

# Assignment M3

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**Abstract**— Peer-to-peer and social media applications have drastically changed the way daily tasks are performed. Friends can keep in touch on Facebook, video streaming transforms your home into a movie theatre, and payment apps can replace physical forms of payment like cash or checks. Some applications have enhanced our lives, but digital payments have lacked traction and capability. After completing various needfinding methods, the results are used to improve the Venmo payment app. A brainstorming plan will be presented along with three possible prototypes for enhancing sending or receiving payment functions.

## 1 BRAINSTORMING PLAN

In order to have a productive individual brainstorming session, a plan with standards and objective criteria will be met. I will set aside 30 – 60 minutes to write down a minimum of 30 ideas onto paper. Ideas will utilize a minimum of three different technologies to encourage thinking outside of the box. The main goal will be written at the top of the page before the brainstorming session begins to keep ideas focused. Below the main goal, keywords from the results of the needfinding plans will be listed to keep ideas within relevance and scope. Since Venmo has a send and receive payment function, the page will be divided in half to separate and categorize ideas.

## 2 BRAINSTORMING EXECUTION

The results of the brainstorming session are shown in *Figure 1*. Devising a brainstorming plan prior to gathering ideas greatly increased my productivity. I was able to write down roughly fifty ideas utilizing different technologies ranging from Bluetooth, voice commands, NFC, and artificial intelligence through image parsing.

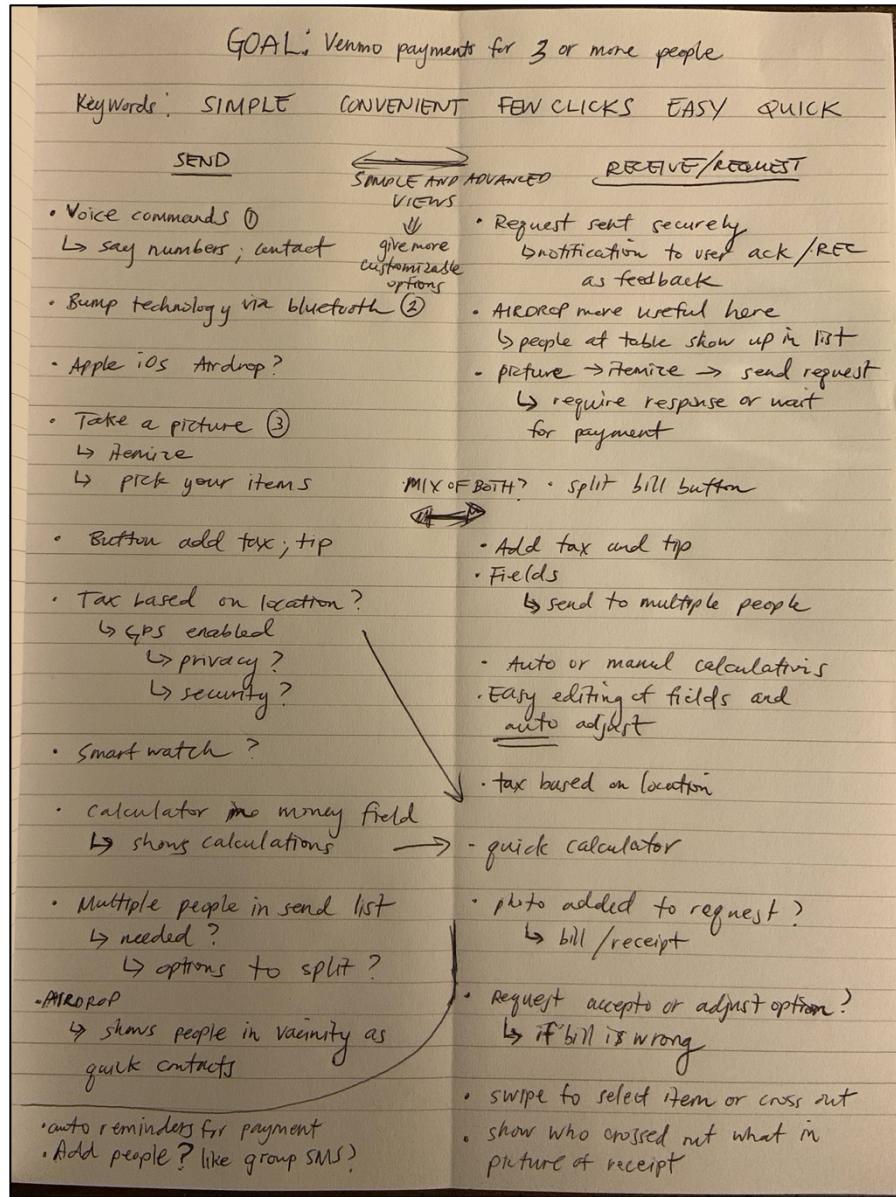


Figure 1 - Brainstorming Results

Dividing the paper to categorize my ideas between sending and requesting payments is the most valuable requirement in the brainstorming plan. This really helped organize ideas and gently guide the thought process, rather than bouncing back and forth and losing track of ideas. Although brainstorming can get messy, which *Figure 1* proves, the separation of ideas was able to show how the interface design must flow cohesively for both send and requesting functions. For sending payments, ideas leveraging voice commands, Bluetooth, NFC and

Apple airdrop to make setting up payments easier were noted. An in-field calculator and quick buttons to automatically add tax and tip exist in both sending and requesting payments. There is a feedback idea for acknowledging payment requests and auto reminders for all users in a transaction. Image parsing may not be as relevant in sending payments but could be more useful to sort a bill when requesting money from three or more people.

### 3 SELECTION CRITERIA

In order to select three ideas for prototyping, key concepts were put in a table to analyze feasibility and applicability towards keywords from the needfinding plan results. *Table 1* summarizes the sending function ideas and *Table 2* is a summary of the request function ideas.

**Table 1 - Sending Ideas Summary**

\* (#) number in parenthesis corresponds to prototype idea for implementation

Idea	Simple	Convenient	Quick	Feasibility	Prototype
Voice commands	NO	NO	NO	HARD	Not useful and awkward
NFC	YES	YES	YES	HARD	Hard, not needed
Airdrop	YES	YES	YES	EASY	IMPLEMENT (2)
Calculator	YES	YES	YES	EASY	IMPLEMENT (1)
Views	YES	YES	YES	EASY	IMPLEMENT (3)
Tax, Tip, Split	YES	YES	YES	EASY	IMPLEMENT (1)
Smartwatch	NO	NO	YES	HARD	No, no value

**Table 2 - Requesting Ideas Summary**  
 \* (#) number in parenthesis corresponds to prototype idea for implementation

Idea	Simple	Convenient	Quick	Feasibility	Prototype
Image parsing	YES	YES	NO	HARD	IMPLEMENT (3)
NFC	YES	YES	YES	EASY	NO
Airdrop	YES	YES	YES	EASY	IMPLEMENT (2)
Calculator	YES	YES	YES	EASY	IMPLEMENT (1)
Views	YES	YES	YES	EASY	IMPLEMENT (3)
Tax, Tip, Split	YES	YES	YES	EASY	IMPLEMENT (1)
Feedback	YES	YES	YES	EASY	IMPLEMENT (2)

The prototype for each implementation increases in feature complexity as shown in each Figure's Prototype column. For example, prototype 1 will implement the quick calculator, tax, tip, and split functions at the most basic level. Prototype 2 will implement Airdrop and payment feedback capability. Prototype 3 will include all features from prototype 1 and prototype 2 in addition to adding more customizable options when splitting payments from an advanced view. Prototype 3 will also add image parsing to automatically itemize a receipt from a photo. All prototypes will be designed with a hypothetical scenario of splitting a meal with 6 people where one individual paid for the bill.

#### 4 PROTOTYPE 1 – TEXTUAL

Given prototype 1 is the simplest of the three, a textual approach will be used to describe the interface design. Prototype 1 integrates the main functionalities to accomplish the task of splitting costs in a group of three or more people.

#### 4.1 Sending Payments

The hypothetical situation requires the user to be able to calculate how much money to send to the person that paid the entire bill. To make this task easier and quicker, prototype one integrates a quick calculator, automatic tip, and location-based tax buttons in the send payment function.

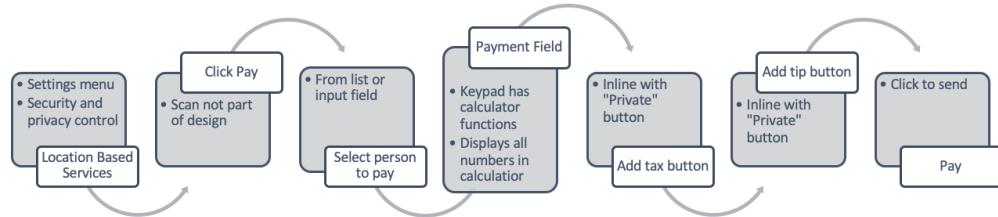


Figure 2 - Sending Payment Process

Referring to *Figure 2*, location-based services will be enabled/disabled when a user creates a Venmo account and can be modified in the settings menu. If a user chooses to disable location-based services, an average sales tax percentage will be used for the “add tax” button. After clicking “Pay” and selecting a person to pay, the payment field is highlighted, and numeric keypad is displayed. The numeric keypad will have functions for addition, subtraction, multiplication, division, and will display the entire calculation string in the payment field. Example,  $15.99 + 20.99 + 2.99 + 5.87 = \$45.84$ . Displaying the entire calculation string keeps track of items and provides proof to the recipient of what items are being paid for. When the sender is satisfied with the total, tax and tip can be added by clicking the buttons next to the “Privacy” button in the app. If location-based services are enabled, correct tax for the user’s location will be added. The “add tip” button will bring up a sub-menu with options for custom tip, or predefined percentages of 10%, 15%, 20%. The custom tip field will also have a numeric keypad with calculator functions. The final payment string with color-coded tax and tip will display as  $15.99 + 20.99 + 2.99 + 5.87 + (\text{3.55 tax}) + (\text{5 tip}) = \$54.39$  and be seen by both the sender and recipient. Tax and tip can also be removed and automatically re-adjust the total to reduce re-calculating totals. Clicking the “Send Payment” button will notify the user the payment was sent securely to the payee.

## 4.2 Requesting Payments

From the requestor point of view, the location-based services, tax, and tip functions are identical to sending payments. The buttons to add tax and tip are located next to the Privacy button in both send and request payment interfaces.

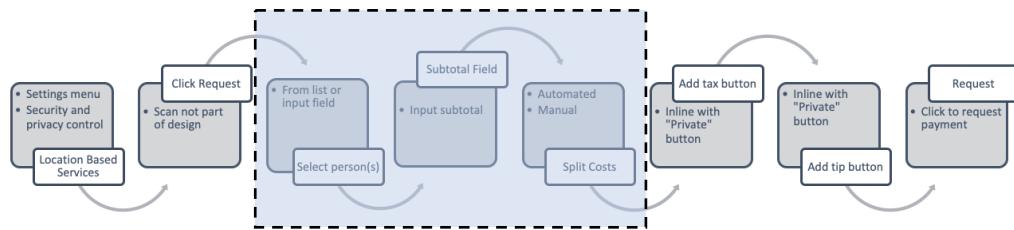


Figure 3 - Request Payment Process

The main differences are highlighted in *Figure 3* when selecting multiple payees, inputting a subtotal, and splitting costs. When the request payment button is clicked, unlike the sending payment interface, the request payment interface allows the user to select up to five different contacts. After people are selected, the payment interface highlights the subtotal field at the top with each requestee listed below and a total requested for each person. On the bottom of the payment interface, there will be a “Split” button on the left and a “Request” button on the right. Clicking this will split the subtotal entered equally amongst all individuals. Editing a single requestees total request amount will automatically split the new remaining total with the other requestees. When all totals are correct, the requestor can add tax and/or tip and request payments to all people by clicking “Request”. A notification pop-up will notify the requestor that payment request was sent to respective individuals securely.

## 5 PROTOTYPE 2 – PAPER

For prototype 2, the paper method was used to show the process for adding quick contacts based on iOS Airdrop/Bluetooth and feedback notifications. *Figure 4* and *Figure 5* show the sending payment process and requesting payment process respectively. You can follow each paper prototype to simulate interacting with a user interface.

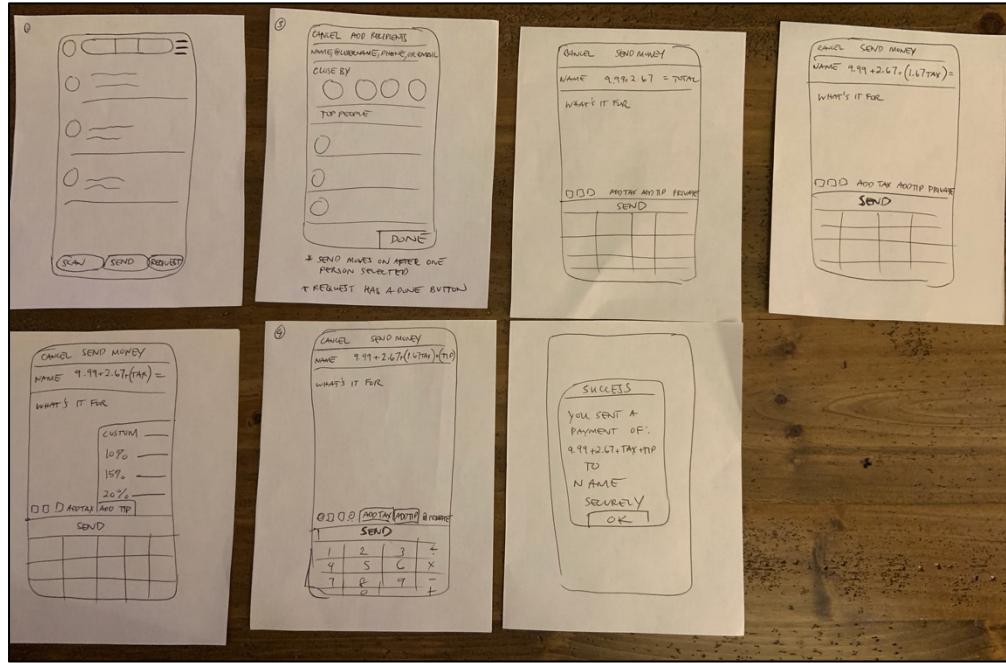


Figure 5 - Sending Payment Process

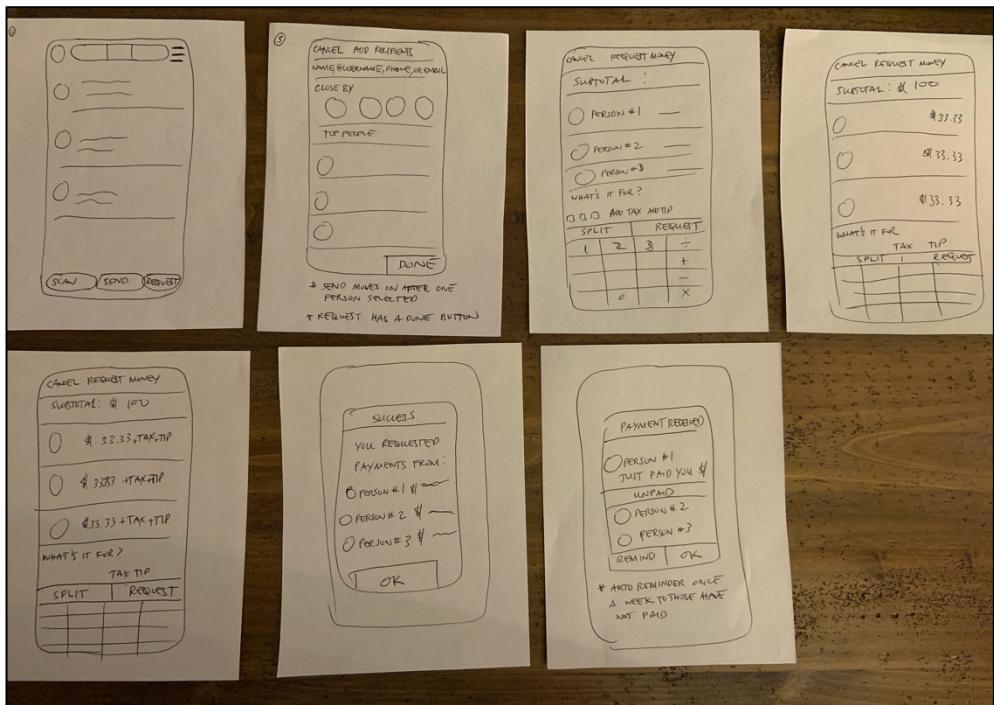


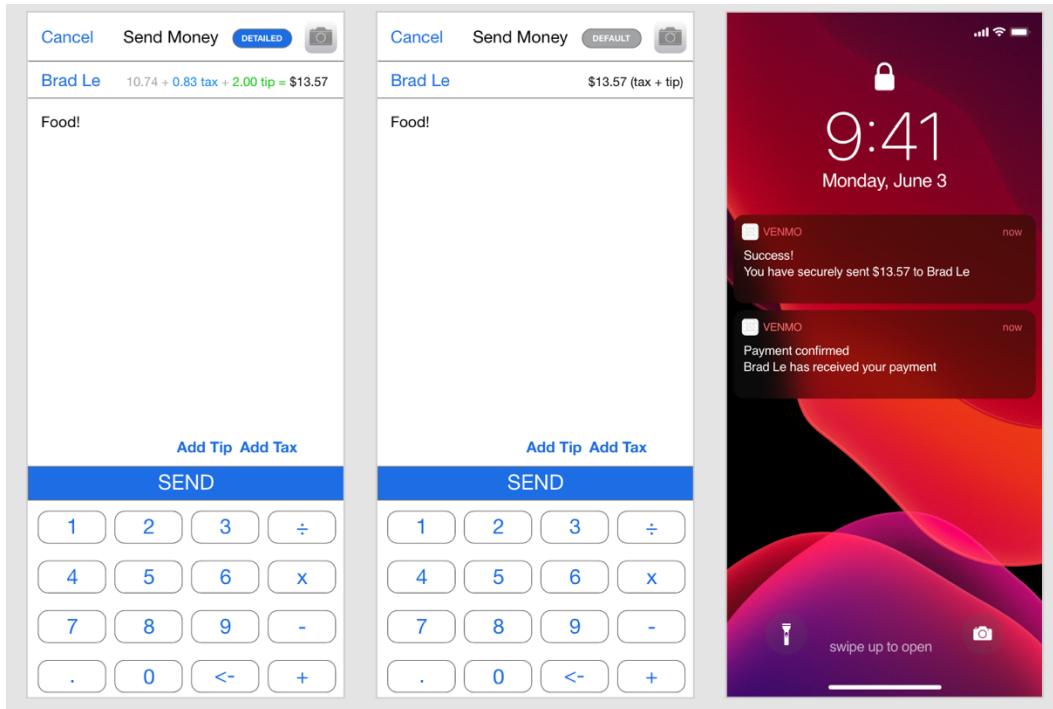
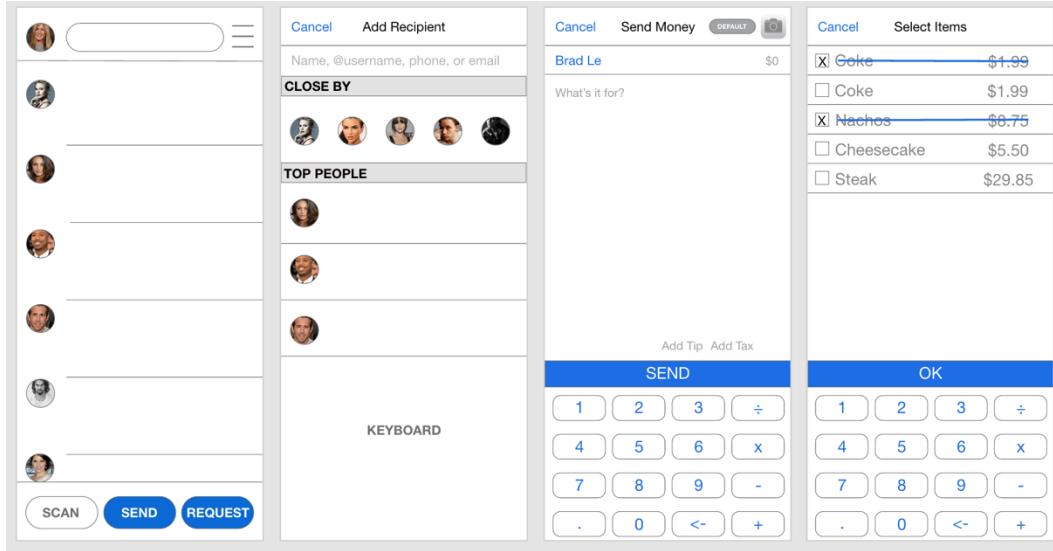
Figure 4 - Request Payment Process

## 6 PROTOTYPE 3 – WIREFRAME

Prototype 3 is the most complex and feature heavy prototype. Therefore, the wireframe method was used. In the send and request payment sequences, there are wireframes showing the addition of image parsing for taking a picture of a receipt. The parsing is smart enough to itemize duplicate ordered items and shows how the user can assign items to each requestee for payment. A “Default” and “Detailed” view give more customizable options and increased visibility for payment calculations. Refer to *Appendices 7* to walk through how each function works.

## 7 APPENDICES

### 7.1 Send Payment Wireframes



## 7.2 Request Payment Wireframes

The wireframes illustrate the process of requesting payment:

- Add Recipient (up to 5):** Shows a list of contacts under "TOP PEOPLE" and a keyboard at the bottom.
- Request Money:** Shows a list of recipients with their names and amounts (\$0). It includes fields for "What's it for?", "Add Tip", "Add Tax", and a numeric keypad.
- Summary Screen:** Shows the subtotal (\$48.08), breakdown of payments (\$12.02 for each of three people), and a "Your share: \$12.02" button. It also includes "Add Tip" and "Add Tax" buttons.
- Assign Items:** Shows a list of items with checkboxes and their prices (\$1.99, \$1.99, \$6.75, \$5.50, \$29.85).
- Request Money (Detailed):** Shows the breakdown of the total amount (\$56.81) among three recipients, including tax and tip calculations.
- Success Screen (iPhone Home Screen):** Displays notifications for Venmo payment requests and successful payments received.