

Perttu Hämäläinen, D.Sc.(Tech), M.A

[perttu.hamalainen@aalto.fi](mailto:perttu.hamalainen@aalto.fi)

h-index 16, i-10 index 26, 1046 citations (Google Scholar), 40 international peer-reviewed articles

<http://scholar.google.fi/citations?user=i90uqXUAAAAJ&hl=en&oi=ao>

**6-year publication gap:** I stopped actively publishing other than patent applications (e.g., WO 2,008,046,963) in 2006 when I joined a high-tech games startup to commercialize my research. *I have started publishing again in 2013 with excellent success, including first-author papers in ACM SIGGRAPH, the most competitive venue for computer graphics and interactive techniques, and best paper nominations at ACM CHI and ACM CHI PLAY*

#### A. Peer-reviewed scientific articles

Naderi, K., Takatalo, J., Hämäläinen, P. Towards Computer-Aided Imagery in Sport and Exercise, accepted for ACM CHI PLAY 2017 companion proceedings

Hämäläinen, P., Xiaoxiao, M., Takatalo, J., Togelius, J., Predictive Physics Simulation in Game Mechanics, accepted for ACM CHI PLAY 2017

Naderi, K., Rajamäki, J., Hämäläinen, P. Discovering and Synthesizing Humanoid Climbing Movements, *ACM Transactions on Graphics*, Vol. 36, No. 4, Article 43, 2017 (*Proc. SIGGRAPH 2017*)

Rajamäki, J., Hämäläinen, P. Augmenting Sampling-based Controllers with Machine Learning, *Proc. ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA '17)*, 2017

Rajamäki, J., Naderi, K., Kyrki, V., Hämäläinen, P. Sampled Differential Dynamic Programming, *Proc. IROS 2016*

Marjalizo Alonso, F., Kajastila, R., Takala, T.M., Matveinen, M., Kytö, M., Hämäläinen, P. Virtual Ball Catching Performance in Different Camera Views. *Proc. AcademicMindtrek '16*

Kajastila, R., Holsti, L., Hämäläinen, P. The Augmented Climbing Wall: High-Exertion Proximity Interaction on a Wall-Sized Interactive Surface. *Proc. CHI 2016*. **Best paper honorary mention (top 5%)**

Hämäläinen, P., Marshall, J., Kajastila, R., Byrne, R., Mueller, F. Utilizing Gravity in Movement Based Games and Play, *Proc. CHI PLAY 2015*. **Best paper honorary mention (top 5%)**

Naderi, K., Rajamäki, J., Hämäläinen, P., RT-RRT\*: A Real-Time Path Planning Algorithm Based On RRT\*, *Proc. Motion in Games 2015*

Kytö, M., Dhinakaran, K., Martikainen, A., Hämäläinen, P., Improving 3D Character Posing with a Gestural Interface, *IEEE Computer Graphics & Applications*, 2015

Hämäläinen, P., Rajamäki, J., Liu, C. K. Online control of simulated humanoids using particle belief propagation. *ACM Trans. Graph.*, 34, 4, Article 81, (*Proc. SIGGRAPH 2015*)

Kajastila, R., Hämäläinen, P. Benefits of 3D topos for information sharing and planning in rock climbing, *Sports Technology*, 2015

Kajastila, R., Hämäläinen, P. Motion games in real sports environments. *interactions* 22, 2 (February 2015), 44-47

Hämäläinen, P., Eriksson, S., Tanskanen, E., Kyrki, V. and Lehtinen, J. Online Motion Synthesis Using Sequential Monte Carlo. *ACM Trans. Graph.* 33, 4, Jul. 2014, 51:1–51:12. (*Proc. SIGGRAPH 2014*)

Kajastila, R., Holsti, L. and Hämäläinen, P. Empowering the Exercise: a Body-Controlled Trampoline Training Game. *Int. J. of Computer Science in Sport.* 13, 1 2014.

Hämäläinen, P., and Kajastila, R., Mixed reality empowerment for enhancing physical exercise, *CHI '14 HCI and Sports Workshop*, 2014

Kajastila, R. and Hämäläinen, P. Augmented Climbing: Interacting With Projected Graphics on a Climbing Wall. *Proc. CHI EA '14*, ACM (2014)

Kajastila, R. and Hämäläinen, P. Augmented climbing: testing prototypes in Wizard of Oz experiment. *Proc. CHI EA '14*, ACM (2014)

Holsti, L., Takala, T., Martikainen, A., Kajastila, R. and Hämäläinen, P. Body-controlled trampoline training games based on computer vision. In *Proc. CHI EA '13*, ACM (2013), 1143–1148

Takala, T.M., Takatalo, J., Matveinen, M., Simonen, T. and Hämäläinen, P. Enhancing Spatial Perception and User Experience in Video Games with Volumetric Shadows. *Proc. OzCHI 2013*

Takala, T.M., Mäkäräinen, M., Hämäläinen, P. Immersive 3D modeling with Blender and off-the-shelf hardware, *Proceedings of 2013 IEEE 8th Symposium on 3D User Interfaces*, Orlando, US, 16th & 17th March 2013

Ekman, Inger; Poikola, Antti; Mäkäräinen, Meeri; Takala, Tapio; Hämäläinen, Perttu Voluntary pupil size change as control in eyes only interaction, in *ETRA '08: Proceedings of the 2008 symposium on Eye tracking research & applications*, New York, NY, USA, 2008, 115-118

Ville Nenonen, Aleks Lindblad, Ville Häkkinen, Toni Laitinen, Mikko Jouhtio, Perttu Hämäläinen. Using Heart Rate to Control an Interactive Game. in *Proceedings of SIGCHI conference on Human factors in computing systems CHI '07*, April 28 - May 3, San Jose, California, USA, pp. 583-586, 2007

Hämäläinen, P., Aila, T., Takala, T., Alander, J., Mutated Kd-tree Importance Sampling, in *Proceedings of the The Ninth Scandinavian Conference on Artificial Intelligence (SCAI 2006)*, Helsinki, Finland, 39-45

Mäki-Patola, T., Hämäläinen, P., Kanerva, A., The Augmented Djembe Drum – Sculpting Rhythms, in *Proceedings of the 2006 International Conference on New Interfaces for Musical Expression (NIME06)*, Paris, France, 364-369

Johanna Höysniemi and Perttu Hämäläinen, Children’s and Parents’ Perception of Full-Body Interaction and Violence in a Martial Arts Game. in *Proceedings of Conference on Designing for User eXperience (DUX 2005)*, 3-5 November 2005, San Francisco, CA, USA.

Höysniemi, J., Hämäläinen, P., Turkki, L., Rouvi, T. (2005) Children’s Intuitive Gestures in Vision Based Action Games, *Communications of the ACM*, Vol. 48, Issue 1, pp. 44-50 (January 2005)

Hämäläinen, P., Höysniemi, J., Ilmonen, T., Lindholm, M., Nykänen, A. Martial Arts in Artificial Reality, *Proceedings of ACM Conference on Human Factors in Computing Systems (CHI’2005)*, Portland, Oregon, 2-7 April 2005, ACM Press

Hämäläinen, P. (2004) Interactive Video Mirrors for Sports training. *Proceedings of the Third Nordic Conference on Human-Computer Interaction*, 23-27 Oct 2004, Tampere, Finland, pp. 199-202

Höysniemi, J., Aula, A., Auvinen, P., Hännikäinen, J. & Hämäläinen, P. (2004). Shadow Boxer - A Physically Interactive Fitness Game. *Proc. Third Nordic Conference on Human-Computer Interaction*, 23-27 Oct 2004, Tampere, Finland, pp. 199-202

Hämäläinen, P., Mäki-Patola, T., Pulkki, V., Airas, M. (2004) Musical Computer Games Played by Singing. *Proc. 7<sup>th</sup> International Conference on Digital Audio Effects (DAFx’04)*, 5-8 Oct 2004, Naples, Italy, pp. 367-371

Mäki-Patola, T. Hämäläinen, P. (2004) Effect of Latency on Playing Accuracy of two Gesture Controlled Continuous Sound Instruments Without Tactile Feedback, *Proc. of the 7<sup>th</sup> International Conference on Digital Audio Effects (DAFx’04)*, 5-8 Oct 2004, Naples, Italy, pp. 11-16

Mäki-Patola, T. Hämäläinen, P. (2004) Latency Tolerance for Gesture Controlled Continuous Sound Instrument without Tactile Feedback. *Proc. ICMC 2004*, 1-6 Nov 2004, Miami, USA

Höysniemi, J., Hämäläinen, P. and Turkki, L. (2004). Wizard of Oz Prototyping of Computer Vision Based Action Games for Children. *Proc. International conference on Interaction Design and Children (IDC2004)*, 1-3 July 2004, Maryland, USA, pp. 27-34

Höysniemi, J. and Hämäläinen, P. (2004). Describing children's intuitive movements in a perceptive adventure game. *Proc. workshop on Multimodal Corpora: Models of*

Human Behaviour for the Specification and Evaluation of Multimodal Input and Output Interfaces, 25 May 2004, Lisbon, Portugal, pp.

Hämäläinen, P., Lindholm, M., Nykänen, A., Höysniemi, J. (2004) Animaatiokone – an Installation for Creating Clay Animation. in proceedings of ACM Conference on Human Factors in Computing Systems (CHI 2004), Vienna, Austria, April 2004, ACM Press.

Höysniemi, J., Hämäläinen, P., and Turkki, L. (2003). Using peer tutoring in evaluating the usability of a physically interactive computer game with children. *Interacting with Computers*, Volume 15, Issue 2, pp. 141-288 (April 2003).

Höysniemi, J., and Hämäläinen, P. (2003). Who is afraid of spiders? Two Perceptive Computer Games for Children. *Proceedings of International Conference on Interaction Design and Children 2003 (IDC2003)*, Preston, England, July 2003.

Hämäläinen, P., and Höysniemi, J. (2002). A Computer Vision and Hearing Based User Interface for a Computer Game for Children. In *Proceedings of the 7th ERCIM Workshop "User Interfaces For All"*, 23-25 October 2002, Paris.

Höysniemi, J., Hämäläinen, P., and Turkki, L. (2002). Using Peer Tutoring in Evaluating the Usability of a Physically Interactive Computer Game with Children. *International Workshop on Interaction Design and Children*, 28-29 August 2002, Eindhoven, The Netherlands.

### **B. Non-refereed scientific articles**

Hämäläinen, P. (2002). Smoothing of the Control Signal Without Clipped Output in Digital Peak Limiters, *Proceedings of 5th International Conference on Digital Audio Effects (DAFx-02)*, pp. 195-198, Hamburg, Germany.

J. Meltaus, V. P. Plessky, P. Hämäläinen, and M. M. Salomaa (2004) Genetic optimization algorithms in the design of coupled SAW filters, *proceedings of 2004 IEEE International Ultrasonics, Ferroelectrics, and Frequency Control 50th Anniversary Joint Conference*.

Kangas, S. and Hämäläinen, P. (2004) Hyötypelien lajityyppimäärittely ja käyttöliittymärealismi, *Lähikuva 2-3/2004*, Lähikuva-yhdistys ry.

### **C. Special issues of a journal**

#### **D. Publications intended for professional communities**

Meltaus, J., Hämäläinen, P. and Plessky, V. (2007). Design of coupled saw filters using genetic and evolution algorithms, *publications in Optics and Molecular Materials*, TKK-F-A847, Helsinki University of Technology

Hämäläinen, P. (2003). Animaatiokone täyttää vuosia. *Avek-lehti 02/03*, AVEK/Kopioisto ry

#### **E. Publications for general public**

**F. Artistic activity**

## Awards

- 2016 Best Applied Game (“Vuoden hyötypeli”), Finnish Game Awards, for Augmented Climbing Wall (in collaboration with Valo Motion)
- 2016 Sinusoidal Oscillations Award at Finnish Game Jam
- 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 11<sup>th</sup> 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.
- Tampere Mindtrek Grand Prix for Kick Ass Kung-Fu, Tampere, Finland
- 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.
- 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)

## Exhibitions

- 2007 Kick Ass Kung-Fu at Wired NEXTFEST, Los Angeles, US
- Kukakumma Muumaassa at Ars Electronica Center, Linz, Austria
- 2006 Kick Ass Kung-Fu at Karate World Championships, Tampere, Finland
- Animaatiokone and Kukakumma Muumaassa at Ars Electronica campus exhibition, Linz, Austria
- Kick Ass Kung-Fu at Wired NEXTFEST, New York, US

- Animaatiokone at Red Sticks international animation festival, Baton Rouge, Louisiana, US
- 2005 Kick Ass Kung-Fu at Ultrasound festival, Huddersfield, UK
- Animaatiokone at Japan Pop, Tennis Palace Art Museum, Helsinki, Finland
- Kick Ass Kung-Fu at Wired NEXTFEST, Chicago, US
- Kick Ass Kung-Fu at Tennispalatsi, Helsinki, Finland
- Kick Ass Kung-Fu at pixelACHE 2005 festival, Helsinki, Finland
- Kick Ass Kung-Fu at Korjaamo gallery, Helsinki, Finland
- 2004 Kick Ass Kung-Fu at Nordic Exceptional Trendshop, Copenhagen, Denmark
- Kick Ass Kung-Fu at Europrix Top Talent, Vienna, Austria
- Kick Ass Kung-Fu at MindTrek, Tampere, Finland
- Kick Ass Kung-Fu at Kiasma Theater, Helsinki, Finland
- Animaatiokone at Korjaamo gallery, Helsinki, Finland
- Animaatiokone at Animex festival, Middlesbrough, UK
- Kukakumma Muumaassa at Musta tuntuu, Rauma Art Museum, Rauma, Finland
- 2003 Kukakumma Muumaassa at Game On exhibition, Tennis Palace Art Museum, Helsinki, Finland
- Animaatiokone at Nordic Exceptional Trendshop, Copenhagen, Denmark
- Animaatiokone at MindTrek, Tampere, Finland
- Animaatiokone at Prix Möbius International, Athens, Greece
- Animaatiokone at Annecy animation festival, Annecy, France
- Animaatiokone at Tough Eye animation festival, Turku, Finland
- Animaatiokone at Kunsthalle Lophem, Belgium
- Animaatiokone at PixelAche: Kiasma in Helsinki, Finland, Gerschwin Hotel in New York, USA, and SAT in Montreal, Canada
- Animaatiokone at FF media festival, Rovaniemi, Finland
- Animaatiokone at Tampere Film Festival, Tampere, Finland
- Animaatiokone at Prix Möbius Preview Exhibition, Helsinki, Finland
- 2002 Kukakumma Muumaassa in Design Museo, Helsinki, Finland
- Animaatiokone at Leffakansio, Helsinki, Finland

Animaatiokone at Kettupäivät, Helsinki, Finland

Animaatiokone at Animatricks, Helsinki, Finland

Animaatiokone at Mainonnan Viikko, Helsinki, Finland

Animaatiokone at Love & Anarchy festival, Helsinki, Finland

2000 Semana Santa exhibition at Helinä Rautavaara's museum, Espoo, Finland.

### G. Theses

Hämäläinen, P. (2007). Novel applications of real-time audiovisual signal processing technology for art and sports education and entertainment. D.Sc. (Tech) thesis for Helsinki University of Technology, Department of Computer Science. Online at <http://lib.tkk.fi/Diss/2007/isbn9789512287055/>

Hämäläinen, P. (2002). QuiQui's Giant Bounce. Concept and Interaction Design of a Perceptually Interactive Computer Game for Children. MA thesis for Medialab for University of Art and Design Helsinki, UIAH.

Hämäläinen, P. (2001). A Scalable Audio Streaming and Processing System. M.Sc(Tech) thesis for Helsinki University of Technology, Department of Electrical and Telecommunications Engineering.

### I. Audiovisual materials and software



**Future Game Animation** (2013-2015), a research project about procedural animation technology and tools for games. My role: Principal Investigator. We have so far published the first real-time system that allows a character to both balance and creatively improvise a realistic way of getting up after falling. Publications and videos: <http://urly.fi/hgS>



**Augmented Climbing Wall** (2014-), a research project about augmenting wall climbing with body tracking and interactive projected graphics. My role: computer vision, additional design. In collaboration with Raine Kajastila, who was a post-doc in my group and led the project. 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>



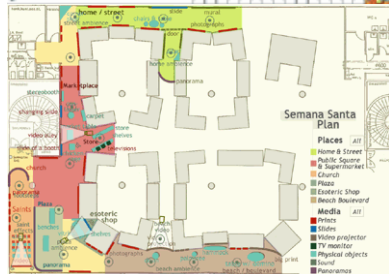
**Animaatiokone** (2002), an installation for learning about stop-motion animation. The installation is built on an animation software and user interface I designed and implemented. <http://www.animaatiokone.com/>



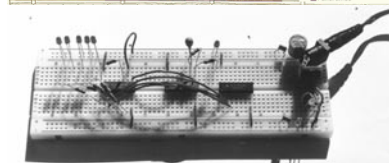
**Kukakumma Muumaassa** (2001-2004), a physically interactive computer game and adventure. This was my Master's Thesis project at UIAH Media lab. My responsibilities were interaction and sound design as well as computer vision and programming. Homepage: <http://www.cs.uta.fi/kukakumma/htmls/mitaih/frset.html>



**Soittopeli** (PlaySingMusic, 2000) musical edutainment CD-ROM. My role: design and programming of the sound engine (in collaboration with Tero Tolonen). The sound engine features, e.g., real time software synthesis of musical instruments and fundamental frequency estimation from the sound input.



**Semana Santa exhibition** at Helinä Rautavaara's museum, summer 2000. My role: design of soundscapes and audio technology. I designed a 20-channel three dimensional interactive sound animation system for behavioural modelling of large acoustic spaces. Homepage: <http://mlab.uiah.fi/semanasanta>



**Digiskitti** (1998) – a series of simple digital electronics devices and a compendium with a step-by-step illustrated guide for building the devices on a breadboard. The devices feature different light and sound effects. Designed for a basic course in digital and computer technology at HUT.