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Wednesday Lab

USC Sprinkles ATM

Introduction

In this project, our group will be visiting the Sprinkles ATM and evaluating the interactions involved in buying a cupcake. The Sprinkles ATM on campus was put into place last year in front of the USC bookstore in the center of campus. It offers "freshly-baked" cupcakes at a upscale price of 3.50 per cupcake. Ever since its conception, it has garnered wide popularity with USC students and visitors.

Our study will focus on the ATM's visual display and user interface. We will be conducting physical measurements on Monday at 3pm, a normal time for students to be purchasing these cupcakes. These measurements include the size of the ATM, how long it takes for each customer to buy a cupcake, a subjective review of how well the user interface is designed, and many more. The only tools we need are a stopwatch for the time motion study, a tape measure to measure anthropometric data, and a camera to document the interface.

User Profile and Needs

Before we begin to even talk about the machine and its evaluation, we must first consider whom the ATM is serving. Knowing the voice of the customer is important in giving an accurate evaluation of the machine. Based on our research, we've identified that the typical user of the Sprinkles ATM machine is almost exclusively a USC student (surprised?). This is followed by USC guests, which include parents and prospective students, and finally faculty and staff. Let's dig deeper on our main user - the student. USC Students are diverse - composed from a wide range or racial and socioeconomic backgrounds. More specifically, 53% of the students are Female, 33.1% are White, and most from California. The next biggest group are international students who make up 24.1% of the student body. Equally important to note is that most of the students are wealthier with respect to other universities. This makes an upscale cupcake machine a perfect match for our students.

Because of such a wide scope of people, it's hard to pinpoint which anthropometric data to use. In this case, we will use anthropometric data standard to US citizens of 2017. In terms of experience and training, USC students are adept at using things like the cupcake ATM machine. After all, this is the generation that grew up on touchscreen devices and minimalists design. In addition, this group of students are familiar with similar machines such as automated grocery checkout machines (such as the ones in the village) and self-order machines in restaurants. Aesthetics matter just as much as functionality when selling to USC students.

Based on the information we strung out from our main customer segment, we are able to come up with user's needs. USC students need a cupcake ATM machine that is quick and trouble free with a nice user interface and visual displays that gives the accurate cupcake order. Thus, the user's critical to quality (CTQ) characteristics are the following: How fast it takes to obtain the cupcake, how easy it is to use the machine, how accurate the machine is, and how aesthetically pleasing the machine is. While these are just initial assumptions, we will validate these assumptions via a survey given to students who have just used the machine. On the other side, the ATM also has expectations of what the user should be able to do. The user is expected to be able to go up to this cupcake machine, read and interpret the information on the screen, push buttons that correspond to their order, check out via credit card swipe, and finally grab their desired cupcakes. To sum this all up, I've create a persona profile featuring our group member, Patrick Macias, to provide an overview snapshot of who the user really is.

USC Demographic

The typical USC student is a white female. 53% of undergraduate and graduate students are females while 33.1% (the largest ethnic plurality) of students are also White. Economically, 13.95% of students come from the top 1 percent of the income sale. Only 21.9 % of students come from the bottom 60 percent.

Personal Information

Hi, my name is Patrick! I'm a senior studying ISE and cupcake connoisseur. Because of my busy engineering schedule, I don't have time to run to a cafe and buy myself a cupcake. I need a cupcake ATM that I can access on the go in between my classes

What I want?

I want a cupcake ATM machine that is quick and trouble-free with nice user interface and visual displays to make sure I get the cupcake that I want. I also wish the ATM machine accepted my USC card. I typically leave my wallet at home since I only need my phone and ID when going to class. I also wish the ATM vended napkins and utensils. Eating that delicious cupcake can get messy sometimes.

What annoys me?

Often times when I try to get a marshmallow chocolate cupcake, I'll click it with all the excitement in the world only to find out it is unavailable. I wish it could communicate that with me beforehand.

System Parameters

Currently, the Sprinkles Cupcake ATM is located on the front side of the bookstore. It can be used at any time. As long as the machine has stock available, you can make a purchase from it. It doesn't matter if it's noon or 2 AM, as long as the machine has inventory, you can make a purchase. The location is under an awning so it doesn't get affected by weather conditions like intense sunlight or rain. The display itself is well lit so outside lighting doesn't affect it. There are street lamps on the side of the bookstore so it does have outside lighting even though it may not need it. Obviously, the machine is the most busy during the daytime. It is also likely to experience more

business when the bookstore itself is busy. Since this machine literally exists on the outside of the bookstore, this is pretty self explanatory. The area is shaded so even on hot days, the area is always relatively cool. There is background noise at the location but its not overbearing in any sense. It can get distracting but its not a big concern. No real line exists for the machine. It can get confusing but for the most part, people just stand behind each other waiting for the next person to finish.

The anthropomorphic data is as follows:

	(all measurements are in inches)		
	height	width	depth
Machine	36	25	3.75
Display Screen (17" Size)	10.75	13.25	
Display Screen Case	19	15.25	
Dispenser box:	11.25	12.75	
Selection Screen	3	4	
From ground:	41.25"		
From stomach to screen:	16"		
Credit card from ground:	49"		
Height from ground to bottom of ATM:	11"		

Currently, the machine exists within a wall in the bookstore facing outwards to the outside street. The ATM is completely straight. As you can see from the data listed above, the current dimensions of the Sprinkles ATM are good but we believe that we can make improvements to them.

Interactive Task Description

The task we are evaluating for this project is the purchase of a cupcake from the Sprinkles ATM machine. The task starts off as follows. First, the subject approaches the Sprinkles machine. From there, they use their dominant hand to touch the display screen to start the process of selecting a cupcake. Once they touch the screen, the screen changes to show a list of possible cupcakes available for purchase. They then select a cupcake and another screen appears. This screen tells them if the cupcake is available and, if it is, the user can then add whatever available quantity to their cart. From there, they can either check out and finish service or go back to the selection screen and order more cupcakes. Once they decide to check out, they hit another button and get taken to a check out screen. They then swipe their ATM card into the card reader on the machine. This confirms their purchase and charges them. From there, the machine selects the cupcake from the inventory via a mechanical arm. It places the cupcakes in a separate compartment. The ATM then opens a panel that leads to this compartment. From there, the subject can grab the cupcakes and then be off on their way.

Interface Design

Interface design is concerned with describing the user behavior and defining how the system will accommodate and respond to that behavior. The Sprinkles ATM is placed strategically in front of the USC bookstore which has the highest foot traffic, allowing for convenient access. It is a pink machine placed on the right side of the building that has an entire pink background. It instantly catches your eyes and is very hard to miss. On the machine, it spells out “CUPCAKE ATM” in all white capital letters which provides a steep contrast against the pink background. Underneath, it says “Sprinkles” in brown cursive letters. The machine itself is rectangular with three sections: the touchscreen, credit card swiper, dispenser.

The touchscreen has a very simple welcome page that states the name of the company and what it is, including instructions (“touch to begin”). The screen also flashes in different colors to capture one’s attention. Once the screen is tapped, then you are taken to a screen that lists the different available flavors by providing a picture and label underneath each one. The visual display of the flavor allows the customers a better experience as it provides a better depiction than just a list of the names especially if a flavor is unknown. Once a certain flavor is selected, then a smaller screen pops up that describes the flavor in more detail as well as the price. In addition, the quantity of each flavor can be selected by pressing the “+” or “-” to add or drop the amount. If you don’t want that flavor anymore, then there’s a button on the upper-right corner which allows you to “add another flavor.” By selecting that button, it takes you back to the original flavors screen to select other one. The screen also has a number on each flavor corresponding to the quantity selected for that one which allows the customers to know what they have selected thus far. Once a flavor and quantity is selected on the pop up screen, then three buttons appear on the right hand side. “add another flavor” is the upper right hand button that is pink. “checkout now” is the middle green button that includes the total base price with the tax underneath it. “clear all” is the lower right hand button that is red. These are the three options the customer can precede with in their order. The buttons used white text on colored background which corresponds with the consistent theme.

If the customer is all finished and ready to check out, then it takes you to a different screen that provides instructions on the final step. It says “please swipe your credit card” with a sentence underneath it, ensuring the customer “no charge will be made until after you receive your purchase.” In addition, it displays the picture of the flavors selected in the middle to show the final decision. Underneath that, there's a timer that counts down the amount of time remaining to swipe your credit card before the order disappears. The timer starts off at 25 seconds which places a sense of urgency on the customer to quickly finish the transaction. This prevents the customer from changing their mind but also speeds up the process in the chance there’s a long line. If one forgets which credit cards are usable, the screen displays the available cards accepted on the bottom. Thus,

all the information needed for the customer is displayed on the final screen with simplicity as well as visuals.

The final screen is a video of the internal atm machine showing the robotic arm reaching for the respective flavors and putting them at the dispenser. This provides an interactive experience for the customer as they can visually see what is happening with their order and showing that the "purchase is on the way!" Once all the orders are gathered and placed in the dispenser, then the screen slides open showing the boxes of cupcakes.

Figure 1: Welcome Screen

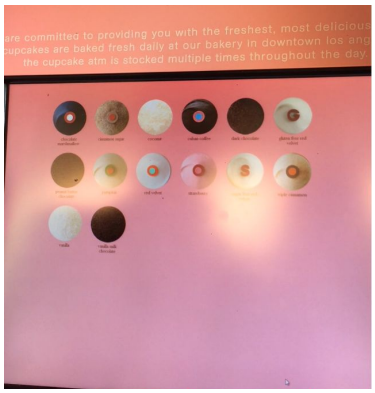

Figure 2: Flavors Screen

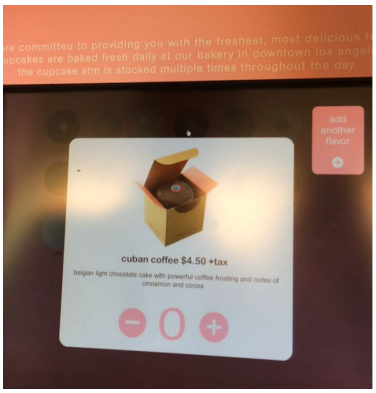

Figure 3: Pop Up

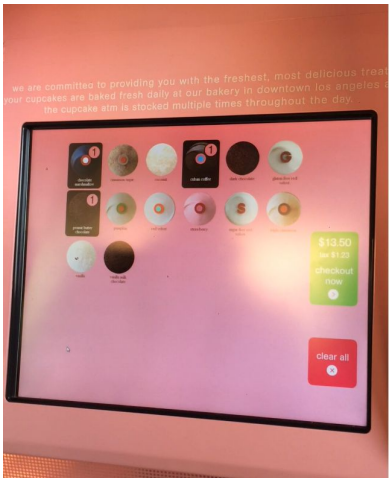

Figure 4: Flavors Quantity

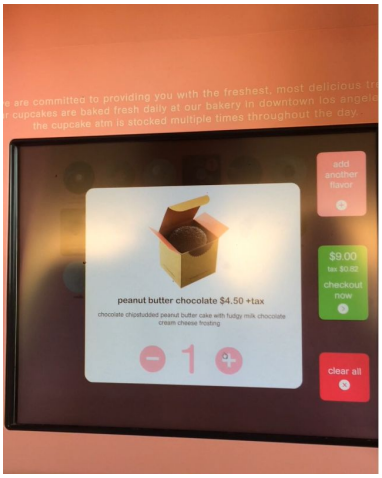

Figure 5: Flavors Selection

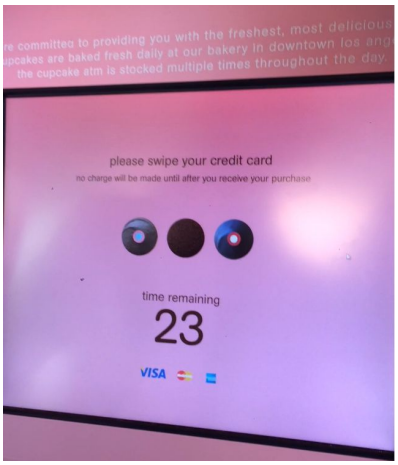

Figure 6: Transaction

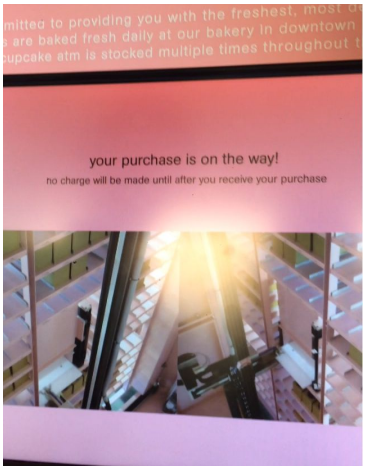

Figure 7: Purchase Handling

Figure 8: Order Retrieval

EVALUATION

Anthropometric Analysis

After examining our data, most of our measurements match up with what would be ideal for an ATM. It's setup so that no matter what size your arms are, you should be able to reach use and the display with minimal issues. The only possible issue is with the height the ATM is at. Shorter people or young children may encounter issues with trying to use the machine. Our main concern was if it would meet the needs of the physically disabled, specifically those that are in a wheelchair. This is the biggest area we believe the machine could make improvement in in order to be more anthropometrically optimal.

Work - Study Measurement

We conducted a short survey to help us answer how long our users felt the entire transaction was taking. When giving them the short survey on my phone, I asked that they write their answers in intervals of half minutes. The results show that the time of using the cupcake ATM only spans from 1 minute to two minutes, with the mean and median equaling 1.5 minutes. However, when I did the direct observation, I got the following times (In seconds : 65.5, 64.5, 35.4, 79.3, 56.2, 57.0). The average we get is 59.6 seconds or almost a minute, which is considerably lower than the user's' input. Perhaps this is due to the aesthetics of the machine. You're easily distracted by the intricate designs that you don't realize how long it's actually taking you to do the task.

In addition, we also went through an MTM based on MTM-1 to break up the individual tasks that cover the entire transaction. Buying one cupcake without any errors or clickbacks are composed of the following movements:

R16B = 15.8 | APAF = 3.4 | R6E = 8.0 | R16B = 15.8 | APAF = 3.4 | R6E = 8.0 |
R16B = 15.8 | APAF = 3.4 | R6E = 8.0 | R10D=12.9 | R20A=13.1 | M5C = 9.2 | R20A=13.1 |
R24D=22.5 | M24A = 22.4

That is, a user is typically 16 inches away. They reach for the screen, applies some pressure to press the touch-screen button and repeat this procedure three times (once to choose a cupcake, the second to choose the quantity, and the third to click check out). The user then takes their credit card out from their pocket or purse, which is roughly 10 inches away) and reaches for the card reader (roughly 20 inches away), slides their card down 5 inches and puts their card back in their pocket. The last step occurs when the user reaches for their cupcakes (24 inches away) in the dispensing box.

Breaking it down it looks like this:

1. R16B = 15.8 | APAF = 3.4 | R6E = 8.0 | x 3 (reaching for button and moving hand away 6 inch to see the screen)

2. R10D=12.9 | R20A=13.1 | M5C = 9.2 | R20A=13.1 |
(credit card payment process. Reaching for card in pocket, reaching for card reader, swiping the card, and putting it back into pocket)

3. R24D=22.5 | M24A = 22.4 (reaching for the cupcake and putting in your other hand)

Thus the normal time for this activity would be 6.3 seconds. Compared to our direct observation time of 59.6 seconds, our numbers seem way off. Why is there such a huge gap? This is because most of the time is spent on just looking at different cupcakes. This results in a lot of time waste since people want to be able to assess what they really want by getting the magnified view of an individual cupcake. In addition, there is a lot of waiting time between the human-machine interaction. For instance, the machine reading your credit card or retrieving the cupcake takes a long time.

While the Sprinkles ATM machine 1 minute average transaction time is commendable, there is still much room for improvement. It was designed well in terms of minimizing the steps to retrieve the cupcakes due to its simple design. However, It's internal process could speed up to accommodate the user's needs of having something quick to eat on the way to their next class. Our team will be looking at a scroll wheel type of view among others in our next improvement phase.

Interaction Features and Styles

The visual display is very simple yet eye catching. Sprinkles' brand is known for its pink theme, and its cursive name can be recognized anywhere. The white capitalized letters across the machine pops out against the pink background. It draws the customers with its design and simplicity. As for the touchscreen, the system provides a display that is visually pleasing and user friendly. It uses the actual pictures of the cupcakes to display the flavors. In addition, the display of buttons and instructions are very short and to the point. It allows for easy ordering and quick transactions. Buttons are rounded rectangles and are color coded with white text. Everything is lowercase which keeps a consistent theme. The numbers are big so it's noticeable with no confusion.

Since the cupcake atm machine is a touch screen, it is very interactive. The machine responds to the user's demand with speed and accuracy. With each touch, the system provides feedback by directing the user to a different screen. The numbers on each flavor is a sign that depicts the quantity chosen for each one. If the user happened to order multiple ones, it helps them keep track of which one was ordered already. Also, the buttons are color coded to assist in the process of differentiating various options. With the addition of more quantities by pressing the "+", it corresponds with an increase in the number or vice versa. While everything is pretty much automatic, the only manual movement needed is the swiping of the credit card. The most interactive part was the final step when the display showed the real live action of the cupcakes being grabbed inside the ATM. This provided a cue as to when the order was finished processing.

Other Human Factor issues

Currently, in regards to ease of use, the ATM is somewhat well designed. It has a very intuitive interface. The buttons are simple enough to use and no operation is too complex for a novice user to understand. The design is user friendly to say the least. It's easy to follow and interact with. In terms of robustness, it's quite easy to be able to move back and forth if an error is made. Cancelling transactions are easy to do and help screens are easy to follow. The only area that could use improvement is being able to see when certain cupcakes are out of stock. You won't see that a cupcake is out of stock until you click on it which leads to user disappointment. This should be done in such a way that it is easily seen by the user as to avoid this issue.