University of Arkansas – CSCE Department
Capstone I – Final Proposal – Fall 2020

Receipt$ave

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Abstract

Have you ever been in a situation where you don't know how much you are spending a month? We are going to solve this problem. For this capstone project, our group is creating a mobile application to help organize your receipts to track what you spend. Take a photo of the receipt to help you organize your household items in the application. Also, the app will suggest simple recipes for what to make with the items you currently have.

The objective of this mobile app is to help people save time and stress when it comes tracking how much you spend a month. By having all your receipts, you won't have to worry about how much you spent. Many people have to worry about having a budget for groceries, and this app will help ease that stress level. This project is significant because it will help people be less stressed out about money and allows people to have one more asset available to help them keep track of their money.

1.0 Problem

Sometimes people cannot make food because they do not have enough ingredients to cook for dinner. In some cases, food ingredients in cans and freezers are too old to know when they were bought. People are uncomfortable with expired food and are nervous about eating it.

Many people do not know how much they spend every month. It would be nice for everyone to spend systematically within their income, but some people spend more than they earn every month. If consumption continues to exceed income, the ending may not be good.

When people buy an electronic product, they do not know the exact date of the purchase, so when it breaks down, they pay for it and fix it even though the item is still under warranty. In other cases, all manufactured goods have a holding period of the performance parts. For

example, if a consumer purchases a Toshiba computer, Toshiba will have to store the main components for seven years from the day the consumer purchased them, even if the computer is discontinued [1]. Consumers must keep receipts to prove their purchases, but otherwise they may not be guaranteed a holding period of the performance parts.

2.0 Objective

The objective of this project is to create an app where you can keep a record of all your receipts in one place. The app will be able to transform the receipt into text which can be easily be put in a Database to be able to track your spending.With this, you can track the total monthly spending through this process and you can set a target of how much you would like to spend in a month and it would show you how much of that has been used and how much is remaining.

With the receipt information in the app, this can be used to know the groceries you have and those you don't hence you can shop according to this list. Assuming that no groceries can go above 3 weeks, those items that have been on the list for more than 3 weeks will be automatically deleted and then when a new receipt is scanned the time value will be set back to zero. This information can also help you to think of a recipe which can come from the groceries you already have and if no recipe comes to mind then you can choose from the suggested ones.The app will allow you to set a reminder to buy groceries at your preferred time.

3.0 Background

3.1 Key Concepts

The first key technology related to this project is Optical Character Recognition (OCR). OCR is the conversion of images of printed letters into editable text forms. Our project captures images of printed receipts on mobile phones, recognizes text from the images, and manages users' spending and inventory based on their content.

The other key technology related to this project is MySQL. MySQL is an open source Relational Database Management System (RDBMS) that uses Structured Query Language (SQL) to request data from a database. In our project, the information read from the receipt will be stored and managed in the database.

3.2 Related Work

There are applications that have achieved some of the functions that our group intends to implement in this project area. The first application is Expensify: Receipts & Expenses [2] that is an application for managing receipts that allows you to capture photos of receipts, manage expenditures, and create financial reports. The other application is Forks Plant-Based Recipes [3] that is a recipe-recommending application that allows you to enter and search the name of the dish you want, show a list of different recipes, and add food ingredients to your food shopping list through the app.

In our project, our application not only provides expense management but also separately manages food items and shows possible cooking recipes using the user's food inventory. Furthermore, it is not just recommending recipes, but our project helps users reduce waste food items by notifying users that an expiration date of food is approaching and encouraging the use of the food items. To get the expiration date reminders, our project provides the recommended shelf life or allows users to enter them manually. Users can also easily check the list of food items they already have through the application, so it helps users avoid unnecessary spending.

4.0 Design

4.1 Requirements and/or Use Cases and/or Design Goals

- **Application Requirements**
    - The application reads the information off the receipt.
    - The information on the scanned receipt image and the information transformed into text should be the same.
    - The application will use a phone's camera to take a picture of the receipt.
    - Item information is added correctly in the database when it is read from a receipt.
    - Recommend recipes to users based on food information in the database.
    - Users can check the expiration date of the food items.
    - Inform the user that the food items are close to expiring and encourage the use of those items.
    - We will ask users to add some items manually that will verify the correctness of data.
    - The user will use the total amount and other amount as required if they need warranty notification or expiration date.
    - Users can track the total monthly spending and set a target of how much they would like to spend in a month and the application shows users how much of that has been used and how much is remaining.
    - Receipts can be saved as images in the app through the Save function.
    - The user interface is neat and easy to use.
- **Use Cases**

This application recommends food recipes that can be cooked based on the ingredients in the house. The application helps reduce the waste of food items by providing users with a list of

food inventory and a notification that the expiration date is approaching. It also shows the user's spending and helps them plan their spending.

4.2 [High Level / Detailed] Architecture

Download application
Open the file
Check the total number
Check the balance or the number of receipt
Upload the receipt or amount of money
Display the confirmation page
Store the file in the cloud and database

This is the simple implementation of the receipt. It will have a dataflow. It is a continuous process in one direction. It goes in one direction from top to bottom. It goes in one direction. Here people download applications on their android smartphones. It will uniformly take the picture of the receipt and update the database. It will make sure the money is spent, how much is owed to people, or how much money is spent. It can be spent weekly or monthly and it can be shortened. The system will be using the database for sure. It will be connected to the backend database. The backend database will be the place where all the files and folders can be stored. The system will be using an SQL database.

The customer will open the application. They will take the picture of the receipt. We will ask for the user to enter the manual data that is in a receipt. We will have a similar concept as the deposit of the check. Here it will have the idea. How a person is spent on what category. It will tell the time data and category.

We have to use the shortened algorithm. To short in different ways as needed. We will use a reference index in the database to sort the data. We will use client-server architecture in some parts. Here is a server we think as a loss of the application is hosted on the phone. In new computer networks are connected remotely request and receive the process.

Servers will wait for the request coming from the servers and to display the results. The necessary requirements in the hardware are located in personal phones and servers. Nowadays most of the smartphone has necessary requirements for client-server applications that will be run in an android program. We will have a huge impact on personal finance. As a student of personal finance, I`m very concerned about my expenses and income. Here we will adopt an app that will

revolutionize the impact on personal finances. People make their each day expenses and very wise decisions on how they're gonna spend their money looking at very relevant information on their phones. It is very easy to spend a lot of money every day without keeping track. That will help as the person to make a very wise and educated decision about my fiance and expenditure.

4.3 Risks

Risk	Risk Reduction
After the conversion process, the text is displayed incorrectly.	Test various situations to ensure proper conversion.
Data loss in the database	Prevent data loss through regular data backup and maintenance.

4.4 Tasks

Receiver into server
Request the file
Check the existing account or create a new account
Check the file and authenticate
Authorize the file access
Validate user

We are going to deliver an application that we are going to use Java, HTML, Javascript, PHP, and SQL databases. The frontend design and display will be completed in 4 pages of HTML pages and Javascript as required. The backend server will be java and my SQL.

The first task will be setting up the environment. We will be able to set up in the Android Studio, or Visual Studio. We will be using 4 HTML pages to display. We will link about 3 Javascript pages for the functionality of the page. And we will be creating Java in the back for

the underlying implementation of the backend. Java and MySQL is required to run the backend database so we will everything will be put together,

The first 2-week task will be setting everything. It will require the meeting and understanding the perspective of the people about the implementation. We will be focused on the display and design of the program on the front side. Where students will do color, font, and necessary set up for the backend. We will start to break down the task into small pieces. And makes sure what type of progress has been made in those tasks giving the attention if needed.

There is the connection issue of how the frontend and backend will be tied together. Where the frontend of the program will work with the backend program together. And the creation of the people who are working on it and making sure everything is done. Complete all the functionality on time and help the people to catch it up.

And we will be testing the program where we will use different methods. We will be doing unit testing for the program if it is working correctly inside. We will test the whole program as required as we go on.In the end, there will be a user manual where users can use it properly. And the program is uploaded in. the program will be on Github. It will be a document to look at, review, and make future updates, security changes, and free to use for educational purposes.

4.5 Schedule

Task	Dates
• Develop Final Proposal	11/25/2020 - 12/5/2020
• Design database schema • Set up SQL database server to specifications	12/5/2020 - 1/16/2021
• Develop backend API for the database to permit on-demand updates • Document database schema, tables, and API to interact with and update the database	1/17/2021 - 2/2/2021
• Implement display grocery items with expiration date in the database • Develop grocery spending analysis function	2/3/2021 - 2/16/2021

● Develop cooking recipe recommendation function ● Create sign-in page and implement sign-in functionality	2/17/2021 - 3/2/2021
● Implement picture upload function ● Develop OCR to recognize receipts and store data to database	3/3/2021 - 3/16/2021
● Develop notification about expiration dates on food from available data	3/17/2021 - 3/30/2021
● App UX & UI design and implementation ● Testing	4/14/2021 - 4/27/2021
● Document	4/28/2021 - 5/2/2021

4.6 Deliverables

- Design document: Technical information for software and database development.
- User documentation: How to use the software
- Database scheme: Detailed schematics on the database system that is used.
- Code: Mobile UI code and backend Java code
- Final Report

5.0 Key Personnel

Michael Panis – Panis is a senior Computer Science major in the Computer Science and Computer Engineering Department at the University of Arkansas. He has completed many relevant computer science courses through his education journey such as Big Data, Database Management Systems, and Software Engineering to name a few. Over this past summer, he was an Information Technology Intern at Phillips 66. Panis gained valuable, real-work experience that he can build off of in the future from the internship. He learned to use data analytic tools such as Alteryx and Tableau. He has experience with C++, Java, Python, Javascript, MySQL, and HTML. He will be working on the database, backend of the app, as well as testing of the app**.**

Ailin Zhang – Zhang is a senior Computer Science major in the Computer Science and Computer Engineering Department at the University of Arkansas. She has completed Software

Engineering, Database Management Systems, Computer Networks, and Artificial Intelligence. She had an internship experience as a Software Developer Intern at Koch Industries during summer 2020. She has experience with C++, Java, Python, Javascript, MySQL, and HTML. She will be working on the UX and UI design, frontend development, and testing the app.

Dilendra Khanal– Khanal is a senior Computer Engineering major in the Computer Science and Computer Engineering Department at the University of Arkansas. He has completed relevant courses like Database Management, Computer Networks, Software Engineering and Embedded Systems. He will be working on frontend development.

Hwajin Jeon– Jeon is a senior Computer Science major in the Computer Science and Computer Engineering Department at the University of Arkansas. She has completed Software Engineering, Database Management Systems, Big Data Analytics, and Computer Graphics. She has experience in Java, C++, MySQL, Javascript, Python, and HTML. She will be working on backend development.

Jaei Ryu – Ryu is a senior Computer Science major in the Computer Science and Computer Engineering Department at the University of Arkansas. He has completed Software Engineering, Database Management Systems, Computer Graphics and Big Data Analytics. He has experience in Java, C++, Python, MySQL, Javascript, and HTML. He will be working on backend development.

Fred Shumbusho – Fred is a senior Computer Science major in the Computer Science and Computer Engineering Department at the University of Arkansas. He has completed Software Engineering, Database Management Systems. He has experience in Java, MySQl, Javascript, React and HTML. He will be working on the server.

6.0 Facilities and Equipment

The equipment we will be using is our own personal computers/laptops. The facilities used will mostly be at our own homes/apartments. Hopefully next semester we will be able to meet on campus if need be, but if we are still in a pandemic meeting virtually online will do. We will be using a database on the backend, and the frontend will be creating the interface of the application.

7.0 References

[1] TOSHIBA, http://business.toshiba.com/downloads/KB/f1Ulds/13073/contents/09-037.htm

[2] Expensify, https://use.expensify.com/mobile

[3] Forks Plant-Based Recipes App, https://www.forksoverknives.com/app/