laboratory.

- 2000-2002 Specialist, Oy Elmorex Ltd. My duties included electronics and software design, game design and design and implementation of signal processing algorithms.
- 1999-2000 Audio programmer, Audioriders Ltd. Further development of my M.Sc. thesis project.
- 1998-1999 Research assistant, Helsinki University of Technology, Signal Processing Laboratory. I produced teaching material for a basic course in digital electronics and computer technology, and worked on my M.Sc. thesis project.
- 1997-1998 Chief technician, OUBS Ota-tv. OUBS Ota-tv is the campus television at Helsinki University of Technology
- 1996-1997 Editor, OUBS Ota-tv. My main responsibility was sound design of the weekly 30-minute program. In addition to that, I did cinematography, lighting and stage design, scriptwriting and video editing.

Research funding, leadership, and supervision

I'm currently supervising four full-time doctoral students and one post-doc. I've also supervised and/or instructed 15+ Master's theses.

- 2017 Automatic Game Testing and Balancing Using Intelligent Agents, Aalto University's internal competitive peer-reviewed funding for a new doctoral candidate (4 years)
- 2016 Virtual Coach Based on Multibody Dynamics (VIMU), Academy of Finland and Tekes (Finnish Funding Agency for Innovation). Total budget 402 803€. Role: PI
- 2016 Interactive Movement Artificial Intelligence (IMAI), Academy of Finland. Total budget 754 214€. Role: PI
- 2015 Augmented Climbing Wall project funding from Tekes (Finnish Funding Agency for Innovation). Instrument: New knowledge and business from research ideas. Total budget 360000. Role: supervising professor, writing the proposal with my post-doc who was the project lead and is now the CEO of the spinoff company
- 2013 Future Game Animation project funding from Tekes (Finnish Funding Agency for Innovation). Total budget 360000€. I'm the PI, wrote the application, and recruited a consortium of 7 game and animation companies.
- 2006-2012 Head of the four person R&D team at Virtual Air Guitar Company, including 3 PhD:s.
- 2009 Nordic game funding (100k€) for the innovative Kung-Fu Live PlayStation 3 exergame. I wrote the application.
- 2006 One year artist grant from Suomen Kulttuurirahasto
- 2002-2005 Funding from HeCSE graduate school for doctoral research
- 2004 Finnish foundation for Technology Promotion scholarship (5000€) for doctoral research
- 2004 Nokia Foundation scholarship (5000€) for doctoral research
- 2003 Nokia Foundation scholarship (5000€) for doctoral research

- 2002 Finnish foundation for Technology Promotion scholarship (5000€) for doctoral research
- 2002 Jenny and Antti Wihuri's foundation scholarship (5000€) for doctoral research

Awards, prizes and honours

- 2017 Finnish Applied Game of the Year ("vuoden hyötypeli") at Finnish Game Awards 2017 for Augmented Climbing Wall (my role: computer vision and parts of the design of the first version, supervising professor in commercialization phase)
- 2016 Augmented Climbing Wall shortlisted for Unity Awards 2016
- 2016 Best paper honorary mention (top 5%) at ACM CHI 2016. In collaboration with Raine Kajastila and Leo Holsti. I wrote the paper and did parts of the design and user studies.
- 2015 Best paper honorary mention (top 5%) at CHI PLAY 2015. I was the lead author. In collaboration with Raine Kajastila, Joe Marshall, Raine Kajastila, Floyd Mueller.
- 2013 Best Low-Cost, Minimally-Intrusive Solution award in 3DUI contest, Orlando, U.S. In collaboration with Tuukka Takala and Meeri Mäkäräinen.
- 2011 Kung-Fu High Impact (Virtual Air Guitar Company) won the "Control Design, 2D or Limited 3D" category in the 11th annual National Academy of Video Game Testers and Reviewers awards
- 2004 Kick Ass Kung-Fu (Perttu Hämäläinen, Ari Nykänen, Mikko Lindholm) won the Games Platforms category in Europrix Top Talent multimedia innovation competition in Vienna, Austria.
- 2004 Tampere Mindtrek Grand Prix for Kick Ass Kung-Fu, Tampere, Finland
- 2004 Korjaamo Young Design Award for Animaatiokone (Mikko Lindholm, Perttu Hämäläinen, Ari Nykänen), Helsinki, Finland
- 2003 Animaatiokone won the Pikku Kakkonen (best multimedia for children) and non-commercial categories at Tampere Mindtrek competition, Finland.
- 2003 Prix Spécial du Jury for Animaatiokone in the international Prix Möbius multimedia competition in Athens, Greece.
- 2002 Kukakumma Muumaassa (Perttu Hämäläinen, Johanna Höysniemi, Teppo Rouvi, Laura Turkki) was one of the winners of the Milia New Talent Competition in Cannes, France, February 2002.
- 2001 Kukakumma Muumaassa won the Pikku Kakkonen category in Tampere Mindtrek competition (best multimedia for children)

Other academic merits and positions of trust

I have been in the program committees of leading human-computer interaction and game conferences (ACM CHI, ACM CHI PLAY), and also the papers chair for CHI PLAY 2017. I've also reviewed for several journals and conferences (e.g., CHI, IHCS, ToDiga, Simulation & Gaming).

I'm also in the steering group of the Helsinki ICT doctoral education network, I've reviewed a grant proposal for NSERC (Canada), and I've been the opponent for one doctoral defense outside Finland (Aarhus University, Denmark).

Scientific and societal impact of research, publication statistics

I have published 40 international peer-reviewed scientific articles. My H-index is 16, <http://scholar.google.fi/citations?user=i90uqXUAAAAJ&hl=fi>. Note that there is a publication gap due to my game industry years 2006-2012, when I could not publish except for patent applications (e.g., WO 2,008,046,963). *I have started publishing again in 2013 with excellent success, including first-author papers in ACM SIGGRAPH, and best paper nominations at ACM CHI and ACM CHI PLAY.*

Research commercialization and media visibility highlights:

- **Commercialization of Augmented Climbing Wall**, a novel AR sports platform which started as a research project in my group. Post-doc researcher Raine Kajastila and I built the first version that was piloted highly successfully in a climbing center; this led to a CHI 2016 publication with an honorary mention, several videos with millions of views on social media (the best performing video with an estimated **100+ million views** on various channels), **Finnish Applied Game ("hyötypeli") of the Year 2016 award**, and a successful spinoff startup that has already sold the system to **30 countries**. Customer feedback indicates that the system is highly successful in **motivating people to exercise** and **encouraging new people to try climbing**.
- **CTO of Virtual Air Guitar Company** in 2006-2012, exchanging the rights to my computer vision patent FI000121981B for shares of the company. Virtual Air Guitar Company attracted an **international investment of 1.2M€** and has published two innovative commercial exergames, Kung-Fu Live and Kung-Fu High Impact. Both games have sold over **100000 copies**.
- **Co-founder of Animaatiokone Industries** that commercialized parts of my doctoral research (award-winning Animaatiokone installation and Kick Ass Kung-Fu game).

In addition to publishing articles, speaking at various events, and actively commercializing my research, I have exhibited my works over 30 times in art and design exhibitions, and at various events, including *Ars Electronica*, *WIRED NextFest*, and *Karate World Championships*.

My work has also appeared several times in national and international media, e.g., *New Scientist*, *WIRED*, *TechCrunch*, *Kotaku*, *Yle*, *Nelonen news*, *Tilt! game show*, and *Helsingin Sanomat*.

Selected projects



Future Game Animation (2013-), a research project about procedural animation and AI technology for games. My role: Principal Investigator. Publications and videos: <http://urly.fi/hgS>

Augmented Climbing Wall (2013-2016), a research project about augmenting wall climbing with body tracking and interactive projected graphics. My role: computer vision, supervisor. In collaboration with Raine Kajastila, who is a post-doc in my group. ACM CHI 2014 video showcase: <http://vimeo.com/89390488>

Kung-Fu Live (2010), and **Kung-Fu High Impact** (2011). KFL is a PlayStation 3 combat game played by punching and kicking in front of the PS3 Eye camera. Kung-Fu High Impact is a sequel for Xbox 360 Kinect. My role: head of the computer vision team, design and implementation of player's exaggerated movement & physics. Video: <http://bit.ly/g7Sb6P>

Kick Ass Kung-Fu (2004), an immersive game installation that transforms computer gaming into a visual, physical performance like modern dance or sports. My role: Lead design & original idea, computer vision, music. <http://urly.fi/hgW>

Animaatiokone (2002), an installation for learning about stop-motion animation. The installation is built on an animation software and user interface I designed and implemented. <http://www.animaatiokone.com/>

Kukakumma Muumaassa (QuiQui's Giant Bounce, 2001-2004), a physically interactive computer game for children. This was my Master's Thesis project at UIAH Media lab. My role: interaction and sound design, computer vision and game programming. Homepage: <http://www.cs.uta.fi/kukakumma/htmls/mitaih/frset.html>