

# SuChef: Designing an In-Kitchen Display to Assist with Everyday Cooking

## ABSTRACT

Decisions about what to eat are often made close to mealtime, when hunger clouds people’s ability to think creatively or conscientiously about their meal choices. As a result, people we studied tended to resort to “everyday meals”: recipes that are tasty, quick, and cheap. These choices often run counter to cooks’ stated values regarding health, variety, ingredient choice, and so forth, but are chosen for their convenience and familiarity. This lack of variety seemed to stem from a scarcity of “everyday” recipes compounded by the fact that usually, at the time they are preparing the meal, cooks are tired, hungry, and don’t want to search for or try less familiar recipes. Based on a study of current cooking practices, we developed the SuChef prototype: a low-fidelity probe supporting the in-kitchen display of everyday meal ideas along with sharing of recipes among members of social groups. The probe was deployed for a week among 5 geographically dispersed but socially connected households and yielded insights into the design space for technology to support everyday cooking.

## Author Keywords

Ubiquitous computing, kitchen displays, paper-prototype, design probe, everyday cooking, ambient interfaces.

## ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

## INTRODUCTION

Practically everyday we ask ourselves the same question: what am I going to eat today? According to our observations, these decisions are frequently made very close to mealtime while in the kitchen staring into the refrigerator and cabinets. In these situations, people often prepared old staples or what we refer to as “everyday meals”: recipes that are tasty, quick, familiar, and cheap (e.g., pasta with sauce or grilled cheese), but are often “tired”, that is cooked more frequently than the cooks would like. This lack of variety seemed to stem from a scarcity of everyday recipes compounded by the fact that usually, at the time they are preparing the meal, cooks are often tired, hungry, and don’t want to search for other

recipes (“I don’t want to make Pasta and Cheese again, but I am exhausted, and I know I have all the ingredients.”). In this paper, we report on a study of everyday cooking practice and its influence on the design of SuChef—a low-fidelity probe supporting the in-kitchen display of everyday meal ideas along with sharing of recipes among members of social groups. We also report the results of the deployment of SuChef among members of a distributed social group.

## RELATED WORK

There have been several systems examining how to integrate technology with cooking; most of this work has focused on improving food preparation and cooking efficiency by displaying information about the recipe, the kitchen layout, or the kitchen itself. For example, both CounterActive [4] and eyeCook [1] provide an augmented kitchen environment to assist novice cooks as they prepare complex meals. The Déjà Vu Display [10], is a system of camera and monitors serving as a memory aid for often-interrupted cooks. While this focus on efficiency and productivity in the kitchen has been occasionally criticized (e.g., [3]), there remains a dearth of systems addressing the less structured aspects of cooking.

A lesser-explored area of study has focused on assisting recipe choice, especially with regard to leveraging social connections and preferences. Synthesthetic Recipes [6] displays avatars representing different family members who voice their preferences and/or concerns about specific recipes. Recently, commercial ventures such as kitchenbug [5] have sought to utilize social networks as a vehicle for collecting and sharing recipes found online.

Our work builds upon previous work and seeks to address two shortcomings. First, we focus on everyday cooking—the type of cooking that most people do most of the time when cooking for themselves and their family. Previous research has tended to focus on support for complex food preparation, which, while cognitively demanding, is performed infrequently by most people. Second, we have looked at the benefits of augmenting people’s *own kitchens* over a period of several days, rather than studying users’ interactions in a laboratory setting.

## STUDY OF COOKING PRACTICES

Cooking, or at least food selection, is a daily activity; however, there is significant variety in method, style, and commitment. In order to gain a better understanding of people’s cooking practices, and thus issues that an in-kitchen system might address, we conducted a two-part

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exploratory study. The goal of the study was to gain a better understanding of how people think about, select, plan for, and prepare meals with an eye towards developing technology that can support those processes.

*Observation:* Eight participants were observed in their own kitchens. These participants ranged in age from 22 to 61 and each participant was observed cooking one meal. These meals included a quick dinner for the family (2), a large dinner party, a snack for children, a dinner for one (2), and a casual dinner for two (2). Each observation session was followed by an interview of cooking and eating habits.

*Diary Study:* In addition, we conducted a diary study involving five young US adults. Participants (none of whom were in the observation study) ranged in age from 24 to 32, three of whom had live-in significant others or spouses and none of whom had children or other dependents living with them. For seven days, participants were asked to send an email at the end of each day detailing the following: what they cooked for each meal that day, when they had made that decision (including any time they had thought about it), how they had made those decisions, and where those decisions were being made. After the seven days, participants discussed the previous week's meals in a forty-five minute retrospective interview.

## Findings

Our study produced four observations that we feel suggest opportunities for technological intervention: 1.) There were two broad categories of meals, which we have termed *performative* and *everyday*; 2.) Decisions to make everyday meals were often made in the kitchen just before mealtime—this resulted in a lack of variety in each cook's palette as creativity and initiative were diminished by hunger; 3.) There were limited resources for discovering new everyday meals and incorporating them into one's repertoire; and 4.) The lack of variety in meals in the diets of our participants was frustrating to them.

1.) *Performative cooking differs from everyday cooking.* Though there was substantial variety among our study participants in terms of foods cooked and consumed, meals prepared during our study differentiated themselves in terms of amount of effort and advance planning:

*Performative* cooking usually involved expensive ingredients that were procured in advance for a specific meal. This type of cooking relied heavily on recipes, as such efforts involved more complex cooking techniques. For instance, one participant spent many days researching menus online and then several days cooking a meal for her friends. This type of cooking was the least common.

The vast majority of the meals we recorded were *everyday* meals. These were prepared from memory using ingredients on hand, and were chosen because of their short preparation time and familiarity. These meals are prepared and consumed frequently by each cook, and thus represent a core component of the cooks' everyday experience.

2.) *Decisions are made in the kitchen, close to mealtime.* Of the meals eaten at home, more than half of the decisions about what to eat were everyday meals and were made in the kitchen immediately before the cook wanted to eat. Often times these decisions took place while participants were looking through their cabinets or refrigerators for culinary inspiration by taking stock of what ingredients they had available.

At the time of making these meals, the cooks were usually hungry and, especially at dinnertime, tired. Thus, they were more likely to cook something they knew from memory than to search for new ideas and recipes. For instance, one person made spaghetti putanesca about once a week, and although "I get really tired of it, but when it's late...it's quick and I know I have the ingredients." Said another participant about a certain evening's meal: "I really didn't feel like getting my computer out and looking up recipes, so I just made pasta and tomato sauce again."

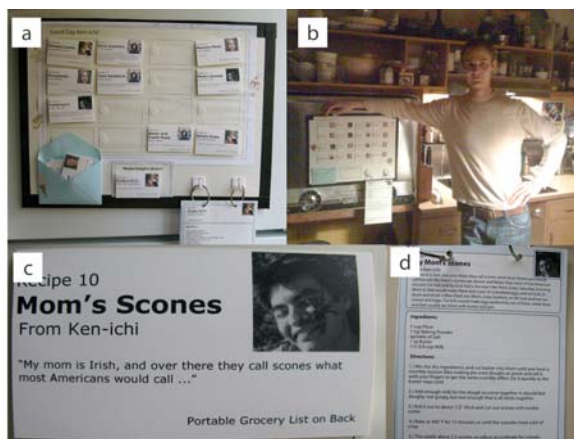
3.) *Cooks had limited resources to find new recipes.* Though tasty, most everyday recipes are so simple that they are not found in cookbooks, so learning about new everyday cooking ideas is challenging. This problem was compounded by the fact that most of the people would "never cook" these recipes for other people, so there was no mechanism by which to find other people's quick and simple recipes. When a guest comes over, hosts wanted to serve a well-planned and well-presented, i.e., *performative*, meal. Everyday meals usually looked sloppy and were not "nice enough" to serve to others.

4.) *Cooks were frustrated with the lack of variety.* Participants did not like eating from the same palette of meals every week. These repetitions made them feel certain meals were "tired" and that they worked against the cook's overall goals of health, variety, and ingredient choice.

## PROTOTYPE

Given our findings, we created the concept for SuChef—an in-kitchen display that shows a list of everyday meal suggestions to help users find cooking inspiration. The system displays a brief synopsis of each meal or dish idea, and allows the user to view more details, including a shopping list and a full recipe. In addition, SuChef supports the sharing of everyday meal ideas among members of a social group. Thus, in addition to showing one's own favorite meals, the display contains a rotating selection of meals suggested by friends and family members.

These features were embodied in the SuChef paper prototype (shown in Figure 1), consisting principally of a matrix of recipe cards (business card-sized pieces of card-stock with a Velcro backing). Each recipe card shows information about the meal, including a photo of the contributor and, when available, an excerpt of the contributing cook's notes about the recipe. The back of each card had a list of all the meal's ingredients, and the full recipes were available in a booklet hanging from the bottom of SuChef. The SuChef interface itself was built on



**Figure 1: The SuChef paper prototype displays everyday recipes in the kitchen to provide inspiration for quick and easy meals. It consists of a list of recipes (a) that can be mounted on an oven or refrigerator (b). Recipe cards display the name, contributor, and a brief quote (c). For a full set of ingredients, instructions, and personal stories, users refer to the booklet hanging from the bottom of SuChef (d).**

a piece of foamcore with magnetic mounts on the back, to allow the unit to be attached to a refrigerator or oven.

To evaluate the SuChef concept and gain further design insights, we distributed the SuChef paper prototype as a design probe, taking inspiration from Gaver, et al [2]. We conducted this study with the same 5 people who participated in the diary study in order to compare before-and-after behavior and responses. This group was a loosely-knit social group: all of the participants knew at least 1 other participant but no one knew more than 2 others.

Before the beginning of the study, each participant was asked to send us between 2 and 5 quick, easy, and cheap recipes that they had prepared in the past week. These became the 24 everyday recipes that populated the paper-prototype. In order to simulate the arrival of new recipes during the deployment, 16 of the recipe cards were placed on the board initially, while 8 others remained in a sealed envelope. The cards in the envelope were of the same format as the recipes on the board, except they included staged comments about the recipes made by the research team members such as “Great recipe!” or “I tried this with a bit of lemon - it was excellent!”

Participants received the board with a series of instructions: they needed to place the board on their refrigerator or oven and should feel free to arrange the cards however they liked. They were told to keep the envelope (with the additional commented recipes) closed until the third day. Moderators sent a reminder e-mail to open the envelope on that day. Additionally, each participant was asked to send an e-mail each evening listing the following: what they cooked for each meal that day, when they had made that decision (including any time they had thought about it), how those decisions were being made, and where the decisions were being made. After the week, the participants

discussed the previous week’s meals in a retrospective interview.

## FINDINGS

Three noteworthy observations resulted from our probe: 1.) The system shifted the eating habits of participants and supported cooking a wider variety of everyday meals; 2.) The social aspects of SuChef were favorably received and influenced how participants utilized the system; and 3.) There were several unforeseen characteristics that participants desired from the project.

1.) *The system shifted eating habits of participants and supported cooking a wider variety of everyday meals.* In a post-study interview of the experience, three of five claimed that, through SuChef, they increased the amount of cooking they performed. This was confirmed by comparing their cooking reports across the two diary studies. The same three participants that increased their cooking asked to continue using SuChef and have a new series of recipes.

Even when the recipes themselves were not used, they often helped inspire some other type of similar cooking, e.g., “I saw the lentil recipe, but decided to make my own.” For two participants, looking at the board in the morning helped them decide what they were going to cook for dinner that evening. By doing this, it allowed them to purchase any ingredients they might need on their way home. This behavior was a shift in the last-minute nature we had envisioned the board addressing, but it did serve the overarching goal of helping cook a variety of meals.

2.) *The social aspects of SuChef were favorably received and influenced how participants utilized the system.* Knowing a participant informed cooking decisions in that it provided a background for the types of recipes that a person would cook. For instance, recipe cards from a person known for her health-consciousness was looked to for healthy recipes. Participants were especially drawn to the recipes of people they knew. One participant went so far as to state that when looking at the board, it was as if the recipes from people they did not know were not even there. Just seeing faces of friends became an asset of the system. Said one participant: “I really liked seeing pictures of my friends in the kitchen.”

Seeing comments from other people encouraged cooking: “After seeing X’s comments about my recipe, it made me want to try his.” Some participants wanted the ability to share their comments with one another and give/view tips on how people had changed the recipes.

Participants liked recipes with stories: One of the most popular recipes was for scones. The recipe card had a long story relating the recipe to the contributor’s Irish mother’s upbringing and how, as a family, they all shared a meal of scones every Sunday. Though not everyone cooked this recipe, it did give more background to the recipe and more background about the contributor to those who knew him.

3.) *There were several characteristics that participants desired that were not included in this system.* Several

participants wished to see what the other participants were cooking. Though not necessarily wanting real time information, there was a desire to have this information to see what recipes were in season or to see if others were cooking their recipes.

Three participants wanted space within SuChef where they could plan upcoming meals. The board was seen as a good place to make decisions about what to cook for the next several meals, and they wished for help visualizing their decisions. Thus, despite our earlier observation that cooking decisions tend to be made at the last minute, participants aspired to plan ahead more effectively and believed that a system like SuChef could help them do so.

Two participants complained that they wanted to have access to the recipes at the grocery store or at the farmer's market. This was particularly strong in one of the two: he never used the board as his decisions about meals were always made at the farmer's market on his way home.

## DISCUSSION

### Drawbacks for our study

Though our prototype demonstrated a promising avenue to address issues regarding everyday cooking, our findings are limited in certain ways. Our participants' ages (26 to 32) and family status (no children) was limited and it must be assumed that cooking needs and practices change over time.

Additionally, even though there was an increase in the amount of cooking, we cannot discount the effects of the monitoring of a subject's cooking. Similarly, the novelty of the system might wear off and the amount and variety of home cooking might return to its original level. It could certainly also be that a new set of everyday meals gets incorporated into a cook's practices and then the value of SuChef trails off. Indeed, a significant challenge for a system like SuChef is to decide when to inject new cooking ideas into its users' ossifying habits so as to keep users' culinary lives "fresh." A longer deployment would be necessary to investigate such issues.

### Implications for Future Research

Our work in this project calls attention to an opportunity for domestic computing systems: support for everyday cooking. Everyday cooking is a more common practice than the performative methods that previous kitchen computing systems were designed to support. Participants appreciated that SuChef addressed this kind of cooking and found value in such a system.

The social aspects of SuChef played an important role in the system's acceptance. Factors such as seeing the stories surrounding the recipes or faces of the people who submitted them were very important to participants. This echoes previous studies showing that people tend to trust and value information more when communicated by people they know personally than when recommended professionally or anonymously (e.g., [8]).

An in-kitchen paper-prototype proved to be a productive way for us to deepen our insights in the everyday cooking design space. Though paper-prototypes have been long heralded as a centerpiece of user-centered design [9], and in fact have been employed in past kitchen studies [7], this study combines a paper prototype with an in situ design probe. A shortcoming of many previous studies of computing in the kitchen is that the subjects were not cooking in their own kitchens across a number of days. The week-long deployment of the SuChef probe allowed us to begin to understand some of the longer term effects of having this system in one's house.

## CONCLUSION

A study of cooking practice showed that "everyday meals"—meals that are tasty, quick, and cheap—were common but often prepared from a limited selection of memorized simple recipes. This lack of variety stemmed from the fact that the cooks were often tired and hungry when they decided what to cook, and the fact that there were limited resources for finding new everyday meals. Given this, we created the concept for SuChef, an interactive in-kitchen system that supports last-minute meal decisions by persistently displaying lists of everyday recipes contributed by one's friends and family. We deployed a paper-prototype of SuChef in participant's kitchens for one week, showing a favorable impact in the amount and variety of cooking and a positive response to the notion of sharing everyday recipes among members of a social group. We believe this study opens up a promising area of research for HCI and ubiquitous computing: support for everyday cooking.

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