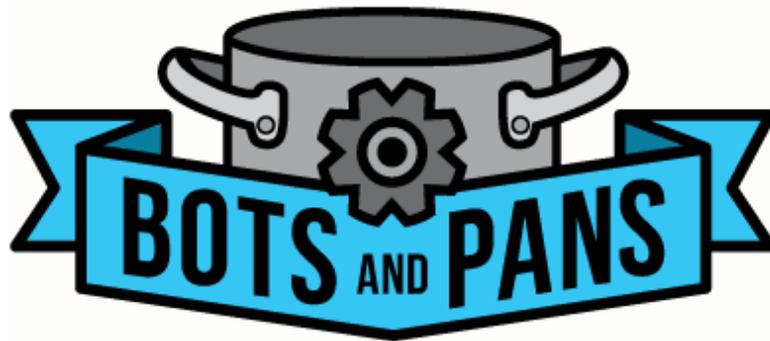


## INFO 213 FINAL SUBMISSION



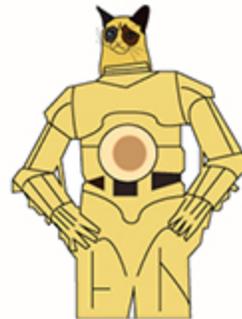
Christina  
Gambacorta



Christina  
Pham



Kate  
Rushton



Morgan  
Wallace



Sandra  
Helsley

### Main Roles for Final Prototype

Christina Gambacorta

Sandra Helsley

Christina Pham

Kate Rushton

Morgan Wallace

Everyone

Experiment Design Master

User Study Maven, Web Dev Guru

Visual Design Chief

JavaScript Slinger

Web Dev Wizard

Artists! Experimenters! Report Writers!

The final prototype is implemented using HTML, CSS, and JavaScript. This meant that it was easy for us to create a prototype with a decent amount of functionality, in a short amount of time, since the majority of our team already had experience working with these technologies. However, this created limitations in our prototype, and we were not able to implement it to as much of as we would have liked.

## **Summary**

At the start of the semester, our group was formed based on one shared goal: to make something fun! We decided to make a game and soon came up with the idea for “Bots and Pans,” a casual cooking simulation game. During the semester, we brought Bots and Pans through the entire design cycle, from contextual inquiry and initial sketches to a working prototype that we tested with actual target users. Throughout this process we studied some common questions in game development: What makes a game fun? What is the right level of difficulty? What degree of autonomy is appropriate? Furthermore, by adapting standard user-centered design techniques to game creation, we were able to test the efficacy of these processes for designing non-work-centered applications.

## **Introduction**

In Bots and Pans, the user plays the role of “Chefbot” (though the name can be changed), a cooking robot bound to kitchen slavery for his human overlord. The game is inspired by cooking simulations like “Cooking Mama” and item combination games like “Little Alchemy.” It is coded in HTML, CSS, and JavaScript, so it can be played in a modern web browser with no download required.

## **Problem Statement**

We wanted to make a game that would appeal to our target audience: people in their 20’s and 30’s. It should be a casual game that users could play in short intervals and also while multi-tasking, such as in-between classes or while talking on the phone.

## **Design Process**

Our game is unique from utility-based designs which forced our team to adapt the standard design process for a game. We began by interviewing a variety of people from “non-gamers” to “casual gamers” to “hardcore gamers.” From the interviews, we developed distinct personas with full life stories and personality quirks. These personas helped us focus on the aspects of our game that appeal most to our target audience.

After the contextual interviews, we held an affinity diagramming session where all members of the team wrote down things they had noticed during testing. This process helped us solidify some common ideas and themes to consider in our design.

With feedback and personas in hand, we each drew some starting paper prototypes. We ended up with 3 designs for our home screen, robot customization screen, and game screen - these would continue to be the fundamental parts of our game throughout the design process. We received feedback on the paper prototype that suggested we should continue to polish the

casual game mechanics as well as provide more feedback to the user when he/she is playing the game and needs a hint.

The next iteration was the high-fidelity prototype. At this stage of the design process, we also started creating art images and a style for the game, because we knew we were going to need many images, with different states (e.g., a pot, a pot with water in it, with boiling water in it, etc.).

We used Balsamiq to make a computer interface that imitated how the game would look in the browser. Despite the limitations of Balsamiq (e.g., inability to use drag and drop or have a game timer), we condensed our 3 main pages from the paper prototype into the Balsamiq framework. From the Balsamiq prototype, we learned our users wanted feedback when combining ingredients and wanted hints for when they were stuck. Lastly, several users wanted more of a story to make the game compelling.

## **Final Prototype**

The final prototype is a web application built with HTML, CSS, and JavaScript. There are three major parts of the game: a home screen, a robot customization screen, and the game screen (which has different available interactive items, depending on the current selected level).

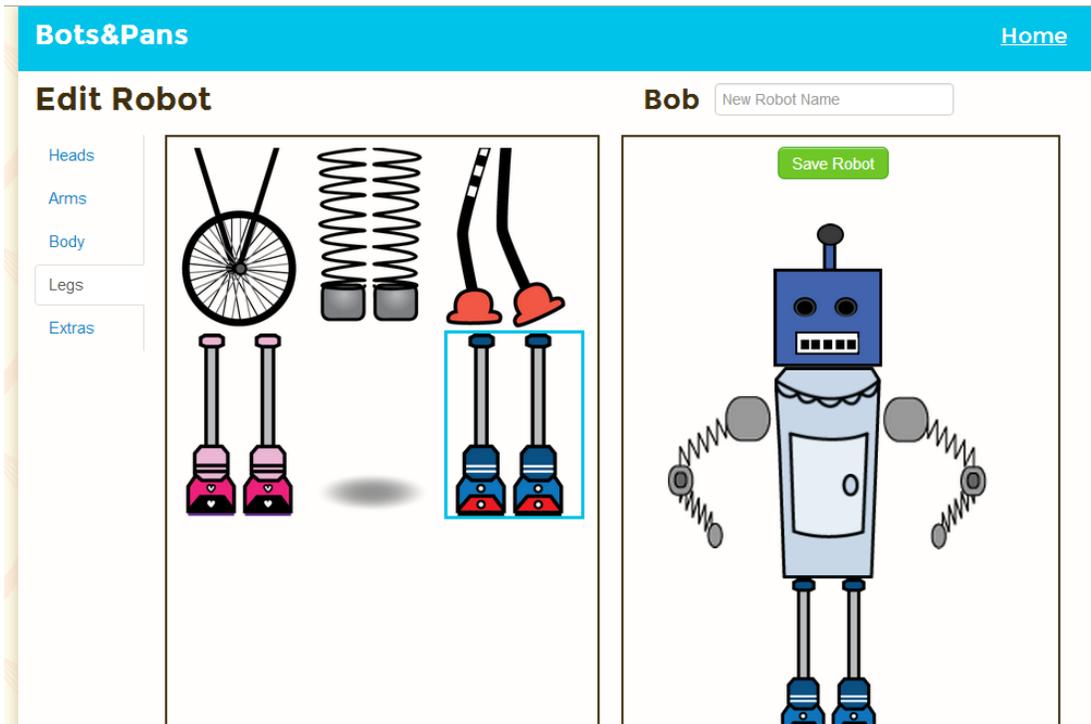
## Home Screen and Recipe Book

The screenshot shows the 'Bots&Pans' application interface. At the top, a blue header contains the app name 'Bots&Pans' on the left and navigation links 'Home', 'Signed in as kate@kate.com', and 'Sign Out' on the right. Below the header, the left sidebar features a robot profile for 'Bob' with an 'Edit Robot' button and a dark green robot head icon. Underneath is an 'Achievements' section with five circular medals: '1 POINT! Dishwasher', '3 POINTS! Well Dressed', '2 POINTS!' (with a question mark), '3 POINTS!' (with a question mark), and '5 POINTS!' (with a question mark). The main content area on the right is titled 'Tutorial' and contains the text 'This quick tutorial will show you how to interact with the game.' followed by a 'Cook!' button and several horizontal lines. Below the tutorial is a 'Recipe Book' section with a list of items: 'Ramen', 'Pancakes', 'Water', 'Pizza', 'Soup', and 'Hummus', each on a separate line with a red underline.

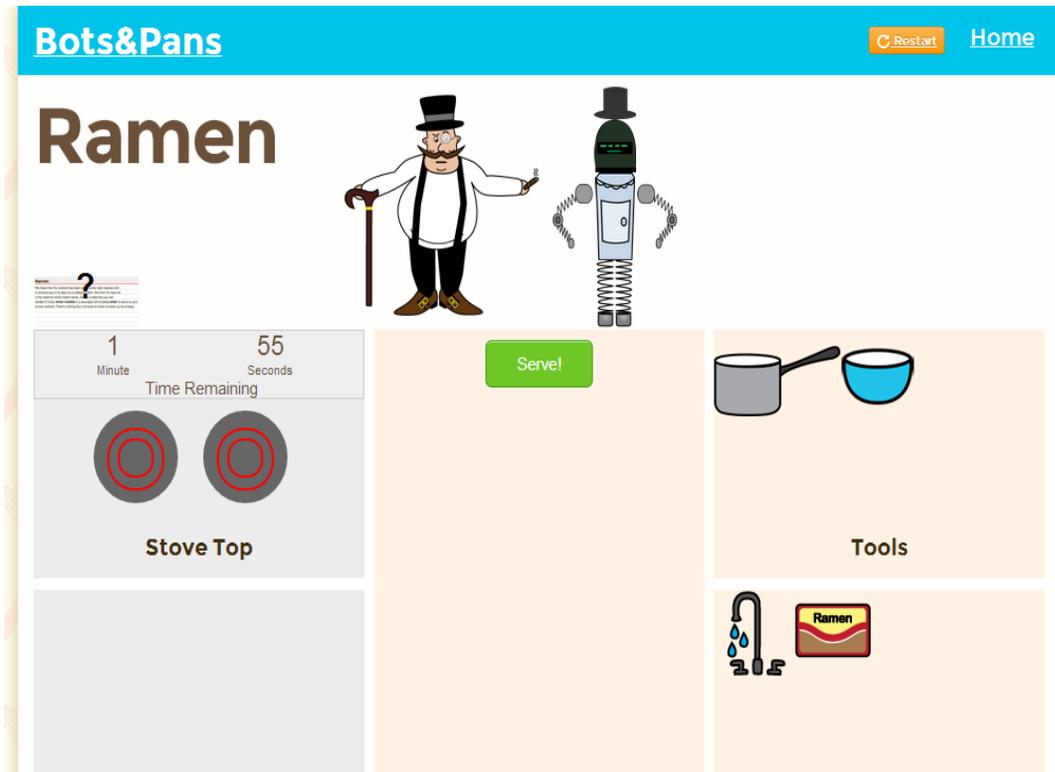
## Create Account

The screenshot displays a modal window titled 'Sign in or Create Account' with a close button (X) in the top right corner. The modal is divided into two sections. The 'Sign In' section includes input fields for 'Email' and 'Password', and a 'Sign In' button. The 'Create Account' section includes input fields for 'Name', 'Email', and 'Password', and a 'Register' button. The background of the modal is semi-transparent, showing the 'Bots&Pans' app interface with a robot character on the left and the 'Hummus' recipe item at the bottom.

# Edit Robot



# Game Screen



### **About the Functional Prototype:**

There are several features we did not implement for the purpose of our experiments. Currently, profile information is not persistent. Account information and game progress (levels completed, best and worst times, and the number of times a level has been played) are not saved. Customized robots are saved, but only using HTML5 local storage, and they would not be transferrable across computers (ideally custom robots would be stored in accounts).

While some achievements and additional levels appear in the home screen, they are there to give the user an idea of what the full game experience might entail. We decided not to implement any sort of achievement tracking or process to unlock more badges, and implemented two levels for simplicity.

## **Experiment Design**

### **Setup**

All participants completed our user study in the same order, with the exception of the A/B testing where order was randomized. They first were provided with a brief introduction to the game and asked to sign the consent form. They then filled out a brief demographic survey, completed several tasks including: creating an account and logging in, viewing badges and the home screen, and playing a tutorial level. For consistency (and because of lots of past experience running user studies), Sandra led the users through the study, while we had a minimum of two other team members taking notes on each user.

After this they played our “easy” level (Ramen) in two game modes: timed and untimed. Here, order of play was randomly assigned. After this, participants answered a few short questions about their game mode preference. This was repeated for our “hard” level (Pancakes), with the same game play order as assigned above. Game mode preference questions were repeated such that we could uncover and effects of difficulty on the preferred mode.

Finally, participants answered several survey questions regarding game difficulty, visual appeal, effectiveness of hints, straightforwardness of tasks, ease of interacting with the items in the game. All of these items were on a 7 point scale, with lower scores equivalent to a negative response and higher equivalent to a positive response. We also asked if the game was fun and if participants were likely to recommend the game to friends and family. These were our two qualitative measures of success.

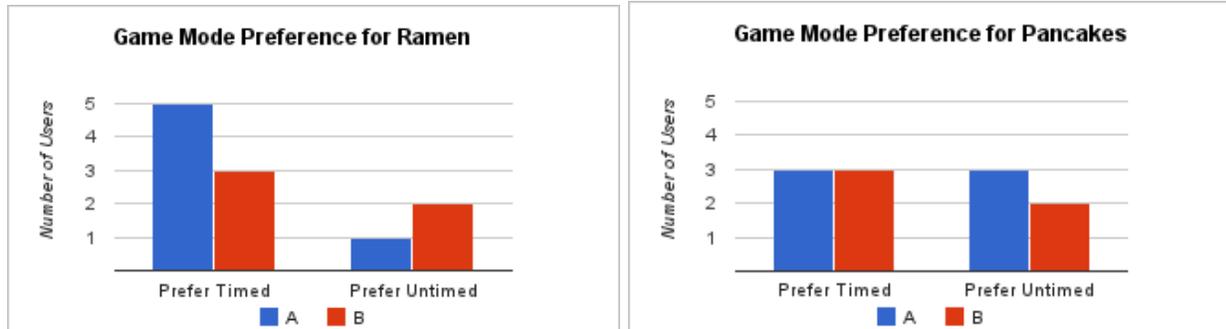
## **Demographics**

We had 11 people participate in our user study. Friends and classmates were recruited as participants (5 females and 6 males, with a range of ages from 18 to 51+, though the majority were in their late twenties and early thirties). Many of our participants were students (8 total), and all individuals spent at least 2-3 hours a day on a computer. All but one participant spent less than one hour of video/computer games per day, but when they did play they were all most likely to play puzzle games on their computer, tablet, or smartphone.

## Evaluation Results - Quantitative

### Timing

There was no significant difference for game mode preference (using a Fisher's test), for either group, or difficulty level. However, in general more people preferred the timed mode, (7 vs. 4, averaged across difficulty levels); this was even more so when the level was easier (8 vs. 3). In the tables below, users in condition A played the timed levels first, while users in condition B played the untimed levels first.



It is also interesting to note that with the exception of one person (she got particularly flustered during the timed level, and is discussed briefly in the “Timing” section of our Qualitative results), all users who failed to complete the timed Pancakes level were in group A, having played the timed levels first. This is likely due to the fact that the first time playing through a level is the most difficult. When playing the level again untimed, 3 out of 5 players were able to complete it within one minute. (one condition A participant was not timed during the untimed levels).

In condition B, 3 of 5 users in the timed Pancakes level finished within 2 minutes (the other two finishing in 3 and 4 minutes), and during the second play, all 5 finished within 40 seconds. In addition, all users in both conditions A and B completed the timed Ramen level within or around 1 minute. These results suggest that we were correct to choose a two-minute countdown timer for our existing levels.

**Survey Items.** Although we did not have enough users to find statistically significant differences between the two groups, there was a trend for people that played untimed levels first ranked the game as more fun (5.6 vs. 4.5), easier to interact with (5.8 vs. 4.5), visually appealing (6.0 vs. 5.6). They were slightly more likely to rank the tasks as more straightforward (5.2 vs. 4.3), and the hints as more helpful (5.8 vs. 5.0). This is interesting, given that more people stated they preferred the timed version. Overall, however both groups gave positive scores to all items on the questionnaire, with the lowest score (4.7 mean) for the item asking if the tasks were straightforward to perform, and the highest score (5.8 mean) for

the item asking if the game was visually appealing.

## **Evaluation Results - Qualitative**

### **Recipes are culture and context-sensitive**

Our testing showed that the experience of cooking a recipe is far from universal concept. The order of ingredients, and what ingredients to use, varies between individuals, cultures, and contexts. The pancakes level was programmed so that the pancakes are first covered with syrup and then topped with a pat of butter. However, almost every participant got stuck at this point in the level, believing that the butter should go on first and the syrup second. More than one participant pointed out that, "Otherwise it [the butter] won't melt!"

Another point of confusion for many was putting butter on the hot pan prior to adding batter. Many people tried to put the batter on an empty pan. One person sent us a follow up email after the testing session to clarify why he couldn't figure it out -- he is allergic to dairy, and as a result uses vegetable or olive oil to grease the skillet.

Finally, multiple players tried to serve from the ramen-in-pot state, while actually they needed to put it in the bowl. Two people commented that this is because they eat the ramen straight out of the pot, with one user commenting on his "bachelor lifestyle."

### **Achievements are sometimes puzzling**

We had our testers take a look at the achievements in their accounts at the start of the test, immediately after performing the "create an account" step. Many seemed puzzled by the achievements, but it's likely due to the limitations of the prototype and experiment design rather than an issue with badges/achievements as feature.

Part of the problem was that the achievements aren't implemented at the moment, they're just static badges that are always present in the profile; so after users create an account and sign in they already have achievements (when they should not have any). Furthermore, because this step was performed before playing a level or customizing a robot, the user was not yet familiar with achievements that pertained to these features. For example, the "Well Dressed" achievement says that you have earned new accessories for your bot, but this was pretty meaningless to users before they had seen the robot editor.

### **Testing found a LOT of bugs**

User testing was very valuable for finding bugs in our prototype that we had not encountered in our own tests. However, the bugs sometimes interfered with testing. Due to the bugs in the prototype and lack of feedback, some users lost confidence in the game -- when they were

doing a task that was incorrect (per the game design) they attributed it to a bug, and continued repeating the same incorrect task. Only one bug was so bad that the user could not continue the game (the pancakes were ready to serve, but could not be served), and fortunately it was only encountered twice.

### **More Feedback: Hints and help should be more proactive**

Many users would benefit from an increased degree of real-time feedback. Very few of our testers noticed the recipe card, despite the question mark, and some suggested that it flash when they made a number of wrong moves. Another suggestion was to have an 'X' appear if an attempted combination was wrong, or to have hints pop up somewhere that was specific to the problem the user was encountering at the time (e.g., Saying somewhere, "Put butter on the pan," when they try to put pancake batter on the pan before butter).

### **Users want more freedom**

A common desire expressed by users was the ability to do the wrong thing. They were disappointed that they couldn't cause fires or burn food. They also wanted to create novel combinations. Most users would create their own recipes within the game if we had that feature, especially if they could share those recipes with their friends, and play recipes created by others.

### **Everyone loves customizing robots**

Most people smiled and laughed when they saw the robot configuration screen -- though it is a very simple idea with relatively simple interactions, it was easily our most popular feature. Approximately half of the users had trouble initially because their instinct was to drag and drop the parts instead of click on them, but all users figured out the expected interaction method quickly. This could be an issue with the transition between a drag and drop interaction and a clicking interaction.

Although everyone was able to modify their bot, few users noticed the Edit Name box without prompting. One suggested it be placed to the left, and another user suggested placing the box closer to the save robot button.

Finally, the tabbed interface with robot parts was intuitive, but the contents sometimes weren't. After seeing an array of options for "Head", the lack of options for arms was momentarily surprising. It was also not clear to many users if the two arm parts were a pair or separate choices.

### **Timing**

Testing affirmed our hypothesis that we should offer the user a choice of whether to play a

level timed or not timed, rather than forcing one or the other. Most users had a moderately positive response to timed games, as they liked the challenge presented by a countdown clock.

However, one participant was so against the timer that she performed worse on the timed level even when she had already played the same level -- the negative experience of the timer overrode the positive influence of prior familiarity with the level. If we had only timed levels, this user would not play Bots and Pans, and since she is the inspiration for one of our personas, we want to ensure that we accommodate her preferences.

## **Discussion**

Overall, the game was well received. While we have a number of problems that negatively affected the gameplay experience, and a number of features that need to be implemented, most users liked the game as a whole.

Many testers suggested additional features like the ability to import recipes, race with friends, and post scores to leaderboards. Some testers were very excited about the prospect of being able to play more levels in the future ("Let me know when you can make pizza!"). All but one said they would recommend it to a friend, and that user added that she rarely recommends games to friends.

We feel that the entire design process was very beneficial to our end result at the end of four months. While we did not deviate much from the overall idea of our game, we certainly pared down different specific aspects of the project as we progressed (e.g., our final prototype focuses more on gameplay and robot customization than human-to-human social interaction).

Early low-fidelity prototyping allowed us to get ideas from everybody, allowing us to both incorporate our different visions, as well as to generate discussions about what would be ideal to aim for. The ease of creating elements for and removing elements from the paper prototype meant that we could quickly fix interaction problems or make adjustments. It was also great that we could receive user feedback, both from fellow students in the class, as well as potential future players. Because the prototype at that point was made of paper, players could focus more on interaction, and less on thoughts like, "I don't like this shade of blue."

The higher-fidelity Balsamiq prototype helped us to work out more of the gameplay interaction, and get a better sense of what parts of the game were important. While we felt limitations of the prototyping software, having a digital version helped us visualize what we wanted the final result to be. In fact, while we were implementing our functional prototype, we often had screenshots of our Balsamiq prototype open, if not the prototypes themselves, to use as reference documents, ensuring that we accurately translated our ideas from one

version to the next.

Finally, the functional prototype realizes our ideas in a live, working format, giving us a tangible product on which we can further refine and improve. We are extremely happy with the general style that we ended up having, and knowing that there are still parts to implement and bugs to fix provide us with many options in the future.

Overall, it was a great experience implementing our game with HTML5, CSS3, and JavaScript: newly updated technologies that hold a lot of promise for the future. We feel that we successfully created a product that is capable of giving many game players enjoyment, and it has been an interesting experience attempting to push the boundaries of traditional work-based interaction design methods. Best of all, we've had fun designing our game in this class, and we have greatly enjoyed working together as a group. Go Team Bots and Pans!

### **Current Status**

Bots and Pans is accessible on the web at <http://www.botsandpans.com>, however, we have not made any changes since we started running experiments with users. The tutorial and two levels ("Ramen" and "Pancakes") are playable, but the rest are still placeholders. Bugs have not yet been fixed, and demo-only features, such as Achievements, are not implemented.

### **Future Plans**

We hope to fix our known bugs and add a fully operational backend to the game to support profile saving. Game art is an important feature that keeps the game fresh, we will add more art to support more levels and more robot customization. The achievements will be made functional: they will pop up upon completion and possibly reward the player with a robot part.

In addition to our questions on users' opinions about our game, we also asked what sorts of recipes they would like to see in the future. Responses to this question were extremely varied, from simple: "fried rice" or "soup," to enthusiastic: "NACHOS!" or "Butternut squash soup!" and complex: "chicken cordon bleu," or "thanksgiving dinner" (note: we ran our studies a full week after US Thanksgiving). We would like to act on some of these suggestions and create the artwork for these potential recipes, so we can enable some levels based on user feedback.