Assignment M3:

FaceID Redesign Prototyping

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***Abstract—*** This report provides an overview of the brainstorming process and selection criteria, followed by three initial prototypes for the FaceID interface redesign. This study will first dive into the detailed description of each prototyping, then evaluate it from the perspective of the requirements stated in Assignment M2.

# 1 BRAINSTORMING PLAN

The goal of brainstorming is to generate many ideas for making FaceID more adaptive to the current pandemic circumstances. Research shows that it is better to start with the individual and then group discussions, so the brainstorming session begins with an individual process before brainstorming as a group.

I will be performing individual brainstorming twice throughout the week, focusing on the core problem we have for the FaceID interface - the ways users respond to the prompt and possible alternative payment authentications other than FaceID or password typing. Then I will be inviting five FaceID users, as an optimal size of people, to continue the brainstorming and potentially develop more ideas. The goal is to have at least twenty ideas before moving forward.

# 2 BRAINSTORMING EXECUTION AND RESULTS

The brainstorming session was executed as planned. As multitasking is not easy (holding the device, responding to the prompt, and then typing digits) for FaceID users to go indoors shopping, the brainstorming is focusing on two things that can potentially improve the user experience:

* Providing users with better ways to respond to the prompt if the FaceID fails - aiming to reduce users' time interacting with the prompt.
* Investigate other possible payment authentication methods on the phone, giving users more options than typing a long series of digits (password) to pay.

See *Table 1* and *Table 2* for the raw results collected from individual and group sessions, respectively.

***Table 1—***Raw results collected from individual brainstorming.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Users’ response to the prompt** | **Alternative payment authentication** |
| 1 |  | Orientation Detection. | Pattern drawing. |
| 2 |  | Voice controlling. | Shake the device a certain number of times. |
| 3 |  | Direct navigation to a different way of payment (no prompt and no response from the user). | Voice recognition. |
| 4 |  | Set “shopping indoors” mode in device preference (no prompt). | One-time pin via phone call or text. |
| 5 |  | Device motion recognition. | One-time pin via text. |
| 6 |  | Hand gesture recognition in front of the camera. | Long press on a particular button. |
| 7 |  | Double-click on a particular button. | Eye motion recognition (recognize rolling eyes, for example). |
| 8 |  | Simultaneously press on certain buttons. | Temporality allows no authentication required for the contactless payment on the phone. |
|  |  |  |  |

***Table 2—***Raw results collected from group brainstorming.

|  |  |  |  |
| --- | --- | --- | --- |
| **Count** |  | **Users’ response to the prompt** | **Alternative payment authentication** |
| 1 |  | Head motion detection. | Fingerprint - aka. TouchID. |
| 2 |  | Eye blinking recognition. | Retina recognition. |
| 3 |  |  | Extra security device - for instance, HSBC Online Security Device. |
| 4 |  |  | Microchip in the human body. |
|  |  |  |  |

Please note that there are some overlaps between the results from individual and group brainstorming sessions, and *Table 2* only has the unique results from *Table 1.* This report will apply the selection criteria below on those raw results to flesh out three ideas for prototyping.

# 3 SELECTION CRITERIA

The goal of this section is to isolate three ideas for prototyping in the following sections. The approach applied here is first to develop a persona then stretch it over time to a timeline of performing the contactless payment by phone.

The persona is created to emphasize the requirements defined from Assignment M2 - an iPhone user with FaceID enabled and is used to contactless payment for daily shopping. When performing the payment after the shopping, the persona first needs to have the device ready, attempt the FaceID to pay, respond to the prompt to use another way of authentication, try to pay again, and get the transaction approved. During this task, we probably want to reduce the time spent on a persona's interaction with the prompt or allow the persona to choose the authentication way in the first place. A more efficient way of authentication than typing in a long password is also in need under the shopping circumstance.

Connecting the persona/timeline to the requirements defined in Assignment M2, the prototypes should have no extra cost or devices needed, save users' time with better interaction with the prompt and be easy to use. We will be moving forward with orientation detection, setting "indoors shopping" mode and voice control to the prototyping stage.

# 4 A TEXTUAL PROTOTYPE OF ORIENTATION DETECTION

## 4.1 Creating the prototype

This prototype focuses on allowing users to choose their preferred way of authenticating a transaction during the payment. Since iPhones had enabled the "Orientation Lock" feature a while ago and the feature performance is stable, we would want to leverage the existing orientation detection ability from the iPhone for this prototype.

In the preference settings, we want first to allow users to set the authentication methods based on the device's orientation. For example, if the user is holding the phone victualling and close to the terminal, the device directly pops up the keypad for password typing; if the user is holding the phone horizontally, then the FaceID interface is enabled instead. The original popup asking if the user wants to pay by password will not show up unless the phone is not held horizontally or vertically.

## 4.2 Evaluation

This prototype is potentially improving the user experience from two primary metrics:

* Leverage the user’s experience to avoid unnecessary communication between the user and device, therefore, save some time on interacting with the prompt;
* Reduce the cognitive resources required to perform the contactless payment by simplifying "holding the device and typing the password" to "holding the device."

From the above description, this prototype fulfills the requirements of being novice-friendly, no extra cost, allowing users to easily navigate between FaceID and password typing and reducing the overall time to complete a transaction from M2. However, there is no straightforward prompt popping up for users to interact anymore. Users will need to be educated/informed about using device orientation to choose different authentication methods. This prototype meshes well with the audience described in the data inventory from M1 because it leverages the existing feature on iPhone.

# 5 A VERBAL PROTOTYPE OF SETTING “INDOORS SHOPPING” MODE

## 5.1 Creating the prototype

This prototype aims to allow users to preset the authentication method before shopping. By temporarily setting the "indoors shopping" mode in the control center, the FaceID will be disabled for the next two hours, no prompt will pop up for users to navigate to the keypad, and the keypad will directly show up once the user holds the device to the payment terminal. Possible questions regarding this prototyping are as follows.

*“Where and how to set the ‘indoors shopping’ mode?”* There are two ways to set the "indoors shopping" mode: (1) dig into the Settings, go to the Wallet & Apple Pay option, then enable this mode from the menu. You would see the toggle switch turning green once the mode is active; (2) navigate to the control center, and then enable this mode from there. The "indoors shopping" icon will be highlighted if the mode is successfully enabled. By default, for both cases, the model will be active for the next two hours.

*“How to end this mode?”* First, the "indoors shopping" will be automatically disabled after two hours. Secondly, you can follow the two paths mentioned above and manually turn the mode off. You will see the mode icon grey out from the control center once it is disabled.

*“How to make sure this mode is working properly?”* You will need to type in a password to unlock the screen, access bank apps and proceed with a contactless payment by phone as the FaceID is temporarily disabled. Also, you can verify by checking if the ratio is green from settings or if the indoors shopping icon is highlighted in the control center.

## 5.2 Evaluation

Similar to the orientation detection prototype, this prototype is potentially improving the user experience from the below metrics:

* Simplify the authentication process by removing the prompt and directly type in passwords to pay. Save users time on navigating from the FaceID interface to the keypad and improve the time efficiency;

This prototype primarily meets the fifth requirement listed in M2 - The overall time spent on contactless payment should not be longer than directly typing in passwords to pay. However, this prototype is not novice-friendly enough as the user needs to be familiar with the contactless payment and the iPhone preference setting cycle.

Additionally, two hours may be too long or too short for shopping; this prototype can allow users to set customized periods for indoor shopping.

# 6 A WIZARD OF OZ PROTOTYPE OF VOICE CONTROLLING

## 6.1 Creating the prototype

This prototype transfers the screen control to voice control when proceeding with the contactless payment by the FaceID interface. By programming the command scripts in the device and leveraging the help from Siri, users will be able to instruct their devices on each stage of completing the payment task and potentially save the time spent on each step. Sample audit commands are listed below, and one of my friends will act like Siri to perform my verbal instructions.

*“Disable/Enable the FaceID.”* My friend will understand this command and disable/enable the FaceID feature on my phone.

*“Disable/Enable the FaceID for the next x minutes.”* My friend will dig into the device settings to disable/enable the FaceID, leave it for *x* minutes, then revert the settings to where it was.

*“FaceID/Password.”* When holding the device close to the payment terminal, the prompt shows up and asks if I want to use a password to authenticate the payment or try again with the FaceID. I will verbally respond with my choice, FaceID or passwords, and my friend will help me click on the prompt.

## 6.2 Evaluation

This prototype fulfills the below requirements from Assignment M2:

* FaceID should allow users to pick which authentication way they want to use if necessary - users can verbally choose the FaceID or password when performing the payment task;
* Users should easily navigate between using FaceID and typing in a password on the screen - users can choose their preferred authentication method by verbally responding to the prompt.
* Such features should be novices friendly and easy to be picked up - this prototype is easy to be picked up because all the verbal commands are from daily conversation.
* The overall time spent on contactless payment should not be longer than directly typing in passwords to pay. This prototype also saves time by not attempting the FaceID if users already know the FaceID would fail.

Plus, this prototype can potentially leverage the help from Siri, and no extra cost is needed besides programming the command script into the software.

A downside of this prototype is verbal commands may be hard to recognize during a noisy environment - a grocery store, for example. More research and investigation are needed to eliminate the effect of noise when voice controlling the FaceID.