

# **A Better CTA Transit Card**

## **Vending Machine**

Team A

March 6th, 2012

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## Proposal Summary

The Chicago Transit Authority provides public transportation services to the Chicago area through a system of trains and buses. In 2011, there were 532 million riders on the CTA<sup>1</sup>. It is one of the most popular mass transit systems in the United States, yet the first step towards using it, purchasing a fare card, is perhaps the most difficult. We are proposing a massive redesign of these vending machines using touch screen technology and HTML 5. This would make fare card purchase easier, quicker, and bring the CTA up to date with other mass transit systems present in the world.

In order to ride the trains and buses of the CTA, a rider must first purchase a fare card. There are a few different types of cards that riders can purchase. The most common card, and the one that this proposal is focused on, is the pay-as-you go CTA Transit Card. It can be purchased from vending machines located in each train station. These are stored-value cards that act as debit cards - the user puts up to \$100 on the card, and then the fare amount is subtracted with each use.



Fig. 1 The CTA Transit Card Vending Machine

Using the card is simple - but purchasing it is not. The vending machine used to purchase the card has no clear flow of information. The directions are

written in a confusing, cluttered way. The machine cannot adapt to different situations - it uses an outdated LCD screen that gives the user unspecific static information. A more thorough evaluation of the current machine can be found below in the User Research section.

The machine would be very confusing and hard to use for first time user, but experienced users likely have little problem. Purchasing a card is actually a very simple process. The machine makes it look extremely complicated, however (see figure 1). The user pushes A to buy new card, insert money the money they would like to put on the card into the machine, pushes the vend button, and takes the card (see figure 2). The machine should be designed for all users to have about the same ease of use.



Fig. 2: The four steps needed to purchase a transit fare card

We are proposing a complete redesign on the current machine. The new machine would be designed with minimalism and aesthetics in mind. It will feature a modern touch screen and a flow of information that would help the user quickly and easily perform an action without requiring them to struggle with an overload of information. The machine will be able to display dynamic content that would help guide the user, rather than impede them. The

machine will also be easy to update because it uses a simple touch screen for all user actions. If fare amounts or fare card technology changes, the machine would be able to easily adapt. The machine will be able to take both cash and credit cards, and will also replace the current “credit only” fare card machines.

In order to design this new machine, we will consider the current machines in use by the CTA as well as the machines used in other cities. We will take the best parts of the current machine and update them to fit into our new machine. We will also consider that the new machine should be able to perform all the actions of the current machine - purchasing cards, checking and adding value to current cards, and more. This is where a simple touch screen interface would be helpful - it would be able to be easily updated to handle any new functions without having to change the whole machine. We will also consider the design and mechanics of the physical machine, but our main focus will be on the flow of information on the touch screen display.

***Goals:***

- A complete redesign the current CTA Transit Card vending machine informed by evaluations of the current system and feedback from current users.
- Design of a CTA Transit Card vending machine that makes purchasing a card as simple and quick as possible.
- A mock up of the flow of information that would be presented to the user using HTML5.
- A rough mock up of what the new machine would look like.
- A report detailing the features, design justification, and possible problems of the new design.

## User Research

### *Competitive Analysis*

In order to design the new machine, we will be considering similar machines that in place in other cities. One of the most advanced machines in the world is in Shanghai, China. In Shanghai, the machine uses a touch screen and simple coin and bill slot for all user interaction.



The machine has a simple look and was designed with aesthetics in mind. The machine does not overload the user with information, and has a clear flow of information to help the user quickly complete their purchase. This is a model that we will be using in order to successfully develop our mock-up for the CTA machine. It is also worth noting that the Shanghai machine is low enough for easy access for customers with disabilities. The audio system could also help those blind people. It is possible to link your shanghai public transportation card to your cellphone. That way you can just scan your cell phone without needing to even purchase a fare card. This ability may be out of our current design possibilities - but with a adaptable touch screen, it would be easy to update to this newer technology.

## Heuristic Evaluation

A Heuristic Evaluation is an informal usability research method focused mainly on the design of an interface. It uses a well-known system of algorithms in order to gather information and judge the usability of a product <sup>2</sup>. These heuristics can be used to help someone who is familiar with the interface gain a better understanding of what it would look like for a new user. The usability evaluator walks through the steps of using the product, noting which areas need to be corrected and which can be ignored.

For this evaluation, we used a three pronged system to represent the problem areas. The system is set up like a traffic light - Green (passable in its current form), Yellow (caution - possible problem), and Red (needs to be fixed immediately).

<i><b>Heuristic</b></i>	<i><b>Rating</b></i>	<i><b>Explanation</b></i>
Aesthetic and minimalist design		The machine is full of unnecessary and cluttered information and is the exact opposite of 'minimalist.' It is not aesthetically pleasing. It uses an outdated interface and LCD screen, does not have an easy to follow flow of information, and seems to have two sets of directions that would only confuse users.
Help and documentation		The instructions are written on machine so they are always visible - but the design of those instructions makes it very difficult to follow them and quickly find any help you need. If you were to only focus on the screen and buttons below it, it would be easy to quickly go through the process - but the rest of the machine makes that very difficult. The documentation is there - but the aesthetics are not. The machine also makes mention of a "transit card" and a "Chicago card" - but does not describe the difference between the two. This would be very confusing for a first time user.
Recognition rather than recall		The instructions are written on machine so they are always visible - but the design of those instructions makes it very difficult to follow them and quickly find any help you need. If you were to only focus on the screen and buttons below it, it would be easy to quickly go through the process - but the rest of the machine makes that very difficult.
Help users recognize, diagnose, and recover from errors		While we did not run into any error messages, it is clear that the machine in its current form would not be able to give dynamic error messages. The user would have to search the machine to find the answer if they were stuck with a problem - which would be difficult and time consuming.
Visibility of system		Screen has information - but it is very static. Each action

status		gets one screen - there is no additional help if someone is taking a long time, etc.
User control and freedom		Large red 'cancel' button below screen does a good job of this. However, once canceled, there is no way to pick up where you left off - it is a very final cancel. It would be a good idea to give the customer the possibility to take a step back rather than having to start from the beginning. Also, although it is written on the machine, it is not clear that no change will be given for a purchase. It would be a good idea to either allow change or make it very clear that no change will be given.
Match between system and the real world		The CTA does not use the word 'card' instead of ticket, though that is a system-wide use and is relatively common. It may confuse new users, however. The machine also uses the word 'vend' instead of 'purchase.' Vend is not a word commonly used, and it may confuse users. Purchase would be a more contemporary word.
Error prevention		Screen gives update on amount of money put in machine and what to do for the next step - but getting to those steps could be difficult for a beginner. If you read them carefully enough, the directions on the machine would guide you through the process - but they are written in such a complicated way that following them would be difficult.
Consistency and standards		Card v Ticket, Vend v Purchase may apply - but on the actual machine the words used are the same. The machine does not describe the difference between a "transit card" and a "Chicago card" - and that also might be a problem.
Flexibility and efficiency of use		You do not have to read the instructions - it is possible to skip directly to the purchasing the card without even looking at the text on the machine. The four steps actually required to purchase the card should be more easily recognizable to new users.



## Materials and Languages

### *Materials*

#### **Fare Machine**

In order to build our CTA fare machine, we will fundamentally need to engineer a machine that is capable of accepting varying forms of currency, such as cash bills, coins, and credit cards. The machine must also be able to accept a customer's current fare card so that he or she can assess the card's current status and add funds. The machine needs to be able to produce new fare cards for customers, containing their purchased transit funds. In order to equip the machine with a high standard of modern usability, a touch screen will tie together all of these fundamental machine functions, acting as the user's core interaction with the machine.

#### **Touch Application**

To provide a proof of concept application, reminiscent of what our actual machine's system might look and operate like, we will be creating an application that can be demonstrated via touch, using a tablet computer. We will be supporting this application with industry-standard open source server technologies.

### *Languages*

As advancements are made with technology innovations, technology is intermingling itself with various aspects of a consumer's relationship with businesses. The challenge, for companies wishing to incorporate such technologies, is ensuring it is stable and robust enough to support future business needs and adapt to the ever-changing needs of consumers. Therefore, when

building something as significant, and widely utilized, as a CTA fare machine, choosing a solid software development strategy is vital.

### **HTML5 Viability**

Keeping this in mind, we have decided that we can actually make use of modern HTML5 technology to run our fare machine's touch screen application and visually design its user interface. From a design standpoint, this is definitely a viable option, as a real world solution. HTML is a highly standardized language that is supported across almost every Internet-enabled device in existence. It has solidified itself as a stable entity in the technology industry and, with the introduction of HTML5, is rapidly taking center stage, pushing some proprietary solutions out of popularity (like Adobe Flash).

### **Our Application**

To produce a realistic proof of concept application, we intend to pair HTML5 with modern CSS and the JQuery JavaScript library, producing a visually and functionally realistic application. To incorporate application logic into the system, we will be using PHP on the server-side, as well as MySQL for data storage. We feel that choosing to rely on these web technologies would not hinder the a fare card machine's functionality, compared with choosing a proprietary compiled language. It effectively keeps the machines from being "set in stone," making future changes much easier to deploy. This means that our fare machine will be able to rise with the technology industry, as well as with business/consumer needs, to always remain an innovative solution in the mass transit market.

## Schedule of Completion

Due Date	Description
March 6th	1.0: Requirements <ul style="list-style-type: none"><li>1.1: Research<ul style="list-style-type: none"><li>(what does the vending machine require)</li></ul></li><li>1.2: Competitive Analysis<ul style="list-style-type: none"><li>(how are other systems better/worse)</li></ul></li><li>1.3: Interviews<ul style="list-style-type: none"><li>(what do people like/dislike, what do they want)</li></ul></li></ul>
March 13th	2.0: Design <ul style="list-style-type: none"><li>2.1: Create Sketches</li><li>2.2: Obtain Feedback about Sketches</li><li>2.3: Finalize a Design (visual prototype of the interface)</li></ul>
March 27th	3.0: Implement <ul style="list-style-type: none"><li>3.1: Start Coding</li><li>3.2: Test Code</li><li>3.3: Fix Issues</li><li>3.4: Finalize the Code</li></ul>
April 3rd	4.0: Verification/Deployment/Documentation <ul style="list-style-type: none"><li>4.1: After Final Testing, Deploy</li><li>4.2: Project Write-Up</li></ul>

## References

1. CTA 2011 CTA Ridership Report (pdf)

[http://www.transitchicago.com/assets/1/ridership\\_reports/2011-Annual.pdf](http://www.transitchicago.com/assets/1/ridership_reports/2011-Annual.pdf)

2. Ten Usability Heuristics

[http://www.useit.com/papers/heuristic/heuristic\\_list.html](http://www.useit.com/papers/heuristic/heuristic_list.html)