Exploring Tradeoffs in the Design Space of Human-Centered Semi-Automated Food Journaling

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Food journaling has received increased attention in both HCI research and daily life, with substantial use of and research on commercial manual food journaling apps such as MyFitnessPal, Ate, Lose It!, and others [1]. People are motivated to journal their food for various reasons, such as understanding their eating patterns, building healthier eating habits, or managing weight [4]. However, food journaling is widely regarded as burdensome, and people often abandon the practice before achieving the benefits they desire [4]. To address the burdens associated with manual tracking and unreliability of manual entry [4], researchers have frequently explored automated dietary monitoring (ADM) as an alternative, more objective approach [2]. Current ADM approaches mostly leverage on-body sensors to automatically detect when a person is eating or identify the types of food people eat [2]. However, automated journaling approaches are still not practical enough to accurately detect when a person starts eating, what they eat, and how much they eat. Research has argued that semi-automated self-tracking can strike a balance between fully-automated and fully-manual approaches, using manual techniques to supplement data that is difficult to capture automatically [3]. In addition, manually logging data can increase people's self-awareness about foods consumed [3], which is crucial for successful behavior change. For example, a person could use a phone app to verify that a wearable camera correctly detected the foods that they ate, or could receive a prompt to describe foods when the camera detects that they were recently eating.

In spite of the potential benefits, little is known about how people would feel in practice about semi-automated food journaling systems. People's acceptability of any innovative self-monitoring technology and the burdens they perceive both have the potential to influence their use of the system. Since people often food journal to achieve goals which require a long term to achieve like losing weight or understanding their diet, understanding technology acceptability and burdens is necessary to ensure technologies could sustain engagement. To explore this design space, we have begun understanding what kinds of on-body diet trackers, such as their form factors, people would be willing to wear in practice.

Following the semi-automated approach, we are also exploring what techniques for prompting people are most willing to respond to when being asked for additional details about foods consumed, and when to deliver them.

To answer our research questions, we plan to conduct a speculative survey, describing different on-body locations a person might wear a food journaling sensor and potential approaches to prompting for further details. For each location and prompting approach, participants will rate the perceived burdens and acceptability of that approach [6,10]. We are currently designing the survey, having brainstormed and sketched different types of semi-automated on-body diet trackers based on insights from a review of prior literature. Previous ADM studies [2,5] suggest dietary monitoring sensors have been designed to be located on a range of body parts: mouth, ear, forehead, jaw, neck, wrist, and chest. We therefore envision how the combination of these sensors with manual confirmations will impact acceptability.

Our sketches draw from past sensing systems for ADM. Different from previous ADM systems, our ideas integrate the use of a manual diet app to offset the drawbacks of automated sensors. For example, a sensor placed on the outside of a person's jaw (Figure 1 Left) can detect when they are chewing [2] , sending an alert to their phone to remind them to manually log their food in a mobile app. Wrist-worn sensors (Figure 1 Middle) can recognize food intake gestures [8], then similarly reminding people to log the food on the phone. Wearable necklace sensors (Figure 1 Right) can directly capture food using embedded cameras [7,9] and can use image recognition to identify the food type, then asking people to confirm the food on the phone. We are currently creating high-fidelity sketches to describe these scenarios, incorporating them into our survey to enable participants to better understand how a semi-automated system could support capture of food information.

Figure 1: Different on-body semi-automated diet tracers. (Left) A semi-automated diet tracker on the jaw. (Middle) A wristband semi-automated diet tracker. (Right) A necklace-shaped semi-automated diet tracker.

This workshop comes at an opportune time for us to better understand other visions that researchers and designers are imagining for human-food interaction. We are excited to draw from these ideas for eating detection and collection of habits into our scenarios, evaluating their feasibility and potential acceptability. Our findings also have the potential to enable creative and practical futures for human-food interaction which rely on understanding when or what a person is eating. We expect to have piloted the survey prior to the workshop, and look forward to sharing some preliminary insights into people's perspectives on the acceptability and burdens of different approaches to semi-automated food journaling.

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