IS

Invited Talker 1

IS1-1 Playware Research – Methodological Considerations

Henrik Hautop Lund (Centre for Playware, Technical University of Denmark, Denmark)

Several sub-disciplines of engineering are driven by the researchers' aim of providing positive change to the society through their engineering. Based on two decades research in developing engineering systems with a societal impact (e.g. in robotics, embodied AI, and playware), in this paper we suggest a cyclic research method based on a mix between participatory and experimental processes. In particular, inspiration from the action research method applied to interdisciplinary technology development becomes a participatory approach characterized by rapid prototyping cycles which allow iterative technology specification and development together with people in their real world environment. With the mixed research method, we suggest that there are cases, where approaches from the positivistic and interpretivistic epistemologies can and should be merged. We exemplify this with health care technology and playware.
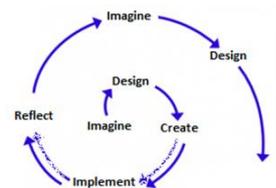
Henrik Hautop Lund, Professor, Technical University of Denmark, is head of the Center for Playware, and has published more than 175 scientific papers and several patents. He has served in the Danish National Research Council. He is World Champion in RoboCup Humanoids Freestyle 2002, has developed shape-shifting modular robots, and has collaborated closely on robotics, ALife and AI with companies like LEGO, Kompan, BandaiNamco, etc. for the past two decades. His Center for Playware at the Technical University of Denmark has a long track record of developing modular robotic playware for playful contextualized IT training in Sub-Saharan Africa, for playful rehabilitation for sport, for music, for wearable, for play, and for education. These modular playware technology developments include I-Blocks (LEGO bricks with processing power) and modular interactive tiles (larger bricks for physical rehab). Further, with the development of East-Africa's first science and business park, local entrepreneurship has been fostered amongst students graduating from the university degree programs in contextualized IT. Combining such skills, it became possible to develop technical skill enhancing football games and global connectivity based on modular playware for townships in South Africa for the FIFA World Cup 2010. Lately, together with international pop star and World music promoter Peter Gabriel, he has developed the MusicTiles app as a music 2.0 experience to enhance music creativity amongst everybody, even people with no initial musical skills whatsoever, and made physical modules for Peter Gabriel's live stage performance. In all cases, Professor Henrik Hautop Lund and his research center develop modular playware technology in a playful way to enhance learning and creativity amongst anybody, anywhere, anytime.

Invited Talker 2

IS1-2 ALife for Real and Virtual Audio-Video Performances
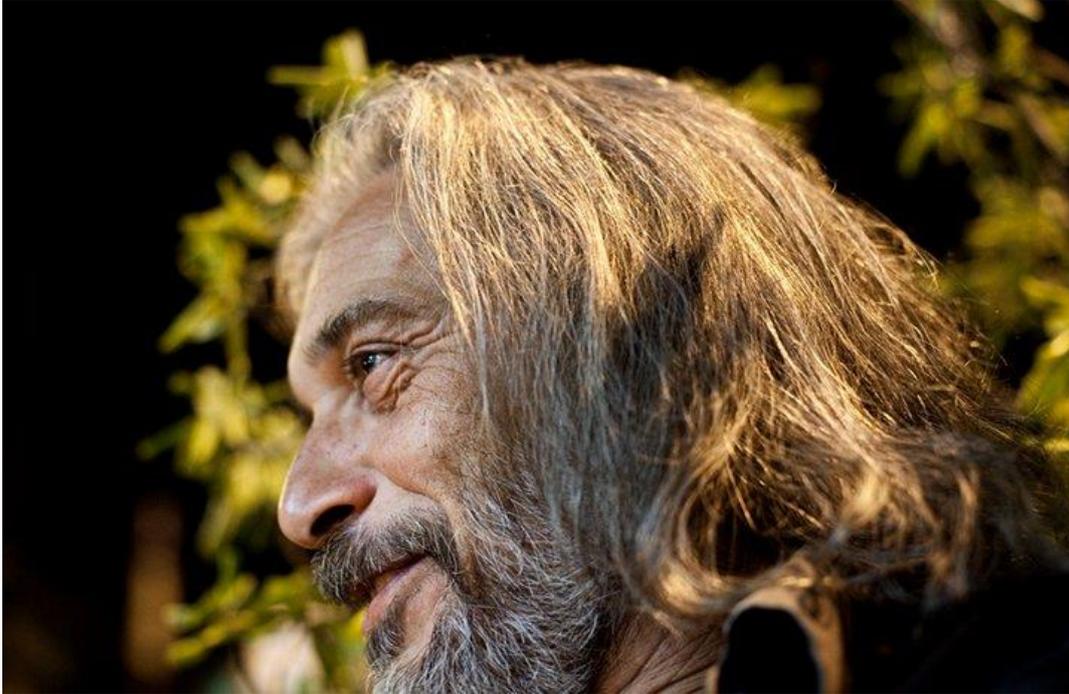
Luigi Pagliarini[1,2] Henrik Hautop Lund[1]
([1] Centre for Playware, Technical University of Denmark, Denmark)
([2] Academy of Fine Arts of Macerata, Italy)

MAG is an electronic art piece in which an ALife software attempts to "translate" musical expression into a corresponding static or animated graphical expressions. The mechanism at the base of such "translation" is based on artificial learning techniques. MAG use population of neural networks that can use both genetic and reinforcement learning algorithms to evolve appropriate behavioral answers to inputs. The combination of artificial evolution and the flows of a repeated song or different musical tunes allows the software to obtain a special relationship between sound waves and the aesthetics of consequent graphical result. Further, we are exploring the concept of run-time creation of both music and graphical expression. To do that we use MusicTiles app that allows users to remix music by connecting musical building blocks. When combining MusicTiles app and MAG software, we provide the possibility to melt both musical expression and graphical expression in parallel and at run-time, and therefore creating a audio-video performance that is always unique.
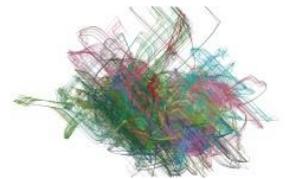
Luigi Pagliarini is an artist, psychologist, multimedia and software designer, expert in robotics, AI and Artificial Life. He is currently Professor at the Academy of Fine Arts of Macerata (Italy) and Consultant Professor at DTU Center for Playware

(Denmark). He has published in different international books, journals, congresses and conferences proceedings and has been rewarded with international prizes more than once. He has exhibited his work in different museums and institutions all over the world. Luigi Pagliarini has also worked for many different institutes and universities as professor or researcher and, as consultant, with many enterprises and multinational factories. His work has often been reported on many international newspapers, magazines and televisions.

Invited Talker 3

IS1-3 Heart-pulse Biofeedback in Playful Exercise using a Wearable device and Modular Interactive Tiles

Tomoya Shimokakimoto[1], Henrik H. Lund[2], Kenji Suzuki[3]
([1] University of Tsukuba, Japan)
([2] Technical University of Denmark, Denmark)
([3] University of Tsukuba/ JST, Japan)

We developed a playful biofeedback system using a wearable device and modular interactive tiles. We suppose that patients could regulate exercise intensity on their own through biofeedback. We propose biofeedback play system called "bioToys" based on exercise with the modular interactive tiles. The system consists of a wearable device and modular interactive tiles. We combine the two systems to provide users with heart pulse biofeedback in playful exercise. We show that using the developed system it is possible for the users to regulate the exercise intensity on their own with biofeedback, and also possible to analyze exercise activity using number of steps on the tiles and heart beat rate.

Tomoya Shimokakimoto was graduated from Master Course of University of Tukuba and now is studying toward Ph.D candidate.