Scope

Earlier this year I took a look at redesigning a Vending machine. I wanted the redesign to be user friendly, intuitive, functional and most importantly I wanted the vending machine to keep its simplicity.

Why a vending machine? Well I like beverages. What can I say, I don't like being thirsty and on days I don't have a water bottle, I buy a drink.

So below you'll get to explore the redesign process using a User's pain points of using the vending machine and the four affordances of Human Computer Interaction.

Introduction

Walking around campus with a good friend of mine we found a vending machine owned by Dasani, and although functional, something wasn't quite right.

I'm roughly 5'11 and she been about 5'5 we both found it extremely difficult to get access to the change slot. Looking closer at the machine we started pointing a few more issues.

We probably spent 15 minutes talking about this vending machine and found several pain points.

Pain Points

- Users have to stoop really low to get access to their change
- Users struggle to access their chosen beverage
- Poor user flow: Payment option is shown before making a beverage choice which can easily result in user choosing the wrong beverage and dissatisfaction
- There is no visible option make a beverage selection change

Question

After finding these pain points I wondered how I could go about doing redesigning this vending machine. Using tools I have available including Adobe XD and researching vending machines online I came up with a new design using **the four affordances of Human Computer Interaction (HCI) design.**

Human Computer Interaction Design

First I had to break down the four affordances of HCI down. It confused me quite a bit.

Being an Interactive Media Management student at Sheridan College, I have become very familiar with human computer interaction. But learning about the four affordances I had to once again take the time to understand different aspects of HCI.

According to the interaction design.org, HCI is the **interaction** between **humans** (the users) and **computers** and while initially concerned with **computers**, **HCI** has now expanded to cover almost all forms of information technology design including, phones, smart watches, televisions, microwaves, yes anything that warrants a user interacting with technology including a vending machine.

Now what are affordances? Psychologist James Gibson coined "**affordance**" in 1977, referring to all action possibilities depending on users' physical capabilities. An affordance is an object's properties that show the possible actions users can take with it, thereby suggesting how they may interact with that object. For instance, a button can look as if it needs to be turned or pushed. The characteristics of the button which make it look "turntable" or "pushable" together form its affordances (Human computer interaction.org-affordances)

So then an interaction-centered view of affordance suggests that affordance is an interpretative relationship between users and the technology that emerges during the users' interaction with the technology in the lived environments.

Hence, users interacting with the vending machine (technology) on campus (lived environment) creates an interpretative relationship. This relationship is shown through the vending machines affordances that suggest how the user may interact with the vending machine

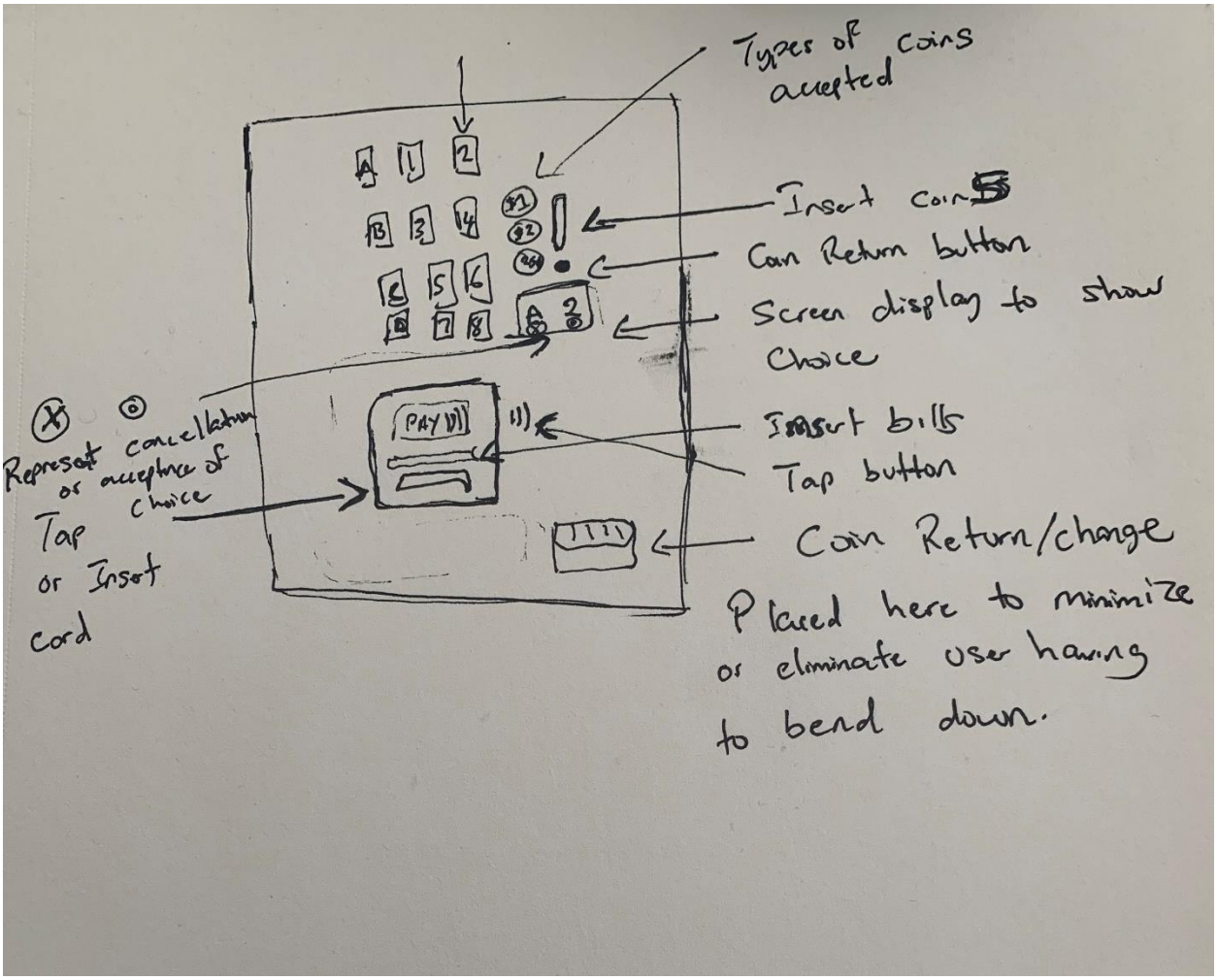
The Four Affordances of HCI as coined by Janet H. Murray are:

- procedural (composed of executable rules)
- participatory (inviting human action and manipulation of the represented world)
- encyclopedic (containing very high capacity of information in multiple media formats)
- spatial (navigable as an information repository and/or a virtual place)

After studying and analyzing the vending machine, I started sketching some quick design changes and notes on how I could improve the overall usability based on the users' pain points and four design affordances of HCI could improve a user's experience with this vending machine.

I had a couple decisions to make when deciding how to position everything so the user wouldn't have to bend creating discomfort and even risk hurting their back. Back pain can also prevent use of the machine. So how would I position the change slot? How would I position the beverage dispenser? How would I position the payment by card option?

I came up with this sketch:



In relation to my vending machine redesign these are the things I took into consideration.

- *Procedural affordance* means that the device can complete a limited number of relevant actions. In relation to vending machine, the user flow allows users to make a choice quickly going from A to Z with minimal mental exacerbation.

- *Participatory affordance* means the *"actions of humans and machines are meaningful to one another" (Walker)*, so people can interact with the digital device in a way that benefits both parties. The vending machine allows meaningful interaction with the user. It's quick and painless and simplified.

- *Encyclopedic affordance* is being able to store and retrieve information. – The digital screen allows the user to view their choice and change that option with a simple click.

- *Spatial affordance* means the medium is presented in a way easy to navigate and use – The user flow allows users to choose a beverage, agree to choice or change it. Pay with coin or tap with card, receive their change and beverage without bending or difficult movement.

Now looking at the vending machine. I took into account all the affordances. I wanted users to able to develop an accurate picture of the interface, so that they can immediately predict the consequences of their actions.

First I designed the procedural aspects.

1) – Choose your beverage on the pad.

2) Accept of don't accept your beverage. This gives users the choice to choose another drink before paying.

3) Pay using one of two options coin or card below with the tap function. Notice I the push button for coin return if the user decides get their money back

4) Receive their beverage.

Second I designed the participatory aspects.

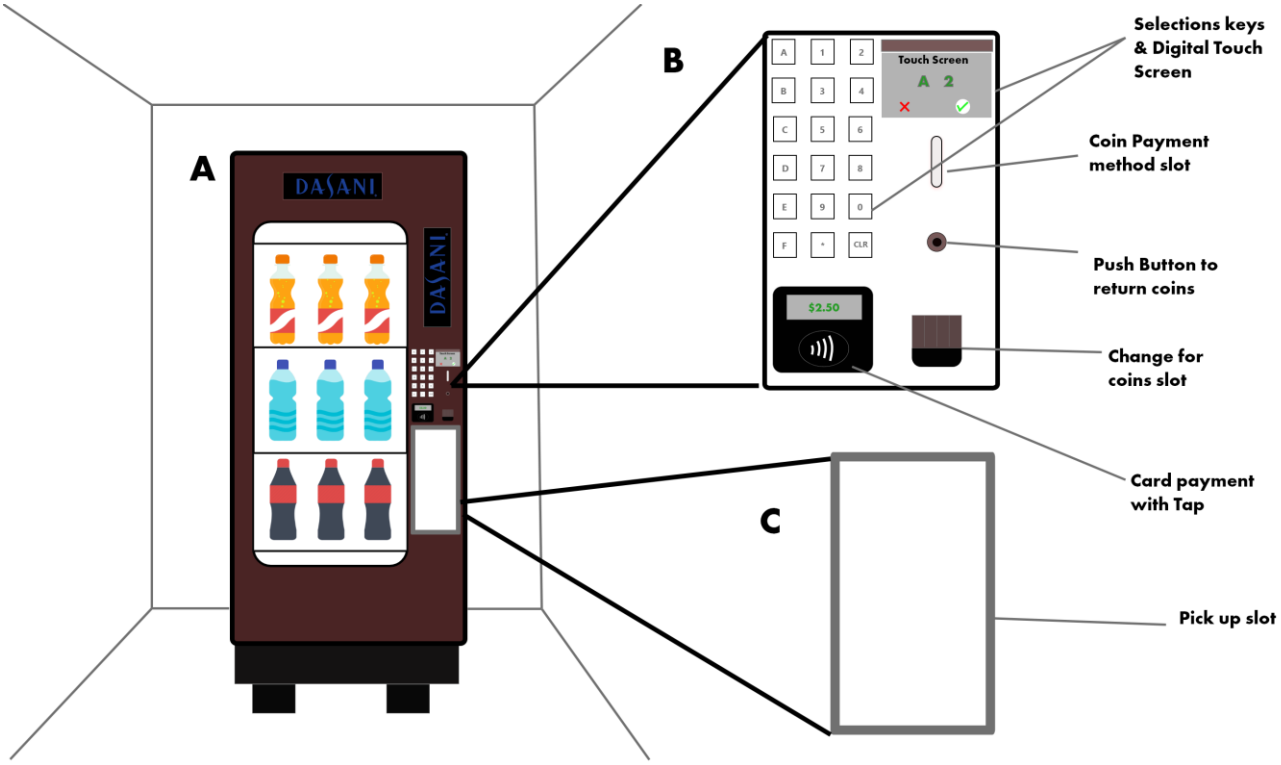
I designed it to enhance the physical aspect and limit any discomfort and make it more intuitive.

Third I designed the encyclopedic function.

1) I designed a Digital screen that allows the user to view their choice and change option and click the red X to change their selection and the green checkmark to accept their selection

Fourth I designed the spatial aspects.

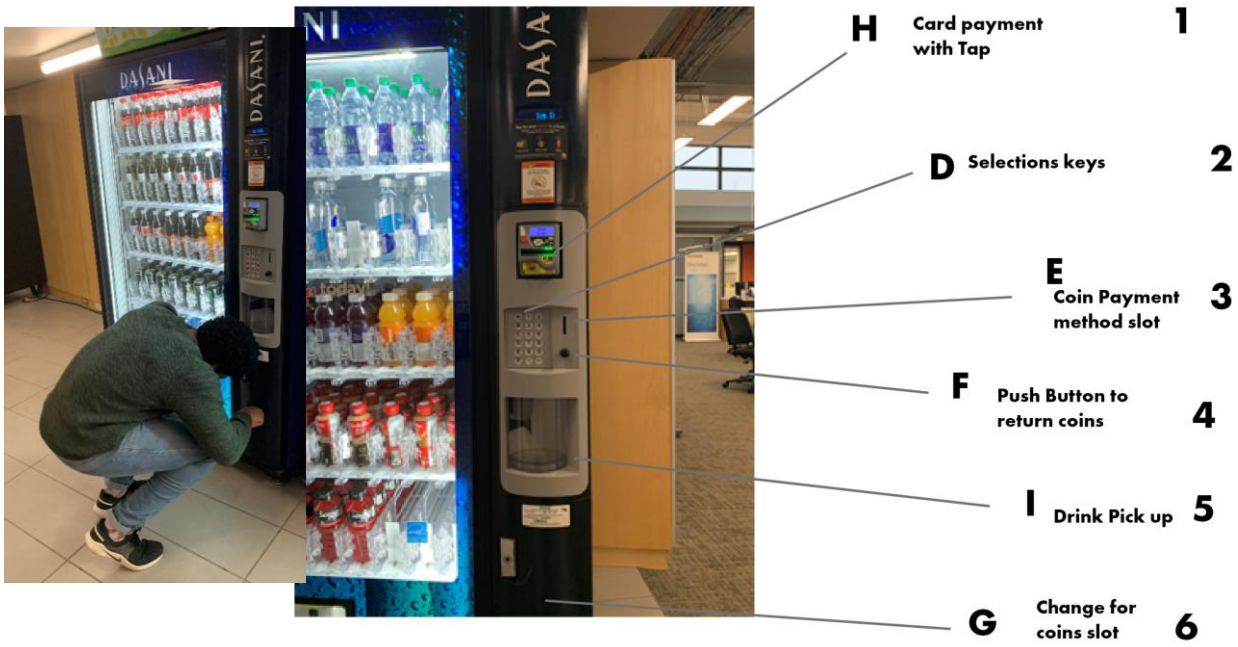
I wanted the positioning of payment methods and instructions to be based on the procedural aspects and user flow. This allowed me to create my final design on using XD.



The major goal of this interface was the user flow. Now a user can start by choosing which beverage they want before payment by coin or card, receive their change and drink without crouching down.

Major changes from original design

Original Design



Original Design Flow

1) See the payment my card option without make a choice of beverage first

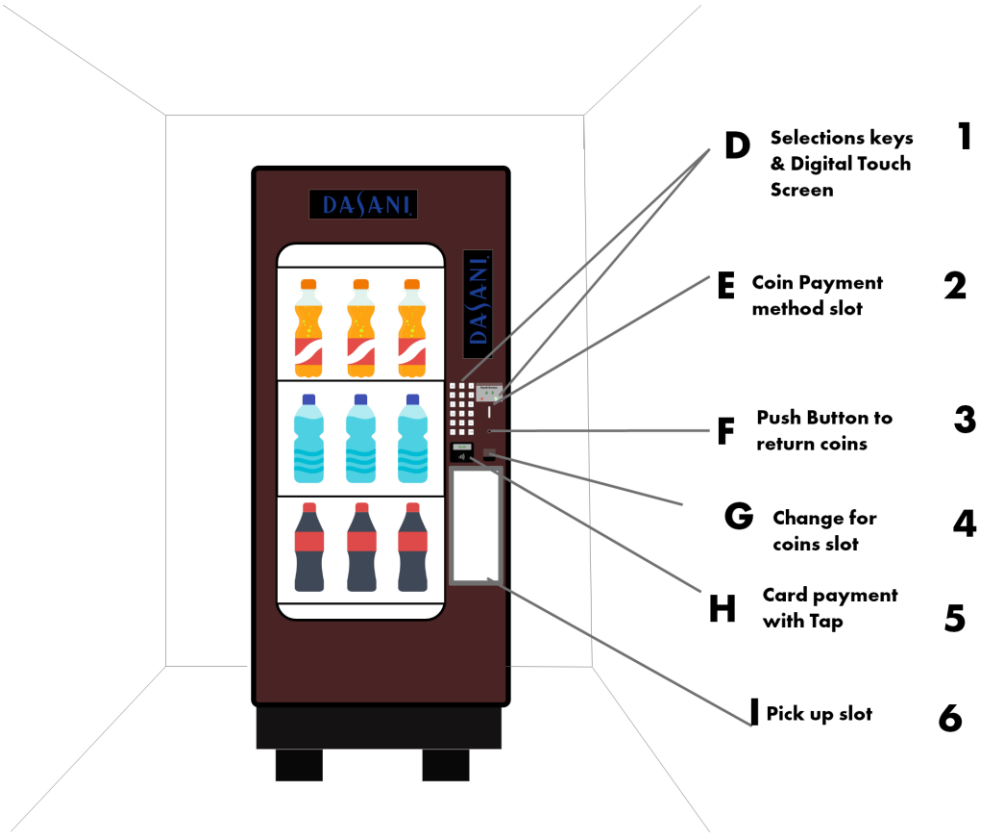
2) Make Selection without a touch screen option to cancel or choose a different beverage option

3) Payment by coin method

4) Push button to return coin

5) Pick up drink forcing using to bend

6) Accept change from coin slot at the bottom forcing the user to stoop as seen in the 1st image.



Final Design Flow:

1) Make Selection with pin pad and accept or change choice with the digital screen
2) Pay by coin after satisfactory selection
3) Push to return coins
4) Retrieve change without bending
5) Pay with tap without bending
6) Receive beverage in pick up slot with minimal bend

Conclusion

The final design flow works to limit and take away the pain points I found earlier using the 4 design affordances of Human computer interaction.

From a procedural stand point the user flow allows users to make an acceptable beverage choice first going from A to Z with minimal mental exacerbation.

From a participatory stand point the vending machine allows meaningful interaction with the user. It's quick, painless and simplified

From the encyclopedic stand point the digital screen allows the user to view their choice and change that option with a simple click.

From the spatial stand point the medium is presented in a way easy to navigate and use – The user flow allows users to choose a beverage, agree to choice or change it. Pay with coin or tap with card, receive their change and beverage without bending or difficult movement.

Resources

1) “Affordances.” *The Interaction Design Foundation*, www.interaction-design.org/literature/book/the-glossary-of-human-computer-interaction/affordances

2) “Four Affordances.” *Janet H. Murray*, 20 Nov. 2011, inventingthemedium.com/four-affordances

3) “Affordances: How Do They Help User Practices?” *Graphility*, 16 Jan. 2019, graphility.com/blog/5488/affordances-help-user-practices/.