Mapping FoodHCI Futures

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Recognizing the significant potential impact that HCI has on food practices and experiences, researchers and practitioners are undertaking a growing number of explorations of novel computing technology and food combinations. These explorations have so far primarily emphasized technology-driven systems and taken a human-centric perspective. We propose a Special Interest Group (SIG) in "foodHCI futures" that creates a space for researchers to discuss the boundaries of food incorporating HCI, and with the simultaneous aims of reconciling food with technology and extending our visions for human-food interactions towards anthropocentrism. Specifically, the SIG will be a beginning of developing a structured conceptual map of the possibilities for future technology interventions in food systems. In developing this map, we hope to encourage democratized debate, provoke new and divergent thoughts on the opportunities for foodHCI, and ultimately gain unique insights that contribute to preferable food futures.

CCS CONCEPTS • Human-centered computing • Interactive design

Additional Keywords and Phrases: FoodHCI, Human-Computer Interaction, Human-Food Interaction

Figure 1: Various food-related explorations in HCI.

1 BACKGROUND

What images might we evoke in examining the futures of food and HCI?

1.1 The interventions of HCI in the food realm: Digital-tech driven vs. food as material concern

Over time, human eating and dietary practices have been shaped by the introduction of new foods [45]. More recently, the emergence of digital technology has taken food innovation to extremes, including significant changes in which foods are produced and prepared, along with the novelty of foodstuffs themselves [45]. Explorations in the Human-Computer Interaction (HCI) field have led to greater convergence between food and digital technology and novel engagements with food, including personal food printing [23, 28, 33, 54], extended reality [8, 39], ingestible sensors [27], digital taste [32, 40], acoustic levitation for food transportation [48, 49], and real-time gustatory manipulation via machine learning [38]. These developments have been supplemented by a plethora of technological innovations, such as: smart kitchens [34] and robot cooking assistants [26] that enhance food preparation. Moreover, automatic diet tracking systems [3] and personal food computers for urban agriculture [9] that support personalized nutrition and home farming practices. This "Human-Food Interaction (HFI)" work [5, 14, 17, 25, 46, 47] has become a major part of HCI research into "the interconnection between the self and food" [13, 14].

While there is clearly great potential for HCI to impact on our food practices and experiences, a technology-driven research agenda (which we find to be prevalent in the literature to date) could hinder the exploration of human-food interactions because it de-emphasizes people and the ways in which they engage with food, and favors a focus on the efficiencies and novelties that new technologies might provide [15]. This focus is evident because most existing systems typically "work" without the food, and the diner does not need to consume the food to have a digital experience. We believe that it is reasonable to argue that, while they are technically novel and well-executed, many systems fail to fully realize the potential to "celebrate the pleasurable and enjoyable experiences that people have with food" through the intervention of technology [24]. In response to these issues, and to avoid the pitfalls of "technological solutionism" [35], we aim to uncover some of the broader meanings of incorporating food and HCI. Rather than just considering the utilitarian aspects of human-food interactions, we will also follow the "material-centered" approach proposed by Wiberg [52, 53] and consider food to be a "material concern" of interaction design emphasizing its aesthetic, sensory and sociocultural qualities and the interplay with people and the ways in which they engage with food.

1.2 FoodHCI for "more than human worlds": Human-centric vs. post-humanistic design

Human food production, consumption, and related practices are deeply entangled with, and dependent upon, the existence of a thriving biosphere and other non-human species [29]. In recent years, in response to the call of de-centering humans in sustainable design, there has been a growth in non-anthropocentric HCI research that seeks to reorient our attention away from a human-centered agenda and towards a multispecies worldview [19, 21, 41]. In this respect, HCI has increasingly explored the "more than human worlds" that are a part of and connected to the food realm, including plants, living cells, microbes, bacteria, and fungi [10, 29, 30], that considers the diverse impacts that food-tech innovation may have on food cultures [18]. Some recent research examples include: an ethnographic study of alternative farming practices that de-center humans in sustainable HCI by engaging symbiotic encounters with companion species [30]; the conceptualization of "collaborative survival" [29] as a way to describe an HCI design process for fungi foraging, and the exploration of how HCI can extend human capabilities of noticing living nonhuman beings; the development of "Nukabot" [11], which seeks to develop affective attachments between people and food, via living fermentative microbes; and speculative designs, such as the "Living Food" project [20], that has even proposed a series of futuristic dishes

that appear to be living creatures, raising questions about the central position of the human when interacting with food.

Learning from these prior works, we attempt to extend the vision of existing HFI research paradigms beyond anthropocentrism, and to consider post-humanistic foodHCI interactions. In doing so, we hope to rethink the future of foodHCI design and expand its boundaries to reflect a world in which “humans and nonhumans [are] bound together materially, ethically, and existentially” [29].

Taken together, we propose the convening of the Special Interest Group (SIG) on “foodHCI futures”. This SIG seeks to reconcile food with technology by creating a structured conceptual map of the possibilities for future technology interventions in food systems. By developing this map, we hope to encourage democratized debate, which provokes new and divergent thoughts on the opportunities for foodHCI. Consequently, we expect the SIG to create a space in which researchers and practitioners can discuss the boundaries of food incorporating HCI and gain new insights that contribute to preferable food futures.

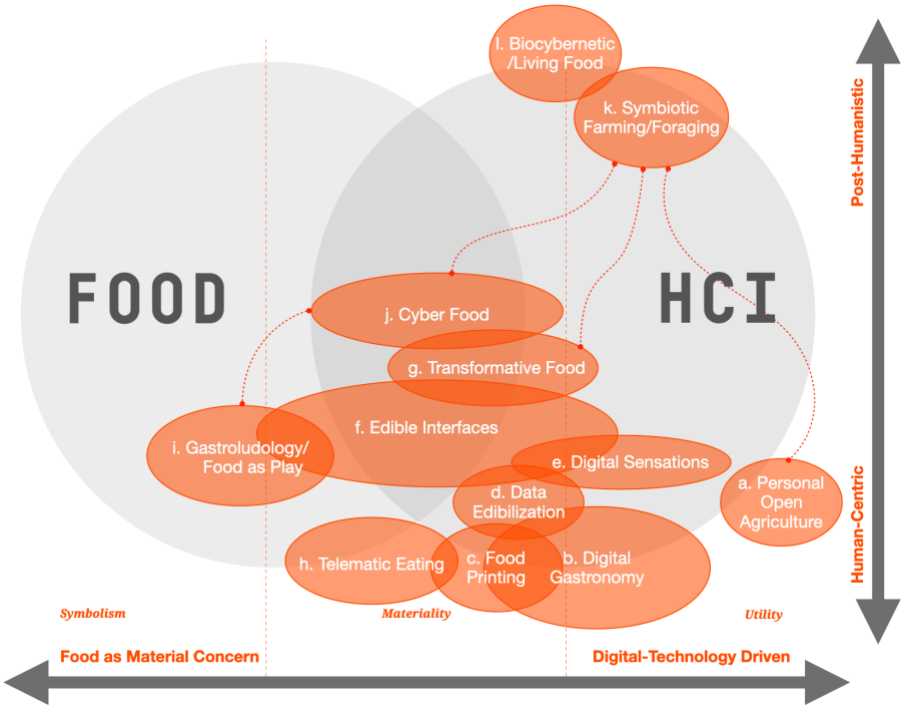

Figure 2: An example of what our map of human-computer integration might look like at the end of the SIG, with some sub-fields: a) OpenAg personal food computer [9]. b) Digital Gastronomy [7, 55]. c) Food printing [23, 28, 33, 54]. d) Data edibilization [36, 51]. e) Digital sensations [43]. f) Edible interfaces [22, 31]. g) Transformative food [44, 50]. h) Telematic eating [4, 42]. i) Gastroludology/food as play [6, 12, 37]. j) Cyber Food [16]. k) Symbiotic farming/foraging [10, 29, 30]. l) Biocybernetic/living food [2, 20].

2 GOALS OF THE SIG

This SIG provides an opportunity for researchers and practitioners interested in the intersection of food and HCI to come together to share their interests and to discuss ways to move the field forward while seeking to incorporate new theoretical contributions. We aim to:

- Facilitate discussions on a wide range of foodHCI topics (some of which are already central to the field, and others that might/should be given greater emphasis), in order to establish a common understanding between SIG attendees of food futures issues.
- Collaboratively create a map of foodHCI that demonstrates a structural understanding of the underlying relationships between these topics, that can further formulate the provocations of future HCI interventions in the realm of food.

Figure 2 shows an indicative version of the map we intend to produce through this SIG. It illustrates loosely structured emerging concepts at the intersections of food and HCI, providing an initial framework as an example for guiding SIG attendees to review and categorize past foodHCI systems, and then to discuss, envision, and collaboratively shape future possibilities and opportunities in the foodHCI futures space. This initial guiding framework runs along two dimensions: the horizontal dimension of the space conveys the original motivations for foodHCI research and design, spanning from *digital-technology driven* to *food as material concern* and comprising three categories: (i) *Utility* – the ability of being useful; (ii) *Materiality* – the sum of the system's material properties, characters, aesthetics, appearance, authenticity and meaning [53]; and (iii) *Symbolism* – the power of food and food practices that reinforce shared cultural, social, and religious identities and strengthen social connections [1]. The vertical dimension of the space conveys the arc of foodHCI futures, ranging from *human-centric* to *post-humanistic* considerations of material, ethical, environmental, planetary, and existential bonds between human and more than human worlds. Several open questions may arise for discussion, such as: What are the subfields across various disciplines of foodHCI? What are the approaches – across the design, implementation, evaluation, and deployment processes for incorporating food with HCI? Where do the barriers exist and what challenges might surface in attempting to do so? How can HCI interventions offer new possibilities for human-food-technology experiences?

Attendees might re-generate the map with completely different categories out of the existing dimensions based on the conversations and discussions during the SIG. We acknowledge that completing a comprehensive map of foodHCI futures is beyond the scope of our SIG, our more modest goal is to encourage new ways of envisioning the possibilities for food practices that might be addressed by the incorporation of HCI. We anticipate that the foodHCI futures SIG will be of interest and value to experienced researchers who wish to advance the field, and to newcomers hoping to get a taste for the field. We also intend to make the SIG accessible to a general audience who wish to become acquainted with foodHCI and to support democratized collaboration between attendees. We hope to surface perspectives beyond those of the SIG's panel of leading experts in the field and encourage inputs from the broader community.

3 FORMAT

Attendees will be given a link to an online conference platform via which they can participate in the SIG. Upon commencement, the format will be as follows:

1. Introduction (15 minutes): Organizers will briefly introduce themselves and present a short background of foodHCI and explain the SIG objectives.

2. Discussion and map drafting (25 minutes): Using a premade skeleton map (refer to Fig. 1), organizers will invite attendees into breakout groups to conceive different ideas (e.g., sketches) and to add to this map via the online platform (e.g. Miro).

3. Map re-organization and pruning (15 minutes): After the map is produced, attendees will attempt to organize and synthesize the map all together, as required, by moving topics around, collapsing related topics, removing redundancies, and so on.

4. Final discussion and reflection (20 minutes): Any further adjustments to the map can be made during the final discussion and reflection. Organizers will provide attendees with permanent access to the online platform so that they might engage in further discussion.

3.1 OUTCOMES AND NEXT STEPS

The major outcome of this SIG will be a map of foodHCI futures developed collaboratively by the attendees and representing diverse perspectives. We hope that this map will clarify the variety of foodHCI topics and that it will benefit researchers in the field and others, outside the field, who hope to gain a better understanding. We also hope that researchers will use the map as a reference tool to help them identify potential opportunities for collaboration in their areas of foodHCI interest. The final version of this map will be available online.

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