Proceedings of the 4th European Tangible Interaction Studio (ETIS) 2020

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The fourth version of the European Tangible Interaction Studio Tangible interaction was hosted by the University of Siena (Italy) and took place online due to the COVID-19 pandemic situation. In total, there were 20 participants attending the ETIS conference from 6 countries: Italy, France, Germany, United Kingdom, Switzerland, Luxembourg.

Tangible Interaction is a research field addressing areas at the border of the physical and the digital. Nowadays many researchers, designers, developers and artists work in this area and a vast range of products and applications are designed and produced accordingly. Besides, many research projects are funded through research funds at a European and international level.

AIM OF THE STUDIO

The aim of this meeting is to gather young European researchers in our field, to get them in touch with internationally renowned researchers and to establish networks for their future. This studio was a follow-up of the previous editions held in Bidart (2013), Fribourg (2016) and Luxembourg (2017) and was a unique opportunity to train in the field of tangible interaction and to discuss your research with professors and other young researchers.

Researchers with different backgrounds from both academic and applied/industrial research participated in ETIS 2020. The studio included voices from enterprises and private research institutions working in the field of tangible interaction. It aimed to provide participants with insights for applied research possibilities, in order to bring tangible interaction principles out of the lab, in the everyday use.

Senior researchers from the industry and internationally known professors introduced different topics related to tangible interaction from their different points of view.

KEYNOTE SPEAKERS

During ETIS 2020, there were 4 keynote speakers: Stéphanie Fleck (University of Lorraine), Marianna Obrist (University College London), Tanja Döring (University of Bremen), and Hiroshi Ishii (MIT Media Lab); the order is according they were presented during the Studio. The abstracts of the keynotes are presented below:

1. **Stéphanie Fleck**, Associate Professor at the University of Lorraine – PERSEUS lab

Title: Tangible learning: Design and evaluation of hybrid environments for human learning and fulfilment

Abstract: Learning requires the construction or questioning of personal knowledge, skills and/or attitudes. This often requires the learner to go beyond appearances, to grasp abstract notions. Unfortunately, sometimes these are only obvious to those who already know. In her

presentation Stéphanie Fleck, explained her works around the design and evaluation of hybrid devices targeted to promote and better understand the development of knowledge, skills and of a positive learning experience.

2. **Marianna Obrist**, Professor of Multisensory Interfaces at UCL (University College London)

Title: Multisensory Experiences: Beyond Audio-Visual Interfaces

Abstract: Marianna Obrist presented the concept of Multisensory experiences, that is, experiences that involve more than one of our senses. While we have built tools, experiences and computing systems that have played to the human advantages of hearing and sight (e.g., signage, modes of communication, visual and musical arts, theatre, cinema and media), we have long neglected the opportunities around touch, taste, or smell as interface/interaction modalities. Within this talk, Marianna Obrist shared her vision for the future of computing and what role touch, taste, and smell can play in it.

3. **Tanja Döring**, Senior Researcher in the Digital Media Lab at the University of Bremen.

Title: Tangible Interaction and Materiality

Abstract: Among the potentials of tangible user interfaces is their rich materiality that can shape sensory and meaningful experiences as well as offer novel functionalities. In her talk, Tanja Döring gave an overview on evolving themes that focus on materiality and interaction and present examples for tangible interaction, including prototypes with advanced, everyday and ephemeral materials.

4. Hiroshii Ishii, Jerome B. Wiesner Professor of Media Arts and Sciences at the MIT Media Laboratory

Title: Making Digital Tangible: The Battle Against the Pixel Empire

Abstract: Hiroshi Ishii presented the trajectory of our vision-driven design research from Tangible Bits towards Radical Atoms, illustrated through a variety of interaction design projects that have been presented and exhibited in Media Arts, Design, and Science communities. These projects emphasized that the design for engaging and inspiring tangible interactions requires the rigor of both scientific and artistic review, encapsulated by my motto, "Be Artistic and Analytic. Be Poetic and Pragmatic."

5. **Domenico Prattichizzo**, Professor of Robotics at the University of Siena and Senior Scientist at the Istituto Italiano di Tecnologia in Genova

Title: Highly wearable haptic interfaces for novel interaction between humans and machines

Abstract: Wearable haptics and wearable sensorimotor interfaces are emerging research trends that will enable novel forms of communication and cooperation between humans and robots. In this keynote, Domenico Prattichizzo introduced design guidelines for wearable haptics and reviewed our research in this field.

PAPER SESSIONS

Moreover, there were 5 paper sessions, which were thematically categorized. We present them here in the order that they were presented during the conference:

Pierre Mahieux, Sébastien Kubicki, Sylvain Laubé and Ronan Querrec: "Time Navigation in a Virtual Environment using Tangible Interactions: application to the domain of History of Science and Technology"

Alexis Olry de Rancourt, Julien Veytizou, David Bertolo, Robin Vivian, J. M. Christian Bastien, Stéphanie Fleck: "PrisMe: a Tangible User Interface for Work Group Regulation. Preliminary User Experience Study"

Stephanie Rey, Anke M. Brock, Christophe Bortolaso, Mustapha Derras and Nadine Couture: **"**Guiding visitors in museums with calm interactions"

Anke Reinschluessel, Tanja Döring, Rainer Malaka**:** "Improving User Interfaces for Physicians through New Materials, Tangible Interaction, and Tactile Feedback"

Laura Cipriani, Andrea Ascani, Carla Sedini, Massimo Bianchini and Stefano Maffei: "The BODYSOUND case. A tangible prototype for co-designing "intangible" healthcare solutions"

Mira El Kamali, Leonardo Angelini, Omar Abou Khaled and Elena Mugellini: "NESTORE: An Embodied Tangible Conversational Agent for Older Adults"

Sujay Shalawadi, Eva Hornecker and Florian Echtler: "Dynamic Representation of Physical Exercises on Inflatable Membranes: Making Walking Fun Again!"

Tom Giraud, Ines Di Loreto and Matthieu Tixier: "Tangible Interaction as a resource for Relational HCI"

Federica Caruso and Venanzio Arquilla: " Yogo: A Hybrid Toy System for Kids with DCD"

Marine Capallera, Leonardo Angelini, Omar Abou Khaled and Elena Mugellini: "Human Vehicle Interaction Model for Supervision in Conditionally Automated Driving Cars"

Serpil Erdonmez and Venanzio Arquilla: " Designing Tangible Tasks for Autism People: NADI"

PANELS

There were also 4 panels, where all participants were asked to discuss on specific current and future ideas. The four panels were the following:

1. **A Workshop on Embodied Vocal Tangible Conversational Agents: a Human Computer Interaction Approach** (Mira El Kamali, Marine Capallera, Leonardo Angelini, Omar Abou Khaled, Elena Mugellini)

This panel dealt with the combination of vocal interaction with tangible interaction. The idea was to explore different embodied vocal conversational agents with tangible aspects and see the different tangible designs and challenges of a vocal conversational agent.

During the panel, the participants engaged in practical application. They brainstormed in groups about the concept of having a vocal conversational agent embedded in a physical device with tangible capabilities. The panel consisted in designing the form of the physical device, the tangibility aspect and properties of the vocal assistant and the kind of interactions users can have with this embodied conversational agent.

2. **Exploring Opportunities of Tabletop Interfaces for Promoting and Analysing Collaboration** (Hoorieh Afkari, Valérie Maquil, Dimitra Anastasiou)

Shared interfaces such as multi-touch tables and tangible tabletop interfaces were found to mediate and support collaboration. During this panel, an interactive tabletop mediated environment called Orbitia was presented, which induces participants' face-to-face collaboration in the context of a joint problem solving activity. We discussed how interactive tabletops can elicit users in applying and progressively refining their collaboration strategies. Participants, after knowing about the fundamental aspects of collaboration in such context, developed and reflected their ideas through a shared brainstorming tool.

3. **Tangible interactions in Virtual Reality environments** (Matteo Sirizzotti, Simone Guercio, Flavio Lampus, Patrizia Marti, Luca Lusuardi, Alessandro Innocenti)

Virtual Reality (VR) provides opportunity for immersive experiences in several fields of application, in particular in training and entertainment. Integrating tangible interaction with virtual environments that mimic real world situations can provide a tremendous enrichment to the user experience. This panel aimed to engage a reflection on possible ways to integrate tangible interactions in virtual reality scenarios. Specifically, the panel included a bodystorming session and rapid prototyping to ideate new concepts of controllers and tangible objects to be used in VR applications to enhance and enrich the interaction possibilities.

4. **Crafting Tangible Interactions. Can thinking through craftsmanship values enrich the design process of TI?** (Erica Vannucci)

This panel suggested that looking closely to craftsmanship practices and unpacking the values craft practitioners have over materiality, techniques and processes, could enrich our knowledge on human-values providing useful nuances that could be used when designing future tangible interactions. During the panel, participants collectively reflected and discussed on how craftsmanship characteristics and sensitivities could be valued and included more in the design of future tangible interactions.

ORGANIZATION

Here we present the local organization committee, the steering committee of ETIS, as well the program committee, which peer-reviewed the ETIS submissions and thus guaranteed the high quality of the contributions.

Organisation Committee

- General Chair: Patrizia Marti (University of Siena)
- Program Chair: Annamaria Recupero (University of Siena)
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- Oronzo Parlangeli (University of Siena, Italy)
- Annamaria Recupero (University of Siena, Italy)
- Guillaume Rivière (ESTIA Institute of Technology, France)
- Jürgen Steimle (Saarland University, Germany)

BIOGRAPHIES OF THE EDITORS

Dimitra Anastasiou is an R&T associate at LIST in the Human Dynamics in Cognitive Environment Unit of the IT for Innovative Services Department. She is working on user behaviour and collaboration on Tangible User Interfaces. From 2015-2018, she was awarded with a Marie Curie Individual Fellowship project (ranked 9 out of 1335 proposals) with the title "Gestures In Tangible User Interfaces"(GETUI): http://www.list.lu/en/project/getui/. From 2014 to 2015 she worked at the DFG project *SOCIAL* at the University of Oldenburg, Germany. She finished her Phd in 2010 at the Saarland University, Germany in the domain of "machine translation". After that she worked as a post-doc on the project "Centre for Next Generation Localisation" at the University of Limerick, Ireland. From 2011-2012 she worked on the project "SFB/TR8 Spatial Cognition" at the university of Bremen, Germany. She has 7 years teaching experience and have organized 6 workshops at international conferences. She is a member of the working group "Be-greifbare interaktion" since January 2016. am Technical National Anchor Point for Luxembourg for the *European Language Resource Coordination,* which manages, maintains and coordinates the relevant language resources in all official languages of the EU.

Valérie Maquil is a Senior R&T Associate at LIST in the research group Multi-User Natural Interaction of the IT for Innovative Services Department. She holds a PhD in Computer Science from Vienna University of Technology, Austria (completed in 2010). Her research focus is the design and evaluation of tangible and tabletop interaction in group contexts. She worked on and lead many EU (FP6, Interreg, Erasmus+, H2020) and national (FNR PSP, FNR JUMP, FNR POC, RDI) projects, involving the design, implementation, and evaluation of tangible and tabletop interaction in the context of collaborative problem solving, collaborative design, or collaborative decision making. She is currently the LIST PI in the FNR CORE project

Overcoming breakdowns in Teams on Interactive Tabletops (ORBIT). She is active in many scientific communities related to tangible interaction. She is member of the steering committee of the Fachgruppe "Be-Greifbare Interaction" and serves as committee member and reviewer for many international scientific communities (TEI, ISS, IHM, Mensch und Computer, …). She is co-creator of Kniwwelino®, the technology-rich, creative environment for learning coding and electronics and owns three patents.

ORGANIZATION

We thank all the following sponsors which financially and scientifically supported ETIS 2020: