The Fridginator5000

I543 Project 9: Usability Test Report

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Executive Summary

The Fridginator5000 is a system that helps reduce the amount of food that is wasted due to neglect. It tracks the food that a person has in his or her refrigerator and warns the individual when the food is about to go bad, or when the food has gone bad. The user can also use the system to decide on what meals to cook, and The Fridginator5000 will pick a meal that utilizes the most food that is about to spoil.

The Fridginator5000 works by constantly scanning the contents of the refrigerator. When the user puts an item in the refrigerator, The Fridginator5000 scans the item for a UPC code and for an expiration date. If it has a clear sight of the Universal Product Code (UPC) and the expiration date, it will know what item was just placed in the refrigerator and when it expires and will be able to store that information. If it does not get a clear picture of the UPC or expiration date, the user will have to input the information of the item placed in the refrigerator. After that, the refrigerator will keep track of the product by sight (using image processing technology). Produce and other such items that do not have UPCs will have to be input by the user. When an item does eventually expire, The Fridginator5000 warns the user of the expired product, and displays a picture of the item in context, making that particular item easier to find for quick disposal.

For our test, we conducted three usability tests in the users' home. All three of our users found the interaction screen intuitive, and were able to complete each task. They comprehended the "expires soon" notification and suggested that those items should be used before they went bad. Overall the users felt that The Fridginator5000 would accomplish our goal of reducing the waste of food.

Participants enjoyed the concept of The Fridginator5000, but had a few problems with the actual prototype. For one, users thought that our task scenarios meant that all food put into the refrigerator needed to be verified, which they found tedious. Users also did not immediately understand that the recipe screen was filtered by what food was going to expire soon. What troubled the users most, was that the prototype structure did not match a real world version of a refrigerator: it did not include a freezer, crisper, door handles, or a door shelf to place items in.

If we were to test The Fridginator5000 again, we would make a few changes to the prototype. The main thing we wanted to test was the touch-screen interface of the product, so it would actually be more helpful to tape the interface onto the users' refrigerator. That way, the lack of depth in our prototype would not distract the user from the actual test. We would also like to make a few changes to our concept, based on our test data and on suggestions. The Fridginator5000 should be able to scan receipts, in order to reduce the amount of work required of users. We also need a way of conveying to the user that the recipe screen sorts the recipes by meals that will use items that will expire soon.

Introduction

Description of the test

The Fridginator5000, a smart refrigerator that keeps track of the items in a refrigerator, focuses on reducing wasted food due to neglect. When food is about to go bad, or has gone bad, the system warns the user. To help prevent wasted food, The Fridginator5000 suggests recipes that use food items that will expire soon. The target population for The Fridginator5000 included individuals living in a shared household ages 20-30.

To test our concept, we took our prototype to the users' home and asked them to perform three simple tasks. Each task was based on a "typical" interaction with The Fridginator5000.

The tasks include:

1) Putting away groceries
2) Use The Fridginator5000's built in recipe suggestions to help decide what to cook
3) Find out which foods will expire soon

Test Objectives

The main purpose of building the prototype and conducting the usability test was to observe and collect information from the target audience that would interact with the Fridginator5000. We wanted to see if the users understood the concept and felt that the system would assist them in creating recipes and reducing food waste. To find out if the user could efficiently navigate the interface, we explained three scenarios, and asked them to complete each scenario's accompanying task.

The refrigerator is designed to inform the user of its contents and the expiration status of each item. During the usability test we closely monitored whether or not the user understood this functionality of the refrigerator.

When creating the prototype, scenarios, and tasks, we considered the following objectives:

- *Intentionality* - Do the users use the interface according to its intended use?
- *Intuitiveness* - Is the interface intuitive enough to let the users know when to use certain functions?
- *Ease of use* - Can the users easily navigate through the screen interface?
- *Usefulness* - How useful do the users find the concept?

It was important for us to understand the user's impression of the product idea. Hence it was important to not only test the prototype but also the design idea as a concept. We used post test questionnaires and informal interviews to find out our participant's general impressions of The Fridginator5000.

Summary of user profile

Based on our design concept we selected the target audience to be in the age range of 20-30 years of age. These individuals must live in a shared household of at least two people and use a common refrigerator. We chose this demographic because this is a common age where individuals live with roommates in households or apartments. The users must also actively purchase groceries and cook food. If they never buy groceries, they would not use the Fridginator5000.

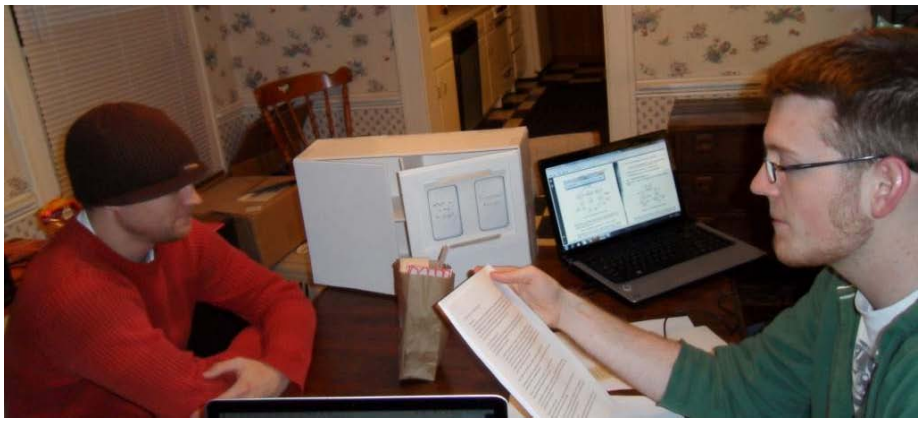
Summary of Test Preparation

Test setup

We tested three males with the Fridginator5000, with the age range of 23-28 years. Two of the three testers were related (brothers.) All testing was conducted in situ within the shared household of our users using the Fridginator5000 prototype. The users all live in the same home, but we made sure to test them separately as to not affect each others' results.

Each user was given a bag of "groceries" that contained the following prototyped items: milk, ground beef, tomatoes, cheese, lettuce, ketchup, and hot dogs. Throughout the usability test, the users were asked to interact with these items and the Fridginator5000.

Team member role assignments



In order to capture each participant's dialogue and interaction with the Fridginator5000, audio was recorded using a laptop, and pictures were taken with digital cameras by Kamlesh and Brian. Marie and Brian acted as observers and took notes using the data collection sheets [See Appendix 5]. The notes from Brian and Marie were then combined. Austin acted as the moderator and facilitated the testing.

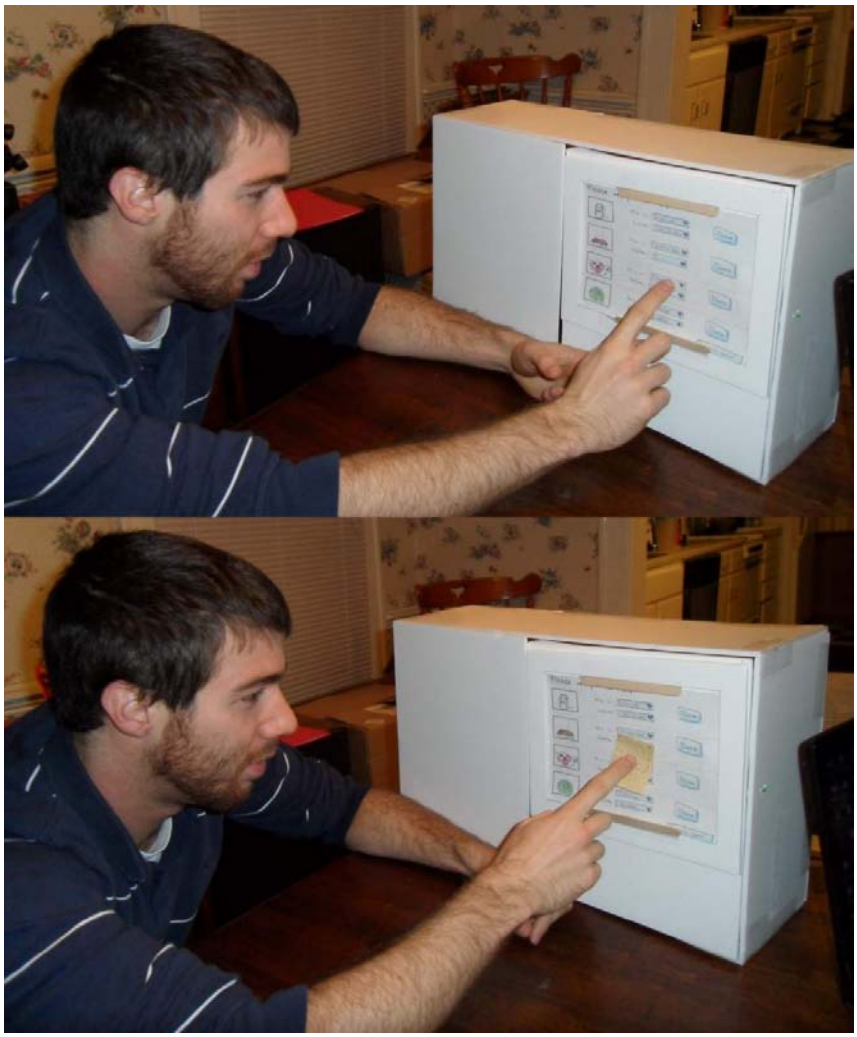
Testing schedule

- Introduction; Consent Form; Overview of Test Procedures (15 min)
- Pretest Questionnaire (5 min)
- Tasks (20-30 min)
- SUS (5 min)
- Post-test Questions; Debriefing (10-15 min)

Session Length

Each testing session lasted around 20 minutes total. Testing time does not include time between sessions to take notes, discuss observations, or prepare for upcoming user tests. The tests were significantly shorter than we had estimated through our test schedule, but this did not effect the results of the tests.

Description and rationales of the tasks and scenarios



Task 1: Putting away groceries

We wanted to study how our users put away their groceries, and if the Fridginator5000 interfered with this process. For items without UPC codes, we wanted to see if the users were able to successfully confirm or modify item names and expiration dates.

Task 2: Decide what to cook for dinner

Helping the user decide what they should cook for dinner was an integral part of our design. To minimize the waste of food products, helping the user decide which items to use first was very important.

Task 3: Find items to discard

An integral feature of our design was to notify the user when certain items had expired. We needed to test if the users were successful and error free in finding the items that needed to be discarded.

Evaluation Methods and Results

Usability Goals

Navigation

We wanted the users to be able to navigate the screens successfully: we wanted them to be able to switch between looking at the actual items that they have in the refrigerator and the suggested recipes page.

Origin of information

We wanted it to be obvious that the suggested recipes were filtered based on the food that was about to go bad the soonest.

Reduction of food waste

We wanted the user to understand this functionality so that he could save his food items and avoid food wastage.

Information input

We wanted the users to be able to input minimum possible data for the refrigerator to be able to know what type of food each item was, as well as when that food would expire.

Appropriate interactions

We wanted the users to know exactly when they needed to interact with the device, and when they could ignore it.

Summary of evaluation strategies

System Usability Scale

We used the System Usability Scale (SUS) to tease out the participants' opinions of the effectiveness and efficiency of and their satisfaction with the concept. The SUS was also used to receive the user feedback on the usability of the prototype.

Post Test Questionnaire

We used the post-test questionnaire to learn more about the user's first impressions of the prototype, the user's personal opinions about the system, the user's overall experience of using the prototype, how the user compares The Fridginator5000 with their own refrigerator, and what improvements the user could suggest.

Summary of data analysis

While testing, we collected both qualitative and quantitative data. We used Excel to create our data collection sheets [See Appendix 5] for collecting and analyzing data from each of our tests. We used this table to easily analyze whether our users successfully completed each task. It was also used to analyze their non-verbal and verbal actions while completing user testing. In addition to this, we also used another spreadsheet to collect opinions and thoughts while walking each user through the post test questionnaire. Analyzing this information was important to further evaluate the design of The Fridginator5000 and its functionality. As a group we went through our data collection sheets and pulled out reoccurring themes found during testing. The common themes revolved on problems with the design, and future improvements to The Fridginator5000.

SUS					
Question	Participant 1	Participant 2	Participant 3	Average	Range
1	5	5	3	4.33	2
2	1	1	1	1.00	0
3	5	5	4	4.67	1
4	1	1	1	1.00	0
5	4	4	5	4.33	1
6	1	1	2	1.33	1
7	5	5	4	4.67	1
8	1	1	2	1.33	1
9	5	5	4	4.67	1
10	1	1	2	1.33	1

Table 1: Results of SUS

We used a SUS questionnaire to gather each participant's thoughts on The Fridginator5000's usability. Using Excel again to create another table [See Table 1], we recorded our users' answers for the questionnaire. We were then able to find the average and range of our users' answers. Rating the system's ease of use on a scale of 1-5, the average user answer was 4.67.

The following tables will show data collected throughout this project.

Pretest Questionnaire

Pre-Test Questionaire			
	Participant 1	Participant 2	Participant 3
Question	**Response**	**Response**	**Response**
1	28	25	23
2	Male	Male	Male
3	Caucasian	Caucasian	Caucasian
4	Associate's degree / Undergraduate degree	Undergraduate degree	Undergraduate degree
5	Employed part-time	Employed part-time	Employed part-time
6	Once a week	Several times a week	Once a week
7	Daily	Daily	Daily
8	Once a month	Once a month	Once a week
9	4 or more	4 or more	4 or more
10	Neutral	Very comfortable	Comfortable

Table 2: Pre-Test Questionnaire Results

User Task Data

Task 1: Putting away groceries

Task 2: Decide what to cook for dinner

Task 3: Find items to discard

Participant 1			
Task	**Verbal Behaviors**	**Non-Verbal Behaviors**	**Task Completion**
1	"What is this?" Stated he would put in the date then press done. "I'm putting my milk in here"… States he would do a similar process for the rest of his groceries "I would pick the date and then pick what food it was then hit done…" "Why are these all up here?" "So I would just verify that itw as produce?" "I kind of want to buy one of these things"	Took groceries out and asked what each item was Placed items into both sides of the refridgerator Presses the "milk" button", then presses the expiration date then presses done	Success

2	Suggestted recipes "Says he'd go for tacos, no spaghetti" "Pretty sweet man" "I kinda want to buy one of these"	Points at suggested recipes Hits the spaghetti button Nodding head Immediately goes to suggested recipes	Success
3	Says he would make a meal with lettuce and ground beef since they are going bad soon "Can I hit that and then it would pop up some meals that use that?"	Hits the what is in my fridge button	Success

Table 3: Participant 1 Task Data

Participant 2			
Task	**Verbal Behaviors**	**Non-Verbal Behaviors**	**Task Completion**
1	"Are these my groceries?" "What is this?" "How many pounds of ground beef is this?" "Which side is the refridgerator and the freezer? I usually freeze my hotdogs" "Ketchup I'd put in the door…" I'm going to re-use this bag" "Tomatoes you put in the crisper… lettuce, these would go in the crisper as well. theres usually a cheese compartment" "Please verify these items…." "I would probably go through each one.."	Grabs bag, and takes out item one by one…" Places ketchup on the door Folds up bag when done w/ putting groceries in Stares at the screen, and reads off it. Points to the milk, then presses it, then selects milk Then reads the expiration date on the milk carton then	Success Success

	"I would probably push the dropdown menu and select milk…" "I would read the expiration date and then press done" "I'm assuming that's beef…" "Oh tomatoes… I usually buy organic so they only last a week.." "I'd press lettuce…"	clicks the expireation button. Presses the expire button, then hits the expiration date and presses done Verifies that it is lettuce	
2	hmm "This kind of reminds me of Dimitri Martain's important things…" "Man, enchiladas look good!"	Presses recipe button Reads the title "Suggest recipes", then presses it Presses enchilada button Scratches chin	Success
3	"I would use these two…"	Points to ground beef and lettuce at the same time	Success

Table 4: Participant 2 Task Data

Participant 3			
Task	**Verbal Behaviors**	**Non-Verbal Behaviors**	**Task Completion**
1	Is this like a bunch of hotdogs. Ground beef… Cabbage, I'll just put these here, here. Awe there's no side drawer I just usually put stuff in the side door Um. I would be like that's not egg nog, that's milk For the ground beef, I would select the date that it says on the ground beef, and then click done It depends on what I was doing, I would probably do this later	Shuts door Clicks the dropdown and makes correct changes and then hits done Clicks dropdowns correctly, makes changes correctly and hits done on each item	Success

2	I go to my fridge and say hey, I want a recipe… I guess. I would go with…. Spaghetti. That's pretty handy, I guess	Clicks on the recipe Clicks on the picture of spaghetti	Success
3	Now I have time to clean my fridge probably. So… I would be like…. "Click" on the lettuce I don't want to cook anything with lettuce, So I would just be like, "throw out" If the ground beef expires soon, I am going to move it to the freezer 9000 or whatever I would be like hey, move to freezer!	clicks on lettuce Takes lettuce out and trashes it after finished, clicks done	Success

Table 5: Participant 3 Task Data

Debriefing Questionnaire

Debriefing Questions			
	Participant 1	Participant 2	Participant 3
Question	**Response**	**Response**	**Response**
Expand on observations during test	Observed more as more information was told that the fridge had a touch screen.		
	I probably would have learned it without you telling me, I would have just played with it and figured it out.		
Encourage user self-reflection on product and test	1st impression: What was weird was that there wasn't any slots on	1st impression: It didn't have a compressor… My first impression	

	the doors to put the ketch up.	was that it was a very good idea and high tech, and I like it.	
What were your general feelings/observations towards the Friginator 5000 when you first saw it?	I was confused that there was no freezer. I didn't understand the screen at first, but thought it was really cool. Its cool that you guys came up w/ the idea to show whats in your fridge and whats about to expire.	I think it could be elaborated a little bit more, some more things could be added that would make it really cool like certain ways to make it scan the date/expiration date of things. I would prefer to scan it and take away the guess work. I guess you could manually insert things you couldn't scan, but i think it'd be a good idea to scan each one. It'd be a lot easier to build that w/ a scanner, you would have to have so many cameras! Other than that maybe it could detect when vegetables are actually going bad. Thats a really good idea though. It should cook for you too!	It looks neat, but I wish the fridge had handles. Its definitely intuitive. It's a good idea, food that spoils pisses me off. It might coerce me to use it more if my fridge was yelling it.
How would you compare the Fridginator 5000 to your refridgerator at home?	It has technology!	Hands down, not even close. I would trade my old on in in a heart beat.	I feel that some days I would want this, and some days I wouldn't. Some days I would be like shutup fridge. Other days, I would be like

			thanks fridge for telling me my shrooms are going bad! As long as it didn't make any noises. It would be easy enough to ignore the screen. Its nice and sleek, and not too in my face.
If you had to improve this design, what would you do?	The only thing I would do is have a doorshelf right there… You should also have a crazy ass ice maker to make deserts	Maybe like, something where you set all the food on top, push a button and then it would automatically put it away for you. Make it like a vending machine where you press a button and it hands it out to you.	To me the whole programming of it, If I had time I would probably do it… it would be nice to just scan the receipt from the store.

Table 6: Debriefing Questionnaire Results

Test Results

Goals	Observations
Navigation *The prototype should be easy to navigate, quick to use.*	All three participants were able to navigate through the Fridginator5000 interface with ease. Each task during testing was completed successfully within seconds.
Origin of Information *We wanted it to be obvious that the suggested recipes were filtered based on the food that was about to go bad the soonest.*	In the terms of origin of information, none of the users were able to discover that the recipes on the recipe screen were using food that would expire soon. After an explanation when the test was complete, the users enjoyed this functionality but thought that it should be more clear. Users thought that recipes were created from all available groceries in their refrigerator.
Reduction of Food Waste *We wanted the user to understand this functionality so that he could save his food items and avoid food wastage.*	The users understood that the Friginator5000 could help them reduce the waste of food; they voiced that they would probably make food with items that are going bad soon. During one test, a user chose not to use the lettuce but rather discard it. He stated that he would like to use some of the items that would go bad soon such as meat, but had no care to use the lettuce.
Information Input *We wanted the users to be able*	The drop downs were intuitive enough for the users to easily understand them. They understood that you could set your own expiration date. However, some of them voiced that it would be

to input minimum possible data for the refrigerator to be able to know what type of food each item was, as well as when that food would expire.	tedious to have to go through every item and make changes. The users were also able to validate each food item in the task cases with ease. The only issue was that one user confused our prototyped lettuce as cabbage.
Appropriate Interactions *We wanted the users to know exactly when they needed to interact with the device, and when they could ignore it.*	For two of the three users, it was not obvious that the users could "skip" the validation screen and do this task later. Only one user noticed this and stated that he liked that he could opt out of entering information at that moment in time. The other two users thought that one would have to validate every item placed in their refrigerator each time they had groceries.

Table 7: Test Results

Classification of the severity of the problems (as well as rationales for the classification)

Low Severity

Two of the users wanted to place grocery items in the drawer of The Fridginator5000 prototype. Although this is very minor, we could have used an actual refrigerator or a more complete prototype to avoid this distraction.

Medium Severity

We identified no usability issues rated medium severity.

High Severity

We identified no usability issues rated high severity.

Critical Severity

We identified no usability issues rated critical severity.

Usability Problems and Recommendations

Through usability testing, we found a few low severity problems. One issue was with our task scenarios; users thought that our task scenarios meant that all food put into the refrigerator needed to be verified, which they found tedious. For future testing, we need to refine our wording and better explain our task scenarios.

Users also did not immediately understand that the recipe screen was filtered by what food was going to expire soon. The users thought that the recipe screen showed random recipes that they could possibly use. In future testing, we will need to re-design the recipe screen to be more intuitive of what recipes are being shown and why they are there.

The biggest issue all participants had was that the prototype structure did not match a real world version of a refrigerator: it did not include a freezer, crisper, door handles, or a door shelf to place items in. Users found it difficult to place grocery items into the prototyped refrigerator because our prototype was missing these items. The users were used to putting items such as hot dogs in the freezer as opposed to the refrigerator, which bothered our participants. In future testing, we recommend to

prototype only the interactive screen so it can be placed on each tester's respective refrigerator. This way, the prototype will not get in the way of the task scenarios.

Through testing, one of the users suggested that instead of forcing The Fridginator5000 to identify the groceries, scan a receipt instead that would already have all of the information present. This would simplify the user interaction with The Fridginator5000 and require less work from the users.

Testing script

See Appendix 1

Participant Consent Form

See Appendix 2

Pretest Questionnaire

See Appendix 3

List of tasks and scenarios

See Appendix 4

Data collection sheets

See Appendix 5

System Usability Scale

See Appendix 6

Debriefing questions / Post-test Questionnaire

See Appendix 7

Appendices

Appendix 1: Testing Script

Introduction

Hi, thank you for coming. I'm Austin, and this is Brian, Marie, and Kamlesh. We're from IU's school of Informatics and Computing, and we're testing a new concept for helping people maximize the use of the contents of their refrigerator. We're testing the usability and functionality of The Fridginator5000. That being said, we're not testing your abilities, so don't be embarrassed or concerned about getting something wrong; if you do it's our fault and not yours. We'll be taking notes and an audio / video recording of the process for analysis purposes only. If you feel uncomfortable and want to pause or stop this usability evaluation at any time, just say so and we'll stop.

Consent Forms

Before we can conduct the test, we'll need you to sign this consent form. Feel free to read the entire document. What it says is that the results of the study will be used for academic purposes only and not published. You are one of three people being studied. We're testing the system only, not your ability to use the Fridginator5000. After you sign the document, we'll be able to continue. [Hand user Appendix 2]

Preliminary Interview / Pre-test Questionnaire

Now that that's out of the way, we have a few questions for you before we actually start the test. Please fill out this questionnaire to the best of your ability. [Hand user Appendix 3]

Tasks

To evaluate this product, we'll be asking you to perform a few tasks while acting out a scenario. [Begin reading the tasks from Appendix 4].

System Usability Scale

Okay, we're done with the tasks now. We'd like for you to complete this System Usability Scale. Read the statement on the left, and place a check-mark in the box that you think appropriately describes the system you just tested. [hand user the SUS from Appendix 6]

Post-test Interview

Now that we've finished testing and have gone through the SUS evaluation, we'd like to ask you a few questions about the product. These questions will be used to understand your final opinions and impressions of the Fridgenator 5000. [Refer to Appendix 7]

Wrap-up

Thanks so much for participating in our study! If there is anything else you'd like to say, please do so. If you think of anything later today that you wish you would have said, you can email me at austintoombs@gmail.com.

Appendix 2: Informed Consent

INDIANA UNIVERSITY BLOOMINGTON

INFORMED CONSENT STATEMENT

Usability Test for Fridginator5000

You are invited to participate in a usability study for the prototype of a new product, Fridginator5000. To be eligible to participate in this study, you must be the own, use, and supply the contents of a refrigerator. Please read and sign this consent statement before agreeing to be in this study. You may direct any questions you have about the study to any of the conductees.

The study is conducted by Austin Toombs, Marie Bautista, Kamlesh Jain, and Brian Oppenlander from the School of Informatics and Computing at Indiana University.

STUDY PURPOSE

The purpose of this study is to understand how users of our target population interact with and use The Fridginator5000. The Fridginator5000 is designed to reduce the amount of wasted food due to prolonged periods of unuse, resulting in decay in quality of food (food that has 'gone bad').

NUMBER OF PEOPLE TAKING PART IN THE STUDY

If you agree to participate, you will be one of three subjects who will be in this study.

PROCEDURES FOR THE STUDY

The study will be conducted as followed:

- Pretest questionnaire
- The actual testing of the prototype
- System Usability Scale
- Post-test questions

The pretest questionnaire consists of ten questions and is used to collect basic, demographic information. The actual testing of the prototype will consist of three tasks that will be asked to perform. These tasks will be explained to you in the form of a scenario. During these tasks you will be asked to say out loud what it is you are thinking about how to complete the tasks. Keep in mind that we are testing the prototype, and not you. If you come across anything that is confusing, it is our fault and not yours, so feel free to tell us what is confusing you. We will be taking notes while you complete the tasks, as well as recording audio and video. After the tasks, you will be asked to complete a System Usability Scale. It's a simple scale that asks you for your opinions on how the tests went. After the SUS we will ask you a few post-test questions and walk you through a debriefing.

RISKS OF TAKING PART IN THE STUDY

There are no foreseen risks associated with this user test. However, if you feel at all uncomfortable during the test you may ask to stop or take a short break from testing.

BENEFITS OF TAKING PART IN THE STUDY

While there may be no individual and immediate benefits from participating in this test, your participation informs the design of a possible future product. The insights gained from your test could be invaluable in the improvement of said design.

CONFIDENTIALITY

Efforts will be made to keep your personal information confidential. We cannot guarantee absolute confidentiality. Your identity will be held in confidence in reports in which the study may be published and databases in which results may be stored. Only the research team will have access to the records and answers to questionnaires and these will not have your name associated with them.

Organizations that may inspect and/or copy your research records for quality assurance and data analysis include groups such as the study investigator and his/her research associates, the IU, Bloomington Institutional Review Board or its designees, the study sponsor, the National Institutes of Health, and (as allowed by law) state or federal agencies, specifically the Office for Human Research Protections (OHRP), the Food and Drug Administration (FDA), and the National Institutes of Health (NIH) who may need to access your medical and/or research records.

COSTS

Participating in this study will not result in any cost to you.

PAYMENT

You will not receive any payment for participating in this study.

COMPENSATION FOR INJURY

In the event of physical injury resulting from your participation in this research, necessary medical treatment will be provided to you and billed as part of your medical expenses. Costs not covered by your health care insurer will be your responsibility. Also, it is your responsibility to determine the extent of your health care coverage. There is no program in place for other monetary compensation for such injuries. However, you are not giving up any legal rights or benefits to which you are otherwise entitled.

CONTACTS FOR QUESTIONS OR PROBLEMS

For questions about the study or a research-related injury, you may contact Austin Toombs at 765-620-9825

For questions about your rights as a research participant or to discuss problems, complaints or concerns about a research study, or to obtain information, or offer input, contact the IUB Human Subjects office,

530 E Kirkwood Ave, Carmichael Center, L03, Bloomington IN 47408, 812-855-3067 or by email at iub_hsc@indiana.edu

VOLUNTARY NATURE OF STUDY

Taking part in this study is voluntary. You may choose not to take part or may leave the study at any time. Leaving the study will not result in any penalty or loss of benefits to which you are entitled.

SUBJECT'S CONSENT

In consideration of all of the above, I give my consent to participate in this research study.

I will be given a copy of this informed consent document to keep for my records. I agree to take part in this study.

Subject's Printed Name: _____

Subject's Signature:_____

Date:_____ (must be dated by the subject)

Printed Name of Person Obtaining Consent: _____

Signature of Person Obtaining Consent: _____ _
Date:_____

Appendix 3: Pre-test Questionnaire

Participant Name: _____

Age: _____

Gender: _____

Ethnicity:

☐ Caucasian ☐ African American

☐ Latino ☐ Asian

Education Level:

☐ Associate's degree ☐ Undergraduate degree

☐ Master's degree ☐ Professional degree (JD. MD, etc…)

☐ Advanced degree (PhD, etc.) ☐ Other: _____

What is your current employment status?

☐ Employed full-time ☐ Employed part-time

☐ Not employed ☐ Self-employed

How often do you purchase food?

☐ Daily ☐ Several times a week

☐ Once a week ☐ Once a month

☐ Never

How often do you cook?

☐ Daily

☐ Several times a week

☐ Once a week

☐ Once a month

☐ Never

How often does food go bad in your refrigerator?

☐ Daily

☐ Several times a week

☐ Once a week

☐ Once a month

☐ Never

How many people do you live with?

☐ 1

☐ 2

☐ 3

☐ 4 or more

How do you feel about using technology in general?

☐ Very uncomfortable

☐ Uncomfortable

☐ Neutral

☐ Comfortable

☐ Very Comfortable

Appendix 4: Tasks and Scenarios

Introduction

You have recently purchased the Fridginator5000 from a local appliance store. While installing it this morning, the engineers told you all about how it can give you suggestions for meals, tell you when your food is about to go bad, and can keep track of what you have in your refrigerator. They also explained to you that the touch screen part of the refrigerator is replaceable, has its own warranty, and is very easy to clean, so you don't have to worry about getting it dirty while you cook.

Task 1: Putting away groceries

You have just come back home from buying groceries at your grocery store. You were almost out of food, so you bought a lot of "the essentials" while you were out. Demonstrate how you would put your groceries away with your new system.

> *As they put away groceries, the refrigerator scans and takes pictures of each item as it is put away. If it can't see the UPC code clearly, or doesn't recognize the UPC code, it will ask the user for clarification. If it can't read the expiration date, it will ask the user to input the expiration date. If the item is produce, it will ask the user to choose what kind of produce it is, and then the refrigerator will suggest an expected expiration date (based on its knowledge of produce). If the user isn't happy with that, they can change it.*

The list of items used: milk, ground beef, tomatoes, cheese, lettuce, ketchup and hot dogs.

The following sub-tasks will not necessarily happen in the same order for each user. It depends on what order the user decides to put away the groceries.

Sub-task 1.1: Putting away a "pre-packaged" item (i.e. anything with a UPC code)

Trigger: putting away the milk, ground beef, cheese, hot dogs.

User places the item in the refrigerator. The refrigerator does all of the scanning and image processing on its own. The screen displays a picture of the item just put away, along with the name of the item. This sub-task requires no user response.

Sub-task 1.2: Clarifying an item

Trigger: user puts away an item in such a way that the system does not get a good look at the item. In this scenario, the milk will cause this sub-task to trigger.

Touch screen will ask the user for clarification of the item. This happens simply by being displayed on the screen with a question. The user might not necessarily see this right away. It displays an image of the item in question, and asks the user to clarify what the item is.

Sub-task 1.3: Clarifying an expiration date

Trigger: similar to the "Clarifying an item" sub-task, except that in this case it deals with whether or not the refrigerator could correctly read and parse the expiration date printed on the item. In this scenario, the ground beef will trigger this sub-task.

The refrigerator responds to this in a very similar way to the “Clarifying an item” task. It displays the question on the screen, and asks the user to clarify the expiration date.

Sub-task 1.4: Putting away produce

Trigger: when the user puts away produce. In this case, it will be triggered when the user puts away the following items: tomatoes and lettuce.

This sub-task acts a lot like the “Clarifying an item” task. The user must select “produce” in this case and tell the refrigerator what kind of produce it is.

Sub-task 1.5: Verifying suggested expiration date

Trigger: after a user enters the type of produce they have just put in the refrigerator. In this case, it will be triggered when the user puts away the following items: tomatoes.

The user must confirm or change the suggested expiration date for the produce in question.

Task 2: Decide what to cook for dinner

You are unsure about what you want to make for dinner. You’re not in the mood for anything in particular, but you know you’re getting pretty hungry. What do you do?

> *In this task, the user is expected to use the system to have meals suggested to them. The first meals suggested to them are meals that use food that will go bad soon. The sub-filter is based on how many items in the recipe are things that the user already has.*

Task 3: Find items to discard

You have noticed recently that your refrigerator has been telling you that some of your food is about to go bad. This morning you saw that some things had already gone bad, but you didn’t have time to clean it then. Now you have just come home from school or work and you’ve decided to clean out your fridge. What do you do?

> *In this task, the following items are listed as going bad: ground beef and lettuce. The user is expected to use the touch screen to figure out what items are bad. The touch screen also displays a picture of the item that needs to be removed, so the user can find it pretty easily.*

Appendix 5: Data Collection Sheets

Participant # (1, 2, or 3)			
Task	**Verbal Behaviors**	**Non-Verbal Behaviors**	**Task Completion**
1			
1.1			
1.2			
1.3			
1.4			
1.5			
2			
3			

Appendix 6: System Usability Scale

Participant Name: _____

Question	Strongly disagree(1)	(2)	(3)	(4)	Strongly agree(5)
I think that I would like to use this system frequently.					
I found the system unnecessarily complex					
I thought the system was easy to use					
I think I would need the support of a technical person to be able to use this system					
I found the various functions in this system were well integrated					
I thought this system was too inconsistent					
I would imagine that most people would learn to use this system very quickly.					
I found the system very cumversome to use					
I felt very comfident using the system					
I needed to learn a lot of things before I could get going with this system					

Appendix 7: Post-test Questions

Participant Name: _____

1. What was your first impression of the prototype?

2. What are your personal opinions about the Fridginator5000?

3. Please expand on observations during the test.

4. Probe: During the [time / section] part of the test, you [insert something weird or different that we noticed]. Explain what you were thinking, or what was happening. Why did you perform the actions that you were doing? What factors made you decide to do what you did?

5. How would you compare the Fridginator5000 to your refrigerator at home?

6. If you had to improve this design, what would you do?