The First International Workshop on Multimodal Interaction for Education

Gualtiero Volpe
Casa Paganini - InfoMus
DIBRIS- University of Genoa
Genoa, Italy
gualtiero.volpe@unige.it

Monica Gori
U-Vip Unit
Istituto Italiano di Tecnologia
Genoa, Italy
Monica.Gori@iit.it

Nadia Bianchi-Berthouze
UCL Interaction Centre
University College London
London, United Kingdom
n.berthouze@ucl.ac.uk

Gabriel Baud-Bovy
RBCS Unit
Istituto Italiano di Tecnologia
Genoa, Italy
Gabriel.Baud-bovy@iit.it

Paolo Alborno
Casa Paganini - InfoMus
DIBRIS- University of Genoa
Genoa, Italy
paoloalborno@gmail.com

Erica Volta
Casa Paganini - InfoMus
DIBRIS- University of Genoa
Genoa, Italy
erica.volta@edu.unige.it

ABSTRACT

The *1st International Workshop on Multimodal Interaction for Education* aims at investigating how multimodal interactive systems, firmly grounded on psychophysical, psychological, and pedagogical bases, can be designed, developed, and exploited for enhancing teaching and learning processes in different learning environments, with a special focus on children in the classroom. Whilst the usage of multisensory technologies in the education area is rapidly expanding, the need for solid scientific bases, design guidelines, and appropriate procedures for evaluation is emerging. Moreover, the introduction of multimodal interactive systems in the learning environments needs to develop at the same time suitable pedagogical paradigms. This workshop aims at bringing together researchers and practitioners from different disciplines, including pedagogy, psychology, psychophysics, and computer science – with particular focus on human-computer interaction, affective computing, and social signal processing – to discuss such challenges under a multidisciplinary perspective. The workshop is partially supported by the EU-H2020-ICT Project weDRAW (http://www.wedraw.eu).

ACM Classification Keywords

H.5 Information Interfaces and Presentation (e.g. HCI); K.3.1 Computers and education: Computer uses in education—*Computer assisted instruction*

Author Keywords

Multimodal interactive systems; multimodal interfaces; education; learning technologies;

ICMI 2017, November 13–17, 2017, Glasgow, UK

ISBN 123-4567-24-567/08/06…$15.00

DOI: http://dx.doi.org/10.475/123_4

WORKSHOP MOTIVATION, EXPECTED OUTCOMES, AND IMPACT

Motivation

Technology is nowadays increasingly used in many learning environments, including the classroom. Whilst, on the one hand, there exists a vast literature on the usage of multisensory interactive systems for teaching, on the other hand at school the visual channel is often the one most frequently exploited, whereas the other channels are left a marginal role only. Moreover, current technologies for education do not still sufficiently ground on psychophysics and developmental psychology evidence. Recent results from these disciplines (e.g., see [1][2]) show indeed that children have a preferential sensory channel to learn specific concepts and that the visual signal in not always the more powerful and effective channel for conveying concepts. A multimodal pedagogical approach taking into account the best suited modality to teach a specific concept and fully exploiting the potential of multimodal interaction can therefore be highly beneficial for education.

This workshop aims at investigating how multimodal interactive systems, solidly grounded on psychophysical, psychological, and pedagogical bases, can be designed, developed, evaluated, and exploited for enhancing teaching and learning processes in different learning environments. A special focus will be on children in the classroom. The workshop represents a unique occasion for researchers and practitioners to meet and discuss multimodal technologies for education under different perspectives, including the pedagogical, psychological, and computational ones, with a strong multidisciplinary approach. A special focus will be on aspects related to Affective Computing (e.g., detection of affective states related to learning) and Social Signal Processing (e.g., how to exploit automated analysis of social interaction in the classroom).

The workshop is partially supported by the EU-H2020-ICT Project weDRAW (http://www.wedraw.eu). weDRAW aims to introduce a new teaching paradigm, based on multisensory

interaction, that exploits the most effective sensory channel in children. Specifically, the workshop will start from the knowledge acquired in the first year of weDRAW, and will be open to new perspectives and experiences.

Expected outcomes

Results are expected both in scientific terms, i.e., a broad discussion of current research on the topics of interest and an analysis of future research challenges, and with respect to applications, e.g., in terms of a collection of scientifically grounded guidelines for designing, developing, and evaluating multimodal interactive systems for education. Moreover, the workshop is expected to foster new collaborations, and to promote future projects.

The organizers will consider the possibility of submitting a proposal for a special issue of an international journal. Candidate journals include e.g., Computers and Education, IEEE Transactions on Learning Technologies, and Journal of Computer Assisted Learning, as well as journals more traditionally related to the ICMI community (e.g., ACM Transactions on Interactive Intelligent Systems, Journal on Multimodal User Interfaces).

Impact

The topics the workshop addresses may have a strong impact both on the research community (investigation of the role of the different modalities and of multimodal integration on the teaching and learning processes; new pedagogical paradigms), on industry (new products for education, grounded on scientific bases and exploiting multimodal technology), and on society (more effective and pleasant approaches to learning). Impact will be pursued through scientific publications (e.g., the above-mentioned special issue) and through contacts with industries and with end users. For example, in the dissemination activities of the project, the weDRAW Consortium will be in contact with more than 1,000 teachers in Europe. Moreover, the weDRAW Consortium includes leading companies in the area of serious games.

WORKSHOP ORGANIZERS

This workshop proposal stems from a longstanding collaboration between University of Genova (Prof. Gualtiero Volpe), Italian Institute of Technology (Dr. Monica Gori and Dr. Gabriel Baud-Bovy), and University College London (Prof. Nadia Bianchi-Berthouze).

Short biographies of the organizers

Gualtiero Volpe is an Associate Professor at DIBRIS, University of Genoa, where he teaches Multimodal Systems. He received his PhD in electronic and computer engineering in 2003 from the University of Genoa, Italy. His research interests include intelligent and affective human-machine interaction, social signal processing, sound and music computing, modelling and real-time analysis and synthesis of expressive content, and multimodal interactive systems. He is author or co-author of more than 100 scientific publications. He was organizer and co-chair of the 5th International Gesture Workshop (GW2003), of the 8th International Conference on New Interfaces for Musical Expression (NIME2008), and of the International Workshops on Social Behaviour in Music (one of them in the framework of ICMI). He was guest editor of special issues for IEEE Transactions on Affective Computing, Journal of New Music Research, Journal on Multimodal User Interfaces, and Entertainment Computing. He is the scientific responsible for DIBRIS of three EU-ICT projects investigating and applying multimodal technologies in the area of education (FP7 MIROR, H2020 TELMI, and H2020 weDRAW).

Monica Gori is tenure track at the U-Vip Unit (Unit for Visually Impaired People) in the Italian Institute of Technology (IIT), Genoa, Italy. From 2004 to 2009 she worked at CNR in David Burr's Laboratory. In 2009 she received her PhD on Humanoid Technologies at IIT / University of Genoa. In 2008 she worked in Martin Banks lab (Berkeley, California). During her PhD she interacted with a strong multidisciplinary environment starting collaborations with engineers and clinical institutes. She also started collaborations with prof. Juergen Konczac (Minnesota University, USA) and prof. Melvin Goodale (Ontario University, Canada). She is an expert of development, multisensory integration, sensory-motor perception, visual disability and spatial perception. She is author or co-author of 41 international papers, 2 book chapters, and many conference abstracts. She was awarded the EU FP7-ICT ABBI project and the EU-H2020-ICT weDRAW project. In both she is the scientific coordinator. One of her works has been listed in faculty of 1000 (Gori et al., Curr Biol, 2008) and she won the TR35 price for young innovators.

Nadia Bianchi-Berthouze is a Full Professor in Affective Computing and Interaction at the Interaction Centre of the University College London (UCL). She received her PhD in Computer Science for Biomedicine from the University of the Studies of Milan, Italy. Her research focuses on designing technology that can sense the affective state of its users and use that information to tailor the interaction process. She has pioneered the field of Affective Computing and for more than a decade she has investigated body movement and more recently touch behavior as means to recognize and measure the quality of the user experience in full-body computer games, physical rehabilitation and textile design. She also studies how full-body technology and body sensory feedback can be used to modulate people's perception of themselves and of their capabilities to improve self-efficacy and copying capabilities. She has published more than 170 papers. She was awarded the 2003 Technical Prize from the Japanese Society of Kansei Engineering and she has given a TEDxStMartin talk (2012).

Gabriel Baud-Bovy is Team Leader in the Robotics, Brain and Cognitive Science Unit of the Italian Institute of Technology and Assistant Professor at the Faculty of Psychology, Vita-Salute San Raffaele University of Milan, Italy. He received his PhD in Psychology from the University of Geneva, Switzerland. He is an expert in haptics, psychophysics and motor control. His research interests include motor control, haptic perception and haptic technology. He has more than 45 publications in international peer-reviewed journals and conferences. He is principal investigator for the EU-FP7-ICT ABBI project and the EU-H2020 PACE Marie-Curie ITN. He is currently associate editor of IEEE Transactions on Haptics

and has been part of the organization committees of several international conferences. He has served as expert in panels of reviewers for the EU and in national grant selection committees. He is a regular reviewer for international journals in the fields of cognitive and experimental psychology, haptics and engineering. He has been invited at Université Pierre Mendes France, Grenoble, and at Université René Descartes, Paris V, France.

Paolo Alborno and **Erica Volta** are PhD students in computer engineering at Casa Paganini, DIBRIS - University of Genova. In their PhD they both contribute to the weDRAW project under the supervision of prof. Gualtiero Volpe and of prof. Antonio Camurri.

WORKSHOP FORMAT

The target duration is a full day. The workshop encompasses both invited presentations and contributions selected upon submission in response to a call for papers. Contributions may consist of papers or demos (with accompanying poster). The weDRAW Consortium will support the workshop by covering the costs for travel and accommodation of the invited speakers and by providing a number of contributions (at least 4-5 contributions estimated from weDRAW, both papers and demos) from different research areas (pedagogy, psychophysics, and computer science), providing an initial ground for discussion. A final panel, involving the organizers and the invited speakers, will summarize the discussions during the workshop, comment on them, and help identifying directions for future work.

Here follows a tentative program:

Morning session:

- invited presentation #1 (1h)
- 3 oral presentations (1.5 h)
- demo session (1h)

Afternoon session:

- invited presentation #2 (1h)
- 2 oral presentations (1h)
- final panel (1h)

PLANNED ADVERTISEMENT MEANS, WEBSITE HOSTING, AND ESTIMATED PARTICIPATION

The workshop website can easily be hosted by the institution of one of the organizers (University of Genoa, IIT, or UCL). The workshop will be advertised by the organizers and the invited speakers through the usual dissemination channels (mailing lists of the different research communities, including for example the mailing list of ICMI, of the AAAC, of ACM SIGCHI, of ACM SIGMM, of the SIGCHI local chapters, and so on). Moreover, the workshop can exploit the dissemination network the weDRAW Consortium is setting up. This includes contacts with teachers, with schools, and with companies in the education area. The workshop will represent a major event for the weDRAW project and will also be advertised through the means made available by the European Commission. Participants from each partner of the weDRAW Consortium will attend the workshop, thus guaranteeing a minimal number of attendants. Given the broad multidisciplinary nature of the workshop we however expect a good number of participants beyond the weDRAW Consortium.

PAPER SUBMISSION PROCEDURE

Submission via web site is preferred. We are happy to rely on the ICMI submission system. We can switch to another submission system or we can manage submissions autonomously on the website of the institution of one of the organizers, if needed. In particular, DIBRIS – University of Genova already managed the submission website for the Workshops on Social Behavior in Music.

PAPER REVIEW PROCEDURE

A double-peer review procedure involving a minimum of two independent experts in the area is envisaged. A Program Committee will be appointed for reviewing purposes. The Program Committee will include experts in pedagogy, psychology, psychophysics, computer science, multimodal systems, and interaction design of products for education.

PAPER SUBMISSION AND ACCEPTANCE DEADLINES

Assuming the camera-ready deadline for workshops is set around end of September (the exact date was not announced yet at the time being), this is a tentative schedule for submissions and reviews:

- Submission deadline: July 24, 2017
- Notification to authors: September 11, 2017
- Camera-ready: end of September

SPECIAL SPACE AND EQUIPMENT REQUESTS

For most of the activities we essentially need a conference room endowed with a projector and an audio system. It would be good to have some space for demos (either in the same room or in another one), endowed with tables, electrical plugs, a projector, an audio system, network connection, and some empty space (e.g., a 3x3 square) for demos concerning analysis of full-body movement. The workshop organizers can provide and bring possible special equipment needed for the demos (e.g., sensor systems).

REFERENCES

1. Maeve M. Barrett and Fiona N. Newell. 2015. Task-Specific, Age Related Effects in the Cross-Modal Identification and Localisation of Objects. *Multisensory Research* 28, 1-2 (2015), 111–151.
2. Monica Gori, Michela Del Viva, and Giulio Sandini. 2008. Young Children Do Not Integrate Visual and Haptic Form Information. *Current Biology* 18, 9 (2008), 694–698.