



# First Multimodal Banquet: Exploring Innovative Technology for Commensality and Human-Food Interaction (CoFI2024)

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Figure 1: The CoFI2024 banner image (generated with AI).

## Abstract

Commensality, the act of eating together, offers a rich multisensory and social experience that technology can enhance. Dining involves interactions with food, where smells, colors, sounds, and textures contribute to a multisensory experience. The table becomes a focal point for social interaction, with nonverbal cues and conversations being the indispensable ingredients of the commensal experience. The CoFI2024 workshop aims to stimulate discussion about how interactive technology can enrich dining experiences. The other aim is to build an interdisciplinary community related to commensality and human-food interaction, focusing on the role of multimodal

interaction among commensal partners sharing food, being humans or artificial dining companions.

## CCS Concepts

• **Human-centered computing** → **Human computer interaction (HCI)**; *HCI design and evaluation methods*; *User centered design*; *Participatory design*.

## Keywords

HCI, food, eating, commensality, digital, user experience, human-food interaction, multimodal, multisensory, dining experience



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ICMI '24, November 04–08, 2024, San Jose, Costa Rica  
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ACM ISBN 979-8-4007-0462-8/24/11  
<https://doi.org/10.1145/3678957.3685762>

## ACM Reference Format:

Radoslaw Niewiadomski, Ferran Altarriba Bertran, Christopher Dawes, Marianna Obrist, and Maurizio Mancini. 2024. First Multimodal Banquet: Exploring Innovative Technology for Commensality and Human-Food Interaction (CoFI2024). In *INTERNATIONAL CONFERENCE ON MULTIMODAL INTERACTION (ICMI '24)*, November 04–08, 2024, San Jose, Costa Rica. ACM, New York, NY, USA, 4 pages. <https://doi.org/10.1145/3678957.3685762>

## 1 Workshop Description

Commensality is a genuinely multimodal and interactive experience that can be enriched with technology. Consider the scenario of dining at a restaurant with a close companion. The interactions with food involve all the senses where smells, colors, sounds, and textures accompany the taste to create a multisensory experience (see [10], [11]). Our perception of food is influenced by the food itself and external aspects such as the ambient sounds and music, the shape of our plates, or even the weight of our utensils. Simultaneously, the table is also the center of another type of interaction – the interaction between humans (and, in the future, between humans and artificial commensal companions [4]), who share food and a unique social experience. The nonverbal behavior of the commensals (eaters) is vibrant, while they share attention between food consumption and engagement in conversation with others. Whether it's a business lunch, a romantic dinner for a couple, or a meal in a noisy student canteen, gatherings around the table represent a captivating reservoir of multimodal interactions enriched with cultural subtleties and social norms. Commensality presents a unique opportunity to explore the multisensory and social principles of dining and how technology can play a pivotal role in enhancing this experience.

The CoFI2024 Workshop<sup>1</sup> collects novel contributions that explore how interactive technology can enhance, facilitate, or make these experiences more enjoyable. The workshop aims to build an interdisciplinary community around multimodal interaction in commensal settings and human-food interaction, fostering collaboration, knowledge exchange, and problem-solving among researchers with different backgrounds. The previous works have identified “Grand Challenges” in Human-Food Interaction (HFI) [3], from food production to understanding the chemical processes and perceptual experience (e.g., an ‘RGB’ for taste/ flavor), and to how we can objectively measure the influence of multimodal aspects on eating. In this workshop, we want to expand this approach by emphasizing the role of multimodal interaction among commensal partners sharing food. At the same time, we actively seek cross-fertilisation between different communities (multimodal interaction, Human-Computer Interaction (HCI), social psychology) as several of the “Grand Challenges” [3] may be addressed with approaches widely used in the multimodal interaction community.

The workshop is particularly timely, with the rapidly increasing interest in interactive technologies related to food and eating together and initiatives such as the COCOA<sup>2</sup> Project funded by the Italian Ministry of University and Research, the Research Topic on Computational Commensality recently published by Frontiers in Computer Science [2], and the rising number of previous workshops such as Workshop on Multisensory Approaches to Human-Food Interaction [7–9], Eat-IT: Interactive Food Seminar<sup>3</sup> and Rethink Eating 2020<sup>4</sup> including the identification of the above-mentioned “Grand Challenges”. Specifically, the builds on these and our prior research initiatives [5], which have also identified significant roadblocks in a broader field, ranging from how digital innovations

can transform our interaction with food and our commensal partners, addressing issues from sustainability, well-being, loneliness, and health, to food security and culinary experiences. Building on this foundation, we will bring together researchers and industry contacts to discuss, develop, and critique the future of related technologies.

The workshop aims to ignite innovation and interdisciplinary collaboration in multimodal interaction, commensality, and HFI research. Welcoming diverse participants from fields like computer science, HCI, design, and psychology seeks to foster a rich exchange of ideas that would not otherwise be possible. The focus is on developing new solutions and speculative prototypes, with participants contributing to a post-workshop academic paper addressing some of the Grand Challenges. This endeavor is expected to influence research approaches and policy discussions, enhancing the study of multimodal interactive technology in commensal settings through hands-on speculative design. Consequently, we hope that this workshop will boost the research on multimodal interactive technology in commensal settings.

## 2 Workshop Content

The workshop lasts a half-day. It starts with a welcome word by the organisers, followed by highlight presentations of the accepted CoFI2024 papers. This will be followed by hands-on activity, using the design principles of “Magic Machines”. The workshop participants are asked to create solutions to challenges or tasks wherein they can suspend current physical limitations to generate technology (or ideas) to solve these issues. In this context, “Magic Food Machines” will explore how multimodal technology could address the grand challenges of commensality and HFI research [3].

Participants are invited to design ‘machines’ or systems that, while they may seem magical or fantastical given today’s technological limitations (inspired by related work on future smell worlds [1]), serve to provoke creative thinking, cross-disciplinary discussion, and insight into the challenges at hand. For example, we may imagine a machine that can instantly scan and understand all nutritional content (HFI) or send the flavors via the Internet in real-time. These processes could involve simple speculative discussion, creating digital and physical prototypes, and applying these principles to the real world.

### 2.1 Contributions

The workshop scientific committee reviewed and selected seven regular and short papers to be presented during the workshop:

- (1) Aidan Beery, Daniel W. Eastman, Jake Enos, William Richards and Patrick J. Donnelly. “Smart Compost Bin for Measurement of Consumer Food Waste”;
- (2) Mario Parra, Jesus Favela, Luis Castro and Daniel Gatica-Perez. “Towards Wine Tasting Activity Recognition for a Digital Sommelier”;
- (3) Lei Gao, Yutaka Tokuda, Shubhi Bansal and Sriram Subramanian. “Computational Gastronomy and Eating with Acoustophoresis”;
- (4) Kheder Yazgi, Cigdem Beyan, Maurizio Mancini and Radoslaw Niewiadomski. “Automatic Recognition of Commensal Activities in Co-located and Online settings”;

<sup>1</sup><https://cofi2024.github.io/>

<sup>2</sup><http://cocoa.github.io>

<sup>3</sup><https://www.dagstuhl.de/en/seminars/seminar-calendar/seminar-details/22272>

<sup>4</sup><https://conferences.au.dk/Rethinkeating2020>

- (5) Albana Hoxha, Hunter Fong and Radoslaw Niewiadomski. “Do We Need Artificial Dining Companions? Exploring Human Attitudes Toward Robots in Commensality Settings”;
- (6) Annika Capada, Ryan Deculawan, Lauren Garcia, Sophia Oquias, Ron Resurreccion, Jocelynn Cu and Merlin Suarez. “Analyzing Emotion Impact of Mukbang Viewing Through Facial Microexpression Recognition using SVM”;
- (7) Haeji Shin, Christopher Dawes, Jing Xue and Marianna Obrist. “How does red taste?: Exploring how colour-taste associations affect our experience of food In Real Life and Extended Reality”.

The three accepted works (2, 4, 6) focus on different aspects of analysis and recognition of human behavior [6] in various eating-related contexts, such as watching Mukbang, wine tasting, and online vs. co-located shared meals. Additionally, another paper (1) proposes an innovative technique to collect a database of food waste images.

The other commensality and food-related topics are less represented, with one work (5) providing an exploratory study of human expectations and concerns towards the idea of artificial commensal companions, and two other works focusing on augmenting the eating experience through the use of Extended Reality (7) and acoustophoresis (3).

## 2.2 Workshop Organization

The workshop is organised by an interdisciplinary team that bridges computer science, HCI, design and psychology:

- **Radoslaw Niewiadomski** is an Assistant Professor at DIB-RIS, University of Genoa (Italy). His research interests include recognition of emotions, nonverbal behavior synthesis, multimodal interaction, datasets creation, embodied conversational agents and social robots. He is co-PI of COCOA project aiming to investigate human-human interactions in a commensal setting and to develop artificial commensal companions, and Guest Editor of the Special Research Topic on “Computational Commensality”.
- **Ferran Altarriba Bertran** is an Associate Professor at Escola Universitària ERAM (Girona, Spain). His work explores how to design technology that adds joy to day-to-day experiences, focusing on socio-emotional flourishing environmental care. As part of that research, Ferran has explored how interactive technology might support increasingly playful and mindful human-food interactions that reinforce, rather than weaken, people’s active participation in their food lives and the broader food system.
- **Christopher Dawes** is a Research Fellow at UCL (London, UK), Department of Computer Science, the Multi-Sensory Devices (MSD) Research Group, in multisensory experiences as part of the Textiles Circularity Centre project. His current work involves designing digital textile experiences in Virtual Reality (VR), aiming to increase awareness of and engagement with sustainable textile choices through multisensory principles. Christopher has also investigated the multisensory principle of eating in VR, such as how the shape of food and the (digital) environment we eat in affect our eating experiences.

- **Marianna Obrist** is a Professor of Multisensory Interfaces at UCL (London, UK), Department of Computer Science, the Multi-Sensory Devices (MSD) Research Group. She is also Deputy Director (Digital Health) for the UCL Institute of Healthcare Engineering. Her research ambition is to establish touch, taste, and smell as interaction modalities in Human-Computer Interaction. Marianna is co-founder of OWidgets LTD (Smell Made Digital), a digital smell technology company. An overview of her work was recently published in the popular science book ‘Multisensory Experiences: where the senses meet technology’ by Oxford University Press.
- **Maurizio Mancini** is an Associate Professor at the Department of Computer Science, Sapienza University of Rome (Italy). Earlier, he was a Lecturer at the School of Computer Science and IT, University College Cork (Ireland). He conducts research in Multimodal Interfaces and Affective/Social Computing, in which he investigates computer interfaces having bodies and nonverbal capabilities, enabling humans to emotionally and socially interact with machines. He is the PI of the COCOA Project.

## Acknowledgments

The work was supported by the Italian PRIN 2022 project COCOA (D53D23008850001), funded by the Next Generation EU (NGEU) Programme, National Recovery and Resilience Plan (PNRR) and by the Italian Ministry of University and Research.

This work was further supported by the Engineering and Physical Sciences Research Council (EP/V011766/1) National Interdisciplinary Circular Economy Research (NICER) programme for the UKRI Interdisciplinary Circular Economy Centre for Textiles: Circular Bioeconomy for Textile Materials, and the European Union’s Horizon 2020 research and innovation programme under grant agreement No 101017746; project Touchless.

We would like to thank the Programme Committee and all reviewers for their contribution in organizing this workshop

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