The Future of Human-Food Interaction

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ABSTRACT

There is an increasing interest in food within the HCI discipline, with many interactive prototypes emerging that augment, extend and challenge the various ways people engage with food, ranging from growing plants, cooking ingredients, serving dishes and eating together. Grounding theory is also emerging that in particular draws from embodied interactions, highlighting the need to consider not only instrumental, but also experiential factors specific to human-food interactions. Considering this, we are provided with an opportunity to extend human-food interactions through knowledge gained from designing novel systems emerging through technical advances. This workshop aims to explore the possibility of bringing practitioners, researchers and theorists together to discuss the future of human-food interaction with a particular highlight on the design of experiential aspects of human-food interactions beyond the instrumental. This workshop extends prior community building efforts in this area and hence explicitly invites submissions concerning the empirically-informed knowledge of how technologies can enrich eating experiences. In doing so, people will benefit not only from new technologies around food, but also incorporate the many rich benefits that are associated with eating, especially when eating with others.

CCS CONCEPTS

• **Human-centered computing**; • **Interaction design**;

KEYWORDS

Food, eating, human-food interaction

1 BACKGROUND

> *"One of the very nicest things about life is the way we must regularly stop whatever it is we are doing and devote our attention to eating."* Luciano Pavarotti

Food is an essential part of life. From birth to death, we spend hours procuring, preparing, eating and digesting food [41]. Its preparation, consumption and even mere sight can bring immense joy [9, 30]. French gastronome Brillat-Savarin argues that the pleasures associated with eating constitute some of life's most enjoyable experiences [8]. Recognizing this seems to be an upward trend, as most millennials identify themselves as "foodies" [42].

With advancements in technology, there has been an increase in the use of digital technology in regard to food-related practices ranging from how we grow, cook, present, eat and dispose of food [26]. Food practices are defined as any human activity in which food is involved, ranging from agriculture, food preparation, eating, gifting food, sharing meals and cleaning up. These are studied in HCI under the term of human-food interaction (FHI), defined as "the interconnection between the self and food" [12, 15].

Human-food interaction researchers have begun experimenting with emerging technologies like computational gastronomy [57], food printing [25, 46], virtual reality [4], capacitance sensing [53, 54], robotics [31], electrical muscle stimulation [34] acoustic levitation [51] and shape-changing interfaces [52] to illustrate new ways of interacting with food. These works highlight the increasing convergence of food and technology leading to new possibilities. At the same time, researchers in the fields of gastrophysics [45] and molecular gastronomy [3] have explored new ways of how restaurants can innovate in food design. These developments are supplemented by smart kitchens [33] and appliances [29, 46] that

enable enhanced food preparation processes. At the same time, social media like Instagram and Facebook support the photographing of meals and sharing of cooking videos [11]. Practices of personalized nutrition [20] and DIY food sciences [28] are also gaining traction.

It is important to note that an HCI perspective on human-food interactions needs to consider the transdisciplinary nature of food research. For example, prior works from a range of fields have investigated human-food interactions, such as anthropology [23, 32], medical sciences [24, 44, 56], psychology [5, 17, 37, 40], and sociology [43, 55]. In consequence, we would like to create an interdisciplinary space for researchers to discuss human-food interaction, in an integral, comprehensive manner. We invite and welcome participants from such fields. We also recommend HCI researchers to consider references outside their immediate field.

Human-food interaction researchers have already collected prior work in workshops [13, 14, 16, 22, 28, 39], resulting in an online summary of existing research [7]. There are also emergent communities, for example, the FoodCHI Special Interest Group [26], the SIGCHI foodCHI network, and the ACM Future of Computing Academy working group on Computing and Food [38], and the Feeding Food Futures (FFF) network [2].

Several of the workshop organizers have been previously involved in conducting such workshops. For example, there was a workshop on "designing recipes for digital food cultures" [22] at CHI'18 that focused on recipes as part of human-food interactions. At CHI'17, there was a workshop called "digital health & self-experimentation [21] that explored, amongst other topics, how to support health through food tracking. At the same conference, there was also a Special Interest Group (SIG) called "Future of Food in the Digital Realm" [26] that briefly brought human-food interaction researchers together at CHI. Outside CHI, related conferences and associated events have also experienced workshops and similar activities around the topic of food or eating, some of them run by organizers of this workshop. This includes workshops at ICMI [35, 36, 48-50], DIS [18, 19, 47], UbiComp'13 and '14 [14], CHI Play'19 [6], EFOOD'19 [1] and at IDC'20 [10].

These past activities highlight that there is an increasing interest in the merging of interactive technology and food, which has attracted attention in a variety of venues by a range of different people from different backgrounds. However, what has not yet taken place is a workshop at CHI that focuses exclusively on the topic of human-food interaction from a holistic perspective and hence considers not just individual aspects such as instrumental perspectives (e.g. health), but also welcomes submissions by people interested in the rich experiential perspectives and how to design for it, paying homage to the diverse community that CHI has been able to attract and bring together over the years. As such, this workshop takes a holistic approach to human-food interaction and highlights that there seems to be an underexplored area within prior workshops around the design of experiential aspects of human-food interactions and hence explicitly invites submissions concerning these.

To complement these prior approaches that were often limited by venue capacity, time and/or thematic focus, we are planning a full day of activities around human-food interaction at CHI'21. Given the increasing interest in human-food interaction, and the initiatives by different subgroups in the field, we believe it is time to join efforts and provide the foundations for this field of inquiry. With this workshop, we aim to bring together a diverse group of scholars to critically discuss past, present, and the future of human-food interaction, as well as how technology design can contribute to food futures that are increasingly stimulating, sustainable, just, and socio-culturally rich.

1.1 Topics of interest

The topics of interest for the workshop include theories, technologies, and applications related to human-food interactions from an HCI perspective. We also encourage contributions that do not neatly fit in existing categories.

1.1.1 Theory, Methods and Aims. Theoretical topics of interest include, but are not limited to:

- Articulations of theoretical aspects of human-food interactions within existing HCI theories, such as embodied interactions
- Links to theories from non-HCI domains, such as health, multisensory perception, and food science
- The use of theoretical understandings to inform the design of human-food interactions, in particular experiential perspectives
- Critical reflections on the potential of, and risks derived from, integrating technology into our food lives and the food system at large
- Methods for co-designing food futures that are socially just, culturally and emotionally stimulating, and sustainable

1.1.2 Technology. We are also interested in contributions related to how technologies such as capacitance sensing, camera-based detection, etc. along with emerging techniques such as machine learning and artificial intelligence can be leveraged for sensing eating and associated activities around food. Such technology topics of interest include, but are not limited to:

- Sensing food
- Detecting eating
- Ingredient analysis
- Artificial intelligence and food

1.1.3 Applications of Food Technology. Applied topics of interest include, but are not limited to:

- Augmenting eating interactions
- Supplementing and enriching multisensory experiences
- Taste as feedback mechanism
- Food visualization
- Edibalization
- Food games and play
- Designing for restaurants, canteens and other food outlets
- Working with the hospitality industry
- Novel approaches and mechanisms for working with food
- Designing cyber food as part of human-machine integration

1.2 Goals of the Workshop

The most important goal of the workshop is to provide an enduring community and networking platform for researchers who are interested in the coming together of food and interactive technology. Other workshop goals are to identify and articulate relevant theoretical insights and guide future research, understand synergies at the intersection of emerging technologies and current knowledge; nurture the growth of a cross-disciplinary research community around the topics and develop plans for subsequent activities (e.g. a journal special issue on the topic); and promote HFI design and research practices that are critical and sustainable from a social, cultural, and planetary perspective.

2 ORGANIZERS

2.1 Jialin Deng is a PhD candidate from the Exertion Games Lab in the Human-Centred Computing department at Monash University, Melbourne, Australia. Her research on interactive eating looks at the future of computational integrated food for an understanding of the design of a synergistic interplay between food and digital technology, as well as the impact of design and technology on the eating experience reflecting human subjectivity, culture, and identity. Jialin has a multidisciplinary background having worked at the intersection of art, design, and the food innovation industry. jialindeng.wixsite.com/whispery-savoury.

2.2 Yan Wang is a PhD candidate from the Exertion Games Lab in the Human-Centred Computing department at Monash University, Melbourne, Australia. Her research focuses on exploring how technologies might enrich eating experiences through augmented multisensory interactions and how playful designs could be developed to enrich eating experiences in everyday life. She has published extensively in the HFI field, demonstrated HFI inventions at CHI previously and has extensive workshop experience from SIGCHI conferences.

2.3 Carlos Velasco is an associate professor at the Department of Marketing, BI Norwegian Business School (Norway), where he co-founded the Centre for Multisensory Marketing. Carlos received his D.Phil. in Experimental Psychology from Oxford University. His work is at the intersection between Psychology, Marketing, and Human–Computer Interaction, and focuses on understanding, and capitalizing on, our multisensory experiences and their guiding principles.Carlos has worked with a number of companies from around the world on multisensory experiences. carlosvelasco.info/.

2.4 Ferran Altarriba Bertran is a PhD candidate in the Social and Emotional Technology Lab at UC Santa Cruz, USA. His research explores how future technologies might support increasingly playful relationships between people, and how situated co-design methods could be leveraged to develop them. As part of his research, Ferran speculates increasingly playful human-food interaction futures, looking at how technology can enable novel exciting forms of playful engagement with, through and around food that bring about positive social, cultural, and emotional outcomes. Ferran co-initiated the Feeding Food Futures network and co-organized several HFI workshops at DIS, CHI Play, IDC and EFOOD. ferranaltarriba.com.

2.5 Rob Comber is Associate Professor of Communication at KTH Royal Institute of Technology, Stockholm, Sweden. His research lies at the intersections of food, democracy and sustainability. His work is increasingly concerned with the interconnected nature of our food practices and the social and societal consequences of how we design for it. He was a founding member of the Human-Food Interaction community in SIGCHI, and has organised workshops on food in HCI at CHI'12, '13, '14, '15 and '16, DIS'12 and UbiComp'13 and '14. He was guest editor of the 2014 Special Issue on Designing for Human-Food Interaction in IJHCS.

2.6 Marianna Obrist is Professor of Multisensory Interfaces at UCL, Department of Computer Science, and Deputy Director (Digital Health) for the UCL Institute of Healthcare Engineering. She is investigating touch, taste, and smell as interaction modalities for HCI. She is a co-founder of OWidgets Ltd, a University start-up developing novel software and hardware solutions for smell experience design. She is an inaugural member of the ACM Future of Computing Academy and was selected Young Scientist 2017 and 2018 to attend the World Economic Forum. She is a Visiting Professor at the Royal College of Art and has recently published a book on 'Multisensory Experiences: where the senses meet technology'. multi-sensory.info.

2.7 Katherine Isbister is a Human-Computer Interaction and games researcher who creates and studies digital games and other playful computer-supported experiences. She is currently a full professor in the Department of Computational Media at the University of California, Santa Cruz, where she directs the Center for Computational Experience. Her focus is emotion and social connection–understanding the impact of design choices on these qualities, and getting better at building and evaluating technology that supports and enhances social and emotional experience.

2.8 Charles Spence is a world-famous experimental psychologist with a specialization in neuroscience-inspired multisensory design. He has worked with many of the world's largest companies across the globe since establishing the Crossmodal Research Laboratory (CRL) at the Department of Experimental Psychology, Oxford University in 1997. Prof. Spence has published over 1,000 academic articles and edited or authored 15 books including, in 2014, the Prose prize-winning "The perfect meal", and the international bestseller "Gastrophysics: The new science of eating" (2017; Penguin Viking) – winner of the 2019 Le Grand Prix de la Culture Gastronomique from Académie Internationale de la Gastronomie. He works in the interaction between food and technology, and has organized many workshops in this space, including being a co-organizer for the last four ICMI Food-Technology symposia.

2.9 Florian 'Floyd' Mueller is Professor in the Human-Centred Computing department at Monash University, Melbourne, Australia, where he directs the Exertion Games Lab. His research sits on the intersection between the human body, technology and play, aiming to help people live a fulfilling life, which includes savoring food. He has co-authored a "Foundation and Trends" treatise on human-food interaction [27] and researches how to experience eating as play. He has co-organized nine workshops at CHI previously and was general co-chair CHI'20.

3 WEBSITE

The workshop website is at: humanfoodinteraction.org

The workshop website contains more details and the call for papers. It also promotes the workshop and presents relevant research results to date. All accepted contributions will appear on the website. Following the workshop itself, videos, photos, and results from the workshop activities will be added, with participants' consent.

4 PRE-WORKSHOP PLANS

We will publish a call for participation on the workshop website and circulate it widely to individuals and communities interested in the topic of the workshop. It will be open to both academic researchers as well as industry professionals and independent researchers. The call for participation will also be posted to mailing lists (including chi-announcements), social media and directly emailed to researchers in our networks. Participants will be expected to have done small tasks based on our brief before the workshop and to arrive with relevant questions and discussion points.

5 WORKSHOP STRUCTURE

CHI 2021 will be an entirely virtual conference because of the ongoing COVID-19 pandemic. It has given us an opportunity to run a very different kind of workshop. We have modified the structure and flow of the workshop to suit synchronous and asynchronous participation for attendees from multiple time zones, and it will be taking place virtually via Zoom or similar platforms. We will send through an email invitation with guidelines of attendance prior to the workshop. The duration of this online workshop will be approximately 4 hours in total. Activities in each session include:

1) Themed presentations: The themed presentations involve creating a shared understanding around the related theme of Human-Food Interaction in HCI and amongst the workshop group. The themes will draw from the growing research in Human-Food Interaction, which have focused on rather independent areas: Sensing Food, Design with Food, and Design around Food. The themed presentations will be given by at least one organizer (as theme facilitator) for each theme respectively, followed by group activities by participants.

2) Group interactions and exercises: The group-based interactions and exercises will be carried out in 3 small groups of around 6 people, each group will be assigned 1-2 organizers as facilitators. The group will brainstorm on at least one novel scenario or idea that focuses on novel human-food interactions, particularly considering experiential perspectives under the particular theme assigned to the group.

3) Showcasing and discussion: The deliverables will be a short write-up with drawings or illustrations to show how future technology could assist in the contexts and activities in question. Lastly, the concepts will be showcased and shared by each group, and then discussed. The organizers will provide working materials (whiteboards and working sheets) via online collaboration tools (e.g. Miro, Mura, and Google Docs). The whole process of this online workshop will be recorded and posted online with each participant's consent.

5.1 Tentative Workshop Agenda:

10min:	Opening
15min:	Introduction and ice-breaking activities

Session 1

Theme 1: Sensing Food

10min:	Presentation (one guest speaker)
20min:	Group activities (ideation)
10min:	Summary&discussion (Q&A)

Theme 2: Design with Food

10min:	Presentation (one guest speaker)
20min:	Group activities (ideation)
10min:	Summary&discussion (Q&A)

Theme 3: Design around Food

10min:	Presentation (one guest speaker)
20min:	Group activities (ideation)
10min:	Summary&discussion (Q&A)
10min:	Virtual coffee break

Session 2

60min:	Group activities (action)
10min:	Virtual coffee break
30min:	Showcasing and discussion
20min:	Summary and closing
Total:	5h 10min

6 POST-WORKSHOP PLANS

Workshop papers will be listed on the workshop website. A report on workshop activities, as well as selected photos and descriptions of outputs from the group activities (subject to authors' permissions) will also be published on the workshop website. We also aim to include social media platforms for continuing knowledge sharing based on the preferences of the community. A variety of post-workshop academic publications will be considered based on the content of the accepted submissions and the outputs of workshop sessions. These include, but are not limited to, a report to be submitted to a venue that is relevant to the CHI community (e.g. ACM Interactions), a full paper submission to a relevant SIGCHI conference based on synergies between individual efforts presented at the workshop, and a special issue of a journal informed by the research agendas articulated at the workshop.

7 CALL FOR PARTICIPATION

Human-Food Interaction, that is, the merging of interactive technology with food practices is becoming increasingly prevalent and popular, fueled by technical advances that make it possible to sense what and how people eat. Knowledge from a wealth of disciplines is required to design for these experiences, and communication between these disciplines is essential to positively inform future human-food interactions. To this end, the interdisciplinary workshop "The Future of Human-Food Interaction" aims to bring together diverse opinions and expertise to offer a platform for researchers and practitioners to learn from each other, highlighting the design of experiential perspectives of engaging with food. We welcome diverse contributions, including empirical research, engineering investigations, design concepts, theory, opinions, and reviews. For more information, please see: humanfoodinteraction.org

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