# Introduction

This document details a touchscreen ATM interface created by Zichen Jiang and Kelvin Lin for Sfwr Eng 4HC3.

## Functionality

The ATM can validate a user through three different input methods: inserting their bank card, swiping their bank card, or entering an account number. Afterwards, the ATM will ask the user to enter a pin associated with their account. As a security feature, users will be given three attempts to enter this pin. If they enter it incorrectly three times the account will be locked out of the system, and a message will be displayed to the user telling them to go to the bank to unlock their account.

Once the user validates their account, they will be directed to a menu where they can select their desired tasks: withdraw, deposit, transfer, check balance, change pin, and sign out. The withdraw feature lets users withdraw money from the ATM, provided they already have money in their account. Users can also deposit money using the deposit feature, which will add money to their account. Users can transfer money to other users, provided that they have their bank number. Users can check their current balance, as well as their transaction history, using the check balance feature. Users can change the pin associated with their account using the change pin feature. Finally, users can sign out of the system using the sign out feature.

## Context

While the functionality of the system is universally accepted, the design of systems is constrained by cultural and societal beliefs and values. Different societies develop different conceptual models and have different expectations of how a system should work. In order to design a good interface – one that can be used by 95% of the population – a target population of users must first be described.

The target audience for the ATM machine will be the working population. This includes everyone 15 years of age and up. About 85.6% of Canadians have working knowledge of English, while another 30.1% have working knowledge of French. Aside from Canada’s official languages, the next most commonly used languages in Canada are Chinese, Punjabi, Spanish, and Tagalog. It will be assumed that most Canadians have prior experience with touch screens and ATMs, even if they are not contained within one system. Most Canadians using the ATM machine will also have used web browsers such as Internet Explorer, Mozilla Firefox, or Google Chrome, where the left pointing arrow is used to represent going back to the previous page, and the home symbol represents going to the root page (or home page).

# The Application Layout

The application is divided into two components: the ATM system, and simulated physical controls. The main ATM system is located at the top of the screen, and it is enclosed in a black border. The black border is not intended to be part of the system: it is there to separate the ATM system from the simulated physical controls.

There are 5 buttons below the application. The five buttons act as physical controls to the system. The simulate actions that the user can perform on the ATM without accessing the touchscreen interface. Such actions are inserting their card, removing their card, swiping their card, taking money from the machine, and inserting money into the machine.

**[INSERT SCREENSHOT HERE]**

The console is also used to denote simulated physical interactions that the user can have with the ATM. Such actions include the card reader being blocked, no money is dispensed from the machine, or the deposit box is closed.

# Providing a Bank Account Number

The first operation users make when using the ATM is providing their bank account. They can do this in three different ways: inserting their card, swiping their card, or entering their bank account number. Since inserting or swiping their card is a physical interaction, the system allows the user to preform those at any time before the user is logged in.

To enter their account number, users will need to tap on the initial screen to access the input selection menu. Afterwards, users will need to tap on the account number button to reach the interface for entering their account number. Users can use either the number pad on the touch screen or the physical number pad to enter their pin. In the application, this is simulated as users can either press on the on screen buttons to enter their pin, or enter their pin on the keyboard. Two options are given because some users may be uncomfortable typing their bank account number using a touch screen fearing that the fingerprints they leave behind may allow the next person to access their bank account. A text label below the text field will inform users they can use the physical keys.

The account number entry method is less assessable to the user because it is expected that option will be the least frequently used. Bank account numbers are commonly 16 digits long; however, a person’s short term memory can only hold about 7 items. Hence, it is expected that most people will not remember their bank account number, so instead of typing their bank account number from the card, they will rather insert or swipe.

In this application, bank account numbers are 10 digits long because the purpose of this application is to model strong applications of design principles rather than to create a hyper-realistic functioning system. To prevent slips such as tapping the same number twice or entering more digits than necessary, the text field is constrained to 10 digits. Users are also able to see the numbers they type in, as a bank account number is not private, and it is guarded by a personalized pin.

# Entering a Pin

As a security feature, once the user inputs their bank account number, the user is also required to provide a pin. This is intended to prevent unauthorized access to a person’s bank account. Like the bank account number, users may use either the onscreen number pad, or they may use the physical number pad attached to the ATM machine. However, unlike their bank account number, their pin will be blocked, so users will see black circles instead of the actual numbers they typed. This is intended to give users feedback so that they know that their input was registered, while protecting their privacy against people watching behind them.

Each pin is 4 characters long, as most people can remember 4 digits in their short term memory. Users are constrained to only entering 4 characters as any additional characters entered after the fourth character will not be registered.

## Success

If the user successfully enters their pin, one of two actions will occur. If the user swiped their card or entered a bank account number, then they will be directed to the main menu. Otherwise, if the user inserted their card, then they will be prompted to remove their card before they are directed to the main menu. The user is asked to remove their card first so they will not forget about their card after their transactions.

Once the user removes their card, then a mechanical guard on the ATM machine prevents the user from inserting their card again until the user is signed out. Likewise, swiping a card while the user is signed in will not have any effect on the system. In this application, this is represented by messages outputted to the console.

## Failure

Users are given three attempts to enter the pin correctly. This was done to account for slips and mistakes that users might make while entering their pin.

If the user incorrectly enters a pin once or twice, then they will be directed to a page with a large ‘X’ icon. The ‘X’ icon signifies to the Canadian audience that they have made a mistake. The icon uses the conceptual model of a barrier lets the user know that the previous input they provided cannot overcome the barrier. The icon is red, in contrast to the rest of the monotone interface, to emphasize the significance of the event to the user. It is assumed that most Canadian users will know that an ‘X’ is a negative signal because ‘X’s are commonly used to denote mistakes, errors, or prohibitions in signs and schools in Canada. Moreover, textual labels signal to the user the number of attempts they have remaining before the user gets locked out of the system.

If the user incorrectly enters their pin 3 times, then they will be locked out of the system. A label as well as an icon of a lock signals to the user that they have been locked out of their account. The conceptual model of a lock is used to let users know that they will need to obtain a key or special permission to access their account again. Text at the bottom of the screen will let users know that they need to talk to a clerk at the bank to get their account unlocked.

Speaking to a clerk is simulated by an action button in the software; however, when the button is pressed, and the user is locked out, then the interface reverts back to the initial interface. This is to simulate the fact that the ATM interface will reset in the time it takes for the user to go to the bank and to come back.

# The Main Menu

Once the user successfully logs into their bank account, they will access the main menu. To maximize discoverability, all of the possible transactions are displayed in the main menu. The user can access any transaction by tapping on the corresponding button.