Usability Study Report

Evidence of the recordings:

Author: Zhengyi Xu

Application scope

Application description:
BillSplit is a streamlined expense sharing application designed to simplify one-to-one financial relationships. The application allows users to manage (add, edit and delete) multiple friends but focuses on splitting individual bills between the user and a single friend at a time.

Home page will by default show a user's dashboard for total balance as well as active friends with their current balances. The user can also choose "Settle" to settle historical bill with the chosen friend. An "Expenses" button on the navigation bar leads to full expenses page with filtering and sorting functions, as well as add expense functions. CRUD operations are available on expenses and friends.

Users - Target audience:

1. **Jordan (28, Apartment Sharer)** shares an apartment with one other person Larry and needs to track shared household expenses.

   "I need to track shared household expenses like rent, utilities, and groceries, and maintain a clear record of who paid for what to keep our financial relationship balanced."

   User Story:

   As someone sharing an apartment with one roommate, I need to track our household expenses consistently. We have recurring expenses like rent and utilities that alternate between us each month, as well as variable costs like groceries and household supplies. I want to quickly add these expenses, specify who actually paid the bill, and have the app update our balance automatically. Sometimes one of us pays for larger expenses, like our semi-annual renters insurance, and we need to split that over time. I'd like to see a chronological list of all our shared expenses and be able to settle up periodically to keep our financial relationship balanced. This helps us avoid uncomfortable money conversations by having clear, indisputable records of who paid for what.

2. **Yuki (24, Intern Buddy)** Yuki is doing her first internship in a company and has made friends with another intern with constant lunch and coffee chats together.

   "I want to maintain exact records of expenses with my new friend without mixing financial obligations."

User Story:

As a new intern building friendships at work, I need a simple way to track expenses with my lunch buddy. We frequently grab meals and coffee together, sometimes taking turns paying or splitting the bill differently each time. I want to quickly record these expenses on the spot, indicating who paid and exactly how much each person owes, without awkwardly calculating splits during our conversations. The app should maintain a running balance between us and categorize our spending patterns on coffee breaks versus lunches. I'd appreciate getting notifications when my friend adds a shared expense and having clear records of our transaction history that I can review later. This helps me maintain financial clarity in our new friendship without mixing personal and professional boundaries, ensuring neither of us feels uncomfortable about money matters as we navigate our internship together.

3. **Susan (26, Precise bills splitter)** Susan values financial clarity and prefers direct financial relationships.

   "I want to maintain exact records of expenses with each friend and split different bills with different friends without mixing financial obligations."

   Susan's Story:

   As someone who values financial precision, I want to record exactly what I spend with each friend and split bills either evenly or with custom amounts. For instance, when I go to dinner with Pat, I want to enter the total bill, specify who paid at the restaurant, and indicate how we're splitting it. If we split the main course evenly but I ordered an extra drink, I need to adjust the split accordingly. I want the app to automatically calculate and update our balance based on who paid initially and how we split the bill. I'd like to be able to edit expense details if I make a mistake, and to settle up individually with each friend without mixing financial obligations. Having a clear history of all transactions with each friend helps avoid disagreements and maintains financial clarity.

Data description: (what data is stored and displayed)

The application uses MongoDB as the database backbone with two collections:

1. **Friends collection** - storing friend name, profile picture URL (can leave empty), and current balance (calculated from expenses collection associated with each friend)

2. **Expenses collection** - storing bill details of incurring date, with which friend, paid by whom, amount, splitting method, description, user amount owed, friend amount owed, and settlement status

Main tasks - use cases: (specific, measurable, concrete)
   ● T1: Suppose you are Jordan and uses BillSplit to track expenses with your roommate Larry. Find out if the bills between Jordan and Larry are settled? If not, find out how much money does Jordan owe Larry or how much money does Larry owe Jordan. Then settle the expenses and find out the same information between Jordan and Larry. Also go to expense

page and find expenses items with Larry to check if the settlement status is correctly reflected after the balance settling operation.

- T2: Suppose you are Yuki, an intern at Google. A new intern Mary just joined your team and you start to have lunch, coffee, pastries together. Therefore you need to add a new friend named Mary. After adding new friend Marry, and add one expense item of coffee, 25 dollars, today, evenly split, paid by you.

- T3: Suppose you are Susan, who has a good friend Ellen with whom you hang out a lot with and you always use the bill split application to log expenses shared. You had lunch today and you paid for the bill of 75 dollars and logged the bill. However, the restaurant later found out that they charged you the wrong amount and refunded you 10 dollars. Please find the edit the lunch bill with Ellen to the right amount.

Experiment

Preparation

Introduction
- Welcome participants
- Ask for consent to record
- Ask to think out loud
- Remind them that they aren't being evaluated, and that they can leave at any time
- Ask participant to think like the target audience

Prepare demographics questions (offer option to refuse to answer any of the questions. Only include relevant questions for the target audience)
- See attached demographic questionnaire filled by each participant.

Prepare recording setup (audio, video and screen)

Prepare Script of the tasks to be read to participants:
- Script for intuitiveness (initial approach): "Thank you for participating in the usability study. Please remember that you can stop at any time, there is no right or wrong answer, and any suggestion is helpful. Do I have your permission for recording? Before we start with specific tasks, please take a moment to explore the app and share any general observations about its functionality."
- Script for T1: "Suppose you are Jordan and use BillSplit to track expenses with your roommate Larry. Please find out if the bills between Jordan and Larry are settled. If not, find out how much money Jordan owes Larry or how much money Larry owes Jordan. Then settle the expenses and check the same information again. Also, go to the expense page and find expense items with Larry to check if the settlement status is correctly reflected after the balance settling operation."
- Script for T2: "Suppose you are Yuki, an intern at Google. A new intern Mary just joined your team and you start to have lunch, coffee, pastries together. Please add a new friend named Mary. After adding Mary, add one expense item of coffee, 25 dollars, today, evenly split, paid by you."
- Script for T3: "Suppose you are Susan, who has a good friend Ellen with whom you hang out a lot and always use the bill split application to log expenses shared. You had lunch today and you paid for the bill of 75 dollars and logged the bill. However, the restaurant later found out that they charged you the wrong amount and refunded you 10 dollars. Please find and edit the lunch bill with Ellen to the right amount."
-

Prepare Post questionnaire Likert Scales
- How effective was the application for T1 (1-5)
- How intuitive/easy to use was the application for T1 (1-5)
- How effective was the application for T2 (1-5)
- How intuitive/easy to use was the application for T2 (1-5)
- How effective was the application for T3 (1-5)
- How intuitive/easy to use was the application for T3 (1-5)
- How effective was the application overall (1-5)
- How intuitive/easy to use was the application overall (1-5)
- Any final comments suggestions of improvement

Experiment Notes

Participant 1

Demographic information:
    Age Range: 35-44
    Gender Identity: Man
    Education Level: Doctoral degree
    Employment Status: Student
    Primary Language: Chinese
    Geographic Region: United States

Detailed notes
- Notes for initial approach:
  - Participant was able to navigate the home page successfully
  - Understood the purpose of the app quickly
  - Commented that the interface was clean and straightforward
- Notes for T0:
  - Found Larry on the home page friend list without difficulty
  - Clearly identified the financial relationship from the balance shown
  - Successfully located the "Settle" button and completed the settlement process
  - Navigated to the expense page to verify settlement status
  - Noted that the "Expenses" button was not immediately obvious

Post-test questionnaire results (Likert scales):
- Effectiveness for T1: 5/5
- Intuitiveness for T1: 4/5
- Overall Effectiveness: 5/5
- Overall Intuitiveness: 4/5
- Feedback: "Button to the expense page is not obvious enough considering its importance. Make the font bigger or use color code to make it stand out."

Participant 2

Demographic information:
    Age Range: 25-34
    Gender Identity: Woman
    Education Level: Master degree
    Employment Status: Student
    Primary Language: Chinese
    Geographic Region: United States

Detailed notes
- Notes for initial approach:
  - Participant quickly understood the dashboard layout
  - Was able to identify the main functions without prompting
- Notes for T2:
  - Located the "Add Friend" function without difficulty
  - Successfully completed adding "Mary" as a new friend
  - Added the coffee expense correctly with all details
  - Suggested that the process required too many steps with separate "Apply" actions

Post-test questionnaire results (Likert scales):
- Effectiveness for T2: 4.5/5
- Intuitiveness for T2: 4.5/5
- Overall Effectiveness: 4.5/5
- Overall Intuitiveness: 4.5/5
- Feedback: "A single apply button to reduce waiting time would improve the experience"

Participant 3

Demographic information:
    Age Range: 25-44
    Gender Identity: Woman
    Education Level: Master degree
    Employment Status: Student
    Primary Language: Chinese
    Geographic Region: United States

Detailed notes

- Notes for initial approach**:**
  - Participant quickly understood the app's purpose
  - Navigated through different sections with ease

- Notes for T3**:**

  - Found Ellen in the friends list without difficulty
  - Located the expense list and identified the lunch transaction
  - Successfully edited the amount from $75 to $65
  - Completed the task efficiently with no hesitation

Post-test questionnaire results (Likert scales):

- Effectiveness for T3: 5/5
- Intuitiveness for T3: 5/5
- Feedback:
  - "Would like to directly add expenses from friend page"
  - "Would appreciate group bill split functions in the future"

Prioritized list of issues and corresponding changes:

Summarize the most crucial issues and changes proposed

Issue1: Expense page navigation is not prominent enough

Change: Increase visibility of the "Expenses" button by using larger font size and distinctive color coding to make it stand out in the navigation bar

Priority: Must

Was implemented?: Yes - Increased font size by 20% and changed button color to a contrasting blue that aligns with the app's color scheme while being more noticeable

Issue 2: Data loading waiting time when choosing each filter and sort condition

Change: Streamline expense creation process by implementing a single "Apply" button rather than immediately loading data when selecting each filter and sorting condition throughout the process

Priority: Should

Was implemented?: No – Save for future function upgrade to redesigned the form submission process to collect all information before applying changes with a single confirmation, reducing waiting time

Issue 3: Inability to add expenses directly from friend profile page

Change: Add a shortcut button on friend profile pages that opens the expense creation form with that friend pre-selected

Priority: Could

Was implemented?: No – Separated operations on friends and expenses on their own pages for clarity

Issue 4:

Issue: Limited to one-to-one expense splitting only

Change: Develop group expense splitting functionality to accommodate situations with multiple participants

Priority: Would

Was implemented?: No - Scheduled for future development phase as it requires significant database structure changes and UI redesign

Appendix: Demographics Questionnaire

Thank you for participating. Your responses help us better understand our audience. You may skip any question you prefer not to answer.

1. **Age Range**:
   - Under 18
   - 18-24
   - 25-34
   - 35-44
   - 45-54
   - 55-64
   - 65+
   - Prefer not to answer
2. **Gender Identity**:
   - Woman
   - Man
   - Non-binary/third gender
   - Self-describe: _____
   - Prefer not to answer
3. **Education Level**:
   - High school or equivalent
   - Some college/university
   - Associate's degree
   - Bachelor's degree
   - Master's degree
   - Doctoral degree
   - Professional degree
   - Other: _____
   - Prefer not to answer
4. **Employment Status**:
   - Employed full-time
   - Employed part-time
   - Self-employed
   - Student
   - Homemaker
   - Retired
   - Unable to work
   - Unemployed
   - Prefer not to answer
5. **Primary Language**:
   - English
   - Chinese
   - Other: _____
   - Prefer not to answer
6. **Geographic Region**:
   - United States
   - Other: _____
   - Prefer not to answer