CookTab: Smart cutting board for creating recipe with real-time feedback

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ABSTRACT

Although many cooking recipes have been shared in the world, there are still many homemade meals that are never written down as recipes. The difficulty to create recipes of such homemade meals lies on (1) experienced cookers might not have accurate information of ingredients (e.g., weight and timing) since they often decide the amount of ingredients just by intuition, (2) they often have trouble to record such accurate information while cooking. To solve these problems, we propose a smart cutting board, CookTab, which allows a user to easily record his/her cooking activities (e.g., the names and quantities of ingredients) while provides real-time feedback to motivate him/her.

Author Keywords   Cutting board, recipe, cooking, kitchen.

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General Terms Design, Human Factors

INTRODUCTION

Although vast amounts of cooking recipes have been shared in the world, there are still many different recipes that require different amount and timing of ingredient even when they are called with the same name. Moreover, many homemade meals, which are modified to suit the family's tastes, are not written down as recipes. Meanwhile, as recipe-sharing services (e.g., COOKPAD[1], allrecipes.com[2]) have become popular recently, common people became interested in writing down their own recipes.

The written recipe mainly consists of ingredient and cooking order. We focus on the ingredients because experienced cookers might not know accurate information of ingredients such as weight and timing since they often decide the amount of ingredients just by intuition. Moreover, cookers often have trouble to record accurate amount of ingredients while cooking. The goal of our research is to create a "Smart Recipe" from daily cooking activities using smart kitchen devices while motivating/supporting cookers (Figure 1).

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[1] http://cookpad.com/

[2] http://allrecipes.com/

In this paper, we focus on a recording system while "cutting": one of the most basic activities of cooking. We propose a smart cutting board, CookTab, which allows a user to easily record his/her cooking activities, including the names and the amount of ingredients. CookTab also provides real-time feedback to motivate and support him/her.
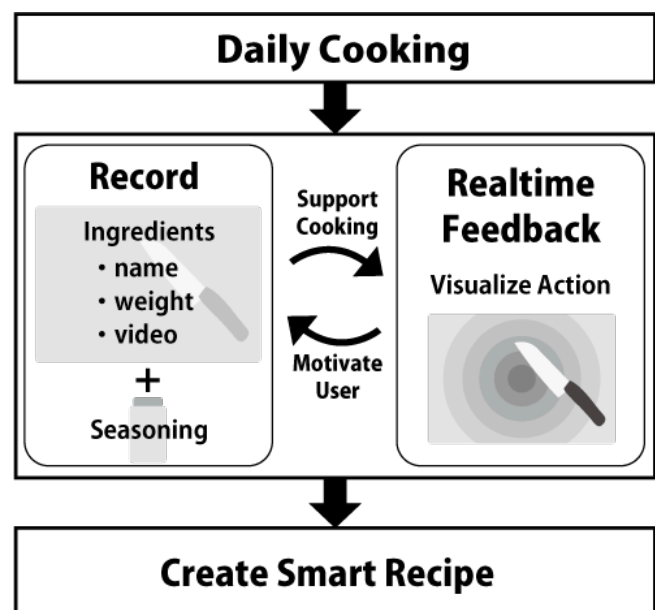

Figure 1. CookTab Framework

RELATED WORK

Many research efforts have revolved around cooking in the ubiquitous computing field. There are several systems that focus on recording cooking. For example, Siio et al. [3] proposed a smart kitchen to record cooking with video/audio by cameras and mikes attached on the kitchen. Chi et al. [1] set weight sensors under complete kitchen (a kitchen counter, a stove and a cabinet) to record the movement of ingredients to support a healthy lifestyle. Kranz et al. [2] focused on a cutting board which equips four load cells and an acceleration sensor. They also attached the microphones and cameras near the cutting board to record ingredients.

While these systems mainly focused on just recording cooking activities, our system provides real-time feedback while recording these activities to motivate/support users.

COOKTAB

CookTab is a smart cutting board that can record the amount and timing of ingredients used in cooking while providing real-time feedback (Figure 2). CookTab equips four weight sensors and a tablet PC under a clear cutting board. The tablet PC contains a capacitive touch panel display and an acceleration sensor. We selected a thin/robust cutting board to cover devices to allow users to access the touch panel easily. The device also equips a camera above the cutting board to capture videos/images while cooking.
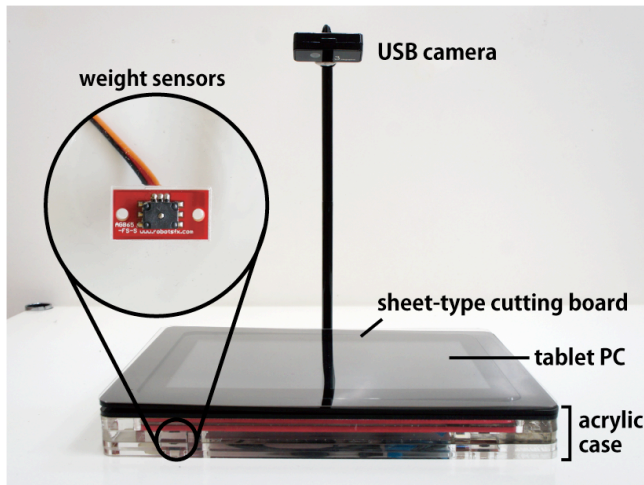
Figure 2. The CookTab prototype. The system can record weight of ingredients and video of cooking while providing visual feedback.

Usage

In this section, we describe the system usage.

(1) A user selects an ingredient used in the cooking through the touch panel as shown in Figure 3-B. The user first selects a category (e.g., vegetable or meat), and then selects the ingredient. When the current ingredient is not found in the list, the user easily creates a new item by tapping an icon and taking a picture using the camera.

(2) The user places the ingredient on CookTab and taps the "REC" button to record the weight and the video using the camera.

(3) CookTab provides visual/auditory feedback based on the activity performed on the cutting board to the user as shown in Figure 3-C. We prepared two kinds of feedback based on different activities: (i) the parameters of his/her cutting activities (e.g., strength and interval) detected by the weight sensor and the acceleration sensor and (ii) the similarity to recorded activities. The former feedback is mainly designed for expert or hobby cookers, while the later feedback is for serious amateur who want to learn the expert cutting technique.

(4) Tap the "STOP" button to finish recording.

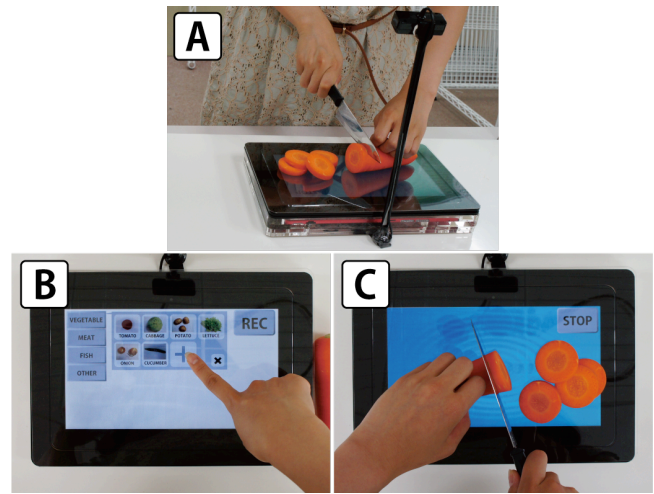(5) Repeat (1) to (4) for each ingredient.

Figure 3. Basic usage of the CookTab. (A) Cutting a carrot on the CookTab. (B) Selecting an ingredient before cutting. (C) Visual effects (e.g., ripple) are shown on the screen according to the strength and interval of cutting

CONCLUSION AND FUTURE WORK

We propose a smart cutting board, CookTab, which allows a user to easily record his/her cooking activities while provides real-time feedback.

Our next challenge is to record other activities in cooking with proper feedback. We plan to develop a recording system for seasonings. Seasonings would require much accurate measurement methods because the amount of seasoning might change the taste drastically even with little difference. In the future, we integrate these e-kitchen tools to create smart recipes including accurate weight, timing, and video of cooking while motivating users for creation.

ACKNOWLEDGMENTS

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