Pervasive Food

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The food industry might not be the first industry to come to mind when having a conversation about pervasive computing. However, the use of technology is already pervasive across this industry, from support for agriculture—including the sensing of plant and animal health—to the supply chain and transportation of food; the preparation, serving, and disposal of food; and support for the social experience of dining and of sharing food.

With our increasing ability to place sensors, computation, and communication in any setting, the value of applying pervasive computing to food and agriculture is also increasing. The articles in this special issue consider new technologies and approaches for supporting the food and agriculture industries.

The Food Computer

The first piece is the Spotlight department, "OpenAG: A Globally Distributed Network of Food Computing," by Caleb Harper and Mario Siller. They authors present the food computer as the center of the next agricultural revolution.

A food computer is an adaptive platform for manipulating the climate conditions to optimize agricultural production and yield. Through experimentation with different climate conditions and plants, digital plant recipes can be identified, enhanced, and reproduced around the world.

Shopping and Consumption

Next, we have three articles related to food shopping and consumption.

The first article is "Supporting Sustainable Food Shopping," by Adrian Clear, Adrian Friday, Mark Rouncefield, and Alan Chamberlain. The authors consider how food impacts the level of greenhouse gases (GHG) for which individuals are responsible. Although individuals can reduce their GHG impact by 25 percent by changing to a plant-based diet, there are many challenges to making this change, each of which offers opportunities to apply pervasive
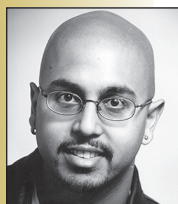
computing. The challenges discussed in this article are as follows: creating an understanding of the factors related to what people buy and eat, automatically capturing what food people buy and consume, and accurately assessing the impact of food choices on environmental sustainability. The authors offer four lessons from their recent work for designers of pervasive systems that influence food-related decisions.

The next article discusses the food shopping experience, adding to the previous article's discussion of how to capture and influence what people buy while grocery shopping. The article, "Understanding Motivations for Using Grocery Shopping Applications," by Pia Tukkinen and Janne Lindqvist, considers consumers' growing use of mobile grocery shopping applications. In particular, they study the use of Foodie. fi, a popular application in Finland that supports integrated meal planning and shopping list compilation to enhance the in-store and online grocery shopping experience. They found that this integration is useful both for engaging users and motivating healthier eating.

Finally, in "Monitoring Dietary Behavior with a Smart Dining Tray," Bo Zhou, Jingyuan Cheng, Paul Lukowicz, Attila Reiss, and Oliver Amft describe a new approach for automatically capturing the food consumption process. The authors discuss how observable acts of naturalistic eating behaviors can be used to identify individual actions while eating. In particular, the approach senses the pressure distribution underneath dining plates to distinguish cutlery-related activities (such as cutting, poking, stirring, and scooping), the number of bites taken, and even what type of food is being consumed.

A Cognitive Food App

The final piece is an interview with two individuals that are part of the Chef Watson team, Lav Varshney (co-creator) and James Briscione (user and tester). Chef Watson is an application that combines ingredients together to create a unique

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dish with a novel flavor profile. Both interviewees talk about Chef Watson in the context of creativity. For Varshney, the focus is on using computation to explore creativity within the domain of cooking. For Briscione, the focus is on how Chef Watson can help professional chefs discover new ingredients, new combinations of ingredients, and new flavors.

Food is obviously a multifaceted issue, so we expect interdisciplinary research to be required to provide solutions to each facet, from sensing techniques and algorithms to studies of consumer food shopping and consumption. We look forward to the future of food, whether it comes from our farms, cities, petri dishes, or printers. We thank the authors for their contributions and hope that you enjoy reading this special issue. In particular, we hope it inspires others to investigate the domains of agriculture and food in their pervasive computing research. ⊠

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