# SensoryX '22 Workshop on Multisensory Experiences at ACM IMX '22

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Our interactions with the world are multisensory in nature - the senses move us through spaces, mix with our memories and are constantly connected by our brains. Focused only on vision for a long time, the field of human computer interaction (HCI) started to meaningfully bring together all our senses in designing interactions for a variety of media. With this workshop, we look at different aspects of multisensory design from authoring tools to the evaluation of multisensory experiences with the aim of identifying the current challenges and opportunities of mulsemedia.

 $\label{eq:ccs} \text{CCS Concepts:} \bullet \textbf{Human-centered computing} \to \textbf{Virtual reality}.$ 

Additional Key Words and Phrases: Multisensory experiences, Mulsemedia, Sensory effects, Immersive media

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## 1 BACKGROUND, SCOPE, AND AIM

Multisensory applications seem to be riding an upward trend nowadays [12, 17–19, 19, 20, 20, 33, 39, 53, 56]. Novel use cases such as tourism [21, 23, 30], education [4, 5], health [48, 51, 52, 55], security [3], digital twins [26] are consistently- and with increasing intensity - being brought to the attention of the interactive media community. The potential of multisensory interaction in a digital space, enabled by increasingly affordable technologies has, unsurprisingly, enabled new possibilities in the fields of VR/AR/XR [40, 41, 43–46]. An enhanced Quality of Experience [11, 35, 37–40, 57, 59], sense of presence [9], and information recall [1, 8, 54, 60] are often touted as end user benefits, and justifiably so; however, adopting a cross-layer perspective also brings to the fore new possibilities, such as that of green computing and building sustainable digital ecosystems [6, 26].

Nonetheless, it remains that our understanding of multimodal and multisensory interaction in physical spaces [13, 15, 16, 22, 25, 27, 28, 47, 49, 50, 58] dwarfs that of corresponding interactions in the digital realm [2, 10, 31, 32]. Naïve mappings and translations between the two have been shown to be just that – naïve. Moreover, in a world in which Artificial Intelligence and Machine Learning algorithms are grabbing headlines, the lack of digital multisensory datasets [34], modelling initiatives [7, 36, 42], as well as programming environments [14, 24, 29] represent but three

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challenges. Indeed, considerable more research needs to take place to explore in order to deepen our comprehension of digital multisensory interaction. SensoryX 2022 taps into this need.

This is the second edition of SensoryX, building on last year's successful workshop. This one-day workshop will offer an interdisciplinary forum of discussion interested in research on designing experiences that align rich data from multiple human senses.

## 1.1 Context and Topics

The workshop focuses on putting the following multisensory media topics in an actualised context:

- An understanding of how digital content can be enriched with multisensory features in different phases of the production-distribution-rendering workflow
- The exploration of various opportunities that provide designers and developers with the means for creating meaningful multisensory experiences by making use of a wide spectrum of sensory experiences
- An overview of different application areas and interaction scenarios that can benefit from multisensory stimulation

Topics of interest include, but are not limited to, the following:

- Multisensory Experiences QoE evaluation (subjective, objective, online vs offline)
- Human Factors (including user modelling) in Multisensory Experiences
- Application areas for Multisensory Experiences (Health, Education, Arts, Tourism, e-Commerce, etc.)
- Multisensory Experiences Standardization
- Multisensory Experiences in Augmented and Virtual Reality
- Cross-layer Mulsemedia design for Multisensory Experiences
- Multisensory Experiences datasets/databases

### 2 ORGANISERS

### 2.1 Workshop Chairs

- Alexandra Covaci is a researcher in the field of virtual reality, currently Lecturer in Digital Arts and Technology at the University of Kent, UK. Her main research area is on the interface between computer science and neuroscience, where she design and develops environments focused on skills training. She has an interest in the design of meaningful multisensory experiences by exploiting different combinations of sensory modalities and she is working towards creating a systematic understanding of multisensory experiences for interactive technologies.
- Estêvão Bissoli Saleme obtained his PhD degree in Computer Science from UFES, Brazil, in 2019. During his PhD, he was an Academic Visitor at Brunel University London, UK, supported by CAPES, had his thesis nominated among the top six 2019 PhD theses in Computer Science by the Brazilian Computing Society, and received an honourable mention at the Brazilian Symposium on Multimedia and Web. His research interests include multimedia and human-computer interaction with a focus on digital multisensory systems, quality of experience of users, immersive technologies (VR/AR/XR), signal processing, middleware, and frameworks.
- Celine Jost is an Associate Professor in Computer Science at Paris 8 University in France, working in the CHArt laboratory for her research, since 2015. She obtained her Ph.D. in Computer Science from South Brittany University (France) in 2013. She mostly conducts multidisciplinary research with different disciplines, for which she received the "RJS/KROS Distinguished Interdisciplinary Research Award" in RO-MAN 2014. She participated in several national projects (EmotiRob, Robadom, MoCa, and INGREDIBLE) and she created and led

four projects (EMSHRI, StimSense, MemoRob, and PRIM). Her research interests include Human-Machine Interaction, multisensory interaction, evaluation methods, user experience, connected objects, social robots, natural interaction, individualized interaction, interaction paradigm, cognitive ergonomics, serious game, artificial companion, disabilities, education, and cognitive stimulation.

- Joel dos Santos is a professor in the Computer Science Department at CEFET/RJ, Brasil. He obtained his Telecommunication Engineering (2009), Masters in Computer Science (2012), and Doctorate in Computer Science (2016) degrees from UFF, Brazil. He was an academic visitor during his undergraduate studies at Universität Ulm (2007-2008) and during his doctorate studies at Inria-Grenoble (2014-2015). He acts since 2006 in multimedia-related projects in the areas of Digital TV, Multimedia Authoring, Application Validation, Multisensory Applications, and Virtual Reality. He currently coordinates the Special Committee on Multimedia Systems and the Web from the Brazilian Computer Society.
- Gheorghita Ghinea is a Professor of Mulsemedia Computing in the Computer Science Department at Brunel University London, UK. His research activities lie at the confluence of Computer Science, Media and Psychology. In particular, his work focuses on the area of perceptual multimedia quality and how one builds end-to-end communication systems incorporating user perceptual requirements. Currently, his research pursuits are centred on extending the notion of multimedia with that of mulsemedia a term which he has put forward to denote multiple sensorial media, ie. media applications that go beyond engaging the by now traditional auditory and visual senses, engaging three of our other human in a realistic manner akin to our experiences of everyday life.

# 3 PROGRAMME

SensoryX 2022 will take place in Aveiro, Portugal, on June 22nd, 2022, in conjunction with the the ACM International Conference on Interactive Media Experiences (ACM IMX 2022). The workshop will feature a world-class keynote by Dr. Carlos Velasco, from the BI Norwegian Business School, Oslo, Norway, on "Multisensory experiences: Where the senses meet technology." The accepted papers encompass discussions about multisensory wearables, multisensory healthcare therapies, mulsemedia editing paradigms and authoring, and mulsemedia QoE challenges. The full programme is detailed in Table 1.

SensoryX '22 will focus on enhancing the multisensory scope of both designers and developers of multimedia and Mixed Reality experiences who could thus harness the whole spectrum of sensory experiences. For this, the workshop will foster and challenge current practices in designing experiences, and will explore and identify future research directions for creating experiences at the intersection of various sensory dimensions.

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Table 1. Detailed programme for the workshop. The schedule is set in Western European Summer Time, Portugal, UTC +1.

Hour	Activity
14:00 - 14:15	Welcome to the workshop and participants' introductions
14:15 - 15:15	Keynote speech. Dr. Carlos Velasco
15:15 - 15:20	Short break
15:20 – 16:00	Papers session I:  - Quantifying Multisensory Immersive Experiences using Wearables: Is (Stimulating) More (Senses) Always Merrier?  Belmir Jose De Jesus Jr (INRS-EMT, Canada), Marilia K. S. Lopes (INRS-EMT, Canada), Marc-Antoine Moinnereau (INRS-EMT, Canada), Reza A. Gougeh (INRS-EMT, Canada), Olivier M. Rosanne (INRS-EMT, Canada), Alcyr A. Oliveira (Universidade Federal de Ciências da Saúde de Porto Alegre, Brazil), Walter Schubert (INRS-EMT, Canada), and Tiago H. Falk (INRS-EMT, Canada)  - An Open-Source Socially Assistive Robot for Multisensory Healthcare Therapies Marcelo Marques da Rocha (Fluminense Federal University, Brazil), Dagoberto Cruz-Sandoval (University of California, USA), Jesus Favela (Centro de
16.00 16.15	Investigación Científica y de Educación Superior de Ensenada, Mexico), and Débora Christina Muchaluat-Saade (Fluminense Federal University, Brazil)
16:00 - 16:15	Papers session II:
16:15 - 17:15 17:15 - 17:30	<ul> <li>Interactions in Multisensory Experiences: Toward a New Timeline Metaphor</li> <li>Céline Jost (Université Paris 8, France), Brigitte Le Pévédic (Université Bretagne</li> <li>Sud, France), Justin Debloos (Université Paris 8, France), and Gérard Uzan</li> <li>(Université Paris 8, France)</li> </ul>
	<ul> <li>How to integrate interactions into video editing software?</li> <li>Céline Jost (Université Paris 8, France), and Brigitte Le Pévédic (Université Bretagne Sud, France)</li> </ul>
	<ul> <li>Ongoing Challenges of Evaluating Mulsemedia QoE</li> <li>Aleph Campos da Silveira (Federal University of Espirito Santo, Brazil), and</li> <li>Celso Alberto Saibel Santos (Federal University of Espirito Santo, Brazil)</li> <li>Final discussion and Concluding remarks</li> </ul>

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