BUDGETOMATIC

A CAPSTONE PROJECT REPORT

BY

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SUBMITTED TO

SCHOOL OF COMPUTER SCIENCE ENGINEERING AND TECHNOLOGY

BENNETT UNIVERSITY

GREATER NOIDA, 201310, UTTAR PRADESH, INDIA

in

*Partial fulfillment of the requirements*

*for the degree of*

BACHELOR OF TECHNOLOGY

APRIL 2022

# CERTIFICATE

This is to certify that the capstone project report entitled “**Budgetomatic**” is being submitted by **Mr. Dikshant Dwivedi** (Enroll. No. E19CS194), **Miss. Pranjali Jain** (Enroll. No. E19CSE114) and **Mr. Kshitij Kumar** (Enroll. No. E19CSE146) to the School of Computer Science Engineering and Technology, Bennett University, Greater Noida, in partial fulfillment of the requirements for the award of Degree of Bachelor of Technology in Computer Science Engineering. It is an original research work carried out by him/them as the 6th Semester 1 credit course from January 2022 to April 2022.

The report has fulfilled all the requirements as per the regulations of this institute and has reached the standard needed for submission. The results embodied in this capstone project report has not been submitted to any other university or institute for the award of any other degree or diploma, degree elsewhere.

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# DECLARATION

We hereby declare that the work which is being presented in the report entitled “Budgetomatic”, in partial fulfillment of the requirements for the Bachelor of Technology in Computer Science Engineering is an authentic record of our own work carried out during the period from January, 2022 to April, 2022 at School of Computer Science Engineering and Technology, Bennett University, Greater Noida.

The matters and the results presented in this report has not been submitted by us for the award of any other degree elsewhere.

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# ACKNOWLEDGEMENT

We would like to take this opportunity to express our deepest gratitude to our mentor, **Dr. Vimal Kumar, Assistant Professor CSE(SEAS)** for guiding, supporting, and helping us in every possible way. We were extremely fortunate to have him as our mentor as he provided insightful solutions to problems faced by us thus contributing immensely towards the completion of this capstone project. We would also like to express our deepest gratitude to Prof. Deepak Garg, Dean, SCSET, Bennett University, who helped us in successful completion of this capstone project.

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ABSTRACT

Budgetomatic is an all-in-one personal bookkeeping, budgeting and accounting app that helps individuals to track and record their expenses. It provides users with a structured format to store essentially any category of expenses be it a commodity, utility, service, lodging, credit scores, tax returns or any one-time payments. It allows users to set reminders for any upcoming dues like rents, subscription renewals, bills, EMIs, etc. and alerts for any budget limit breaches for specified categories. It also allows users to keep an attendance record of daily wage manual service providers and manage their payrolls. It automatically generates a detailed expense analysis report for a selected time frame that contains category wise spending, total savings made, and personalized recommendations based on the user expenditure practices for better saving and future budget prediction. For convenience, the app has an inbuilt feature that allows users to scan receipts for auto-filling expenses with data and download the expense reports in excel format.

1. INTRODUCTION

In today’s consumer and service-driven economy, keeping track of our expenses and managing our finances is getting increasingly difficult. Imagine being a bachelor in Bangalore living in a rented apartment and working in a hectic corporate environment, you pay for services like housekeeping and cook on daily basis. You must pay your house rent and take care of monthly internet, electricity and water bills. You also have streaming services like Netflix and software subscriptions to pay for. Or, say you are running a household with children to take care of. There are countless expenses to look out for like school fees, groceries, house maintenance, health insurance, EMIs, loans, etc. You may also be a hosteler living on monthly allowances who always must survive on a cheap pack of noodles at the end of the month until the next one arrives. In all such scenarios, being conscious of where your money is being spent is hard. How can one maintain a budget or save money efficiently, if they aren’t even aware of what they are spending on? This is a perfect recipe for ending up in an adverse financial debt. Our team aims to reduce the hassle of managing and tracking the endless list of expenses by providing an app-based platform for the users’ book-keeping, reminders, and time to time expense analytics.

* 1. Problem Statement

The most important agenda that we are concerned about is saving and wise use of money. Following are the issues, Budgetomatic will be dealing with 1. Difficulty in manual budgeting - time and resource consuming, erroneous and lack of expertise in financial mathematics. 2. Missing due dates and paying late fines - Too many services, subscriptions, bills, and EMI payments to look out for. It’s very easy to forget the deadlines and must pay heavy penalties 3. Unorganized and unstructured budget - An average person has no expertise in dealing with accounting structures. They also do not have the time to research and develop expertise for the finding the most organized way of tracking expenses. 4. Complex expenditure analysis - The mathematics involved in tracking for serious budgeting can get very complicated and time consuming. It is easily a nightmare and a demotivating factor for the people who are looking to put a cap on their expenses. With Budgetomatic, the idea is to provide users with a report for specified timeframe that is generated using the best and most complicated finance tools available in the market and is capable to give them not only an informed idea on the state of their expenses but also ML based tips and recommendations as well.

1. Background Research

In the modern era, expenditure analysis has become chaotic and complicated without any pre-determined architecture to follow. People overspend their money on things that they don’t need and end up in adverse situations. Around 33% of the Indians don’t have enough savings to fulfil their needs and requirements. This is an agenda of big concern these days. The average earning of an Indian citizen is ₹3,90,000/year excluding taxes (as of 2022). The stats released by (MoSPI) Ministry of Statistics and Program Implementation reveal the following information about the expense patterns of Indians: • Indians spend a considerable proportion of their salaries. On average, they spent ₹ 77,085 per person according to the 2017-18 survey i.e., approximately 25% of their earnings. • Indian households expend the most on food items (₹ 22,500 / 30%), with dwellings and utilities (₹ 14,381 / 27%) and conveyance (₹ 13,567 / 20%) being the secondary and tertiary requirements respectively. • Medical coverage spending has expanded most rapidly since 2012 (18% on average per year, excluding inflation). As per the survey conducted by mint, which was based on the feedback from 500 partakers, 51 per cent of them put aside a particular proportion of their earnings each month. 45 per cent of the individuals who put away a piece of their savings said that they couldn't keep track of their expenses that were made through numerous UPI applications and needed to depend on their bank statements to do as such. As indicated by the survey, 35 per cent of these individuals find it challenging to find a dependable financial instrument with low-risk opportunities. The most important agenda that we are concerned about is saving and wise use of money. Following are the issues, Budgetomatic will be dealing with: 1. Difficulty in manual budgeting 2. Missing due dates and paying late fines 3. Unorganized and unstructured budget 4. Complex expenditure analysis

* 1. Proposed System

The project aims to bring all different kinds of expenses like water and electricity bills, insurances, EMI’s, groceries, house help salaries, etc. under one application-based digital platform “Expense Tracker”. The app will provide an organized and convenient user interface where the users will be able to enter the data into various categories. The app will make it possible for the user to keep a record of every purchase, whether it is a service, commodity, utility, or lodging. The app will also give a complete weekly and monthly analysis making it effortless for the user to track and manage their money well. Since most of the tasks will be done by the app, it will save a lot of time and effort for the user, making it easy-going.

* 1. Goals and Objectives

Table 1: Goal and Objectives

|  |  |
| --- | --- |
| **#** | **Goal or Objective** |
| 1 | Make the system extensible – future updates like bug fixes, interface improvements can be done easily. |
| 2 | Make the system easy to support – provide good documentation, configuration/build files, administrator’s manual. |
| 3 | Make the system very easy to use – users would agree that minimal to no training is needed. |
| 4 | Build a prototype that demonstrates the user interface by 21/04/2021 - in order to get early feedback from the customer/users. |
| 5 | Make the interface highly responsive with a consistent design language. |
| 6 | Reduce manpower by enabling automated testing and bug tracking. |
| 7 | Make the system flexible to changes according to early reviews and survey. |

1. Project Planning

This section covers the details of the project planning. Selecting the lifecycle of the development, project stakeholders, resources required, assumptions made (if any) are detailed in the sections below.

* 1. Potential Clients

Maintaining a budget is a widespread practice and as awareness increases, it is only increasing with time and a huge part of maintaining a budget is tracking expenditures. Given the broad spectrum of features covered, coupled with the fact that there are less alternatives in the personal budgeting app market, expense tracker has huge earning potential with a wide and diversified customer base. All the individuals struggling to put a cap on their expenses, maintain a budget or account of their personal spending are the major beneficiaries of this application. This includes homemakers, bachelors, students, etc.

* 1. Innovation in the Project

Receipt Scanning for Auto-filling expenses: The idea is to scan through bills/receipts/invoices and look for all the keywords required to automatically fill the expenses saving users' time and resources. Initially, the plan is to roll out the feature for specific type of printed receipts. With later iteration, the feature will accommodate wider variety of such expense accounts and also recognize hand-written receipts as well. AI/ML based personalized recommendations on user expenditure practices for better saving.

* 1. Different form Similar Existing Solutions

There are several pre-existing products for budget management. We have briefly mentioned some of those below along with their drawbacks: 1. Mvelopes: Is a web-based personal finance software that tracks expenses and analyze the report but does not have an attendance maintenance feature for manual service helpers. 2. Goodbudget: helps saves money and makes users know where they spent more than needed but is not free for users who want to create multiple accounts and since the categories of expenses are not pre-defined, the app makes it diligent and time-consuming for users to enter expenses. 3. Mint: Organizes the expenses, provides alerts/ reminders and shows budget analysis, but does not support multiple currencies and is not available in India. 4. Expensify: provides a very comfortable UI to use by choosing well-defined categories, but is bug-ridden, frequent loss of data is reported and accused of privacy policy violations. 5. Walnut: free budget tool that helps you track your income and expenses easily, but doesn't detect transactions through cash or UPI, no reliable manual adding option. Budgetomatic will be overcoming all these drawbacks. It will have attendance feature, pre-defined categories and have a secured backend.

* 1. Project Resources

Table 2: Project Resources

|  |  |  |
| --- | --- | --- |
| **Resource** | **Resource Description** | **Quantity** |
| Mongo dB cluster | A database cluster provided by the mongo dB for trial basis. | 1 |
| Capstone Team | Our team of students who will be the primary developers of the project. | 4 |
| Samarth Aggarwal | The mentor who will be able to provide us with technical assistance. | 1 |
| Windows workstation | An windows 10 workstation with VS Code and android studio for developing the android version of the software. | 4 |
| Android Phone | An Android phone to be used as test hardware for the mobile version of the software. | 2 |

* 1. Assumptions

Table 3: Assumptions

|  |  |
| --- | --- |
| **#** | **Assumption** |
| A1 | The capstone team members will be able to meet face to face once a week. |
| A2 | Mongo dB cluster will be available for the team to work with as a trial for the first month of the project. |
| A3 | Team members will be able to familiarize themselves with the Node.js, Android studio, and NoSQL. |
| A4 | Team will have sufficient time to complete a working model to present by the end of semester. |
| A6 | The development test data provided will be sufficient to create an accurate prediction of user actions. |
| A7 | The models developed will be easily extended to other forms within the time frame. |

* 1. Short and Long Term Planning

The initial phase of our app development process will entail planning and strategy development. We will determine everything from what this application will be about and who our ideal interest group will be, to which technologies, resources, and other information related to its development should be utilized, as well as our success objective. This will require about a month, and afterwards a project road map will be in undertaking. The following three to four weeks will be spent conducting research and learning the software and languages that will be utilized in Budgetomatic's development, such as android studio, firebase, java, etc. as well as figuring out how to work with and integrate all of the SDKs and resources for the application's various functionalities. The design stage follows, where we will grasp and iterate on the UI (user interface) and UX (user experience) design of our app until we have a final blueprint. We will create the figma file and afterward continue on to the development stage once it is completed. The design stage should take about 3 months. The development stage will incorporate creating and dealing with the project's database and coding the functionalities. The development stage will be completed within the next two or four and a half months. The last couple of weeks will be spent testing and debugging the app and its functionalities, ensuring that everything is in perfect sync with the database and that all of the features work.

1. Project Deliverables
   1. Measurables

* Month 1: We will finalise the technology stack. Then we'll begin learning Android programming and Node.js. We will begin by studying java from freecodecamp and then on to node js. In addition, we will learn about views and build a little form app to get a sense of how things work. To learn mongodB, we will go through the basics of no SQL databases. Will join up for Atlas, become acquainted with the UI, and launch a cluster. In addition, we will begin studying node js using express and be exposed to the backend. We will follow instructions on the internet to develop an attendance system and begin building up the project's basic ui layout. We will lay out the framework after all of the higher-level specifics have been completed.
* Month 2: We'll begin with developing the sign-up/sign-in page. To build up user authentication and safeguard routes that use client API, we will utilise the passport module in conjunction with auto0. We will create a logo for the app in Photoshop and display it on the flash screen. We will use Postman to test the login API and begin creating the site with a sliding tab layout. The navigation buttons on the top and bottom panes will be given full functionality. A floating action button in the expenses section will be used to open the window where new expenses and incomes may be created and recorded. The button will also have an auto-fill receipt scanning capability that may be utilised afterwards. The produced transactions are then entered into the spending section's daily, calendar, monthly, and weekly tabs, and a budget is calculated. Finally, the total tab will be utilised to compute the customer's overall budget for a specified time frame. The timeline may be altered by using the drop down menu on the main navigation bar.
* Month 3: After that, the "My Services" area will be created. The database schemas will be enhanced in this phase to include service assistants, attendance records, and general information. The APIs will then be created to make it easier to add, create, update, and delete multiple service providers. Following that, a mechanism for calculating salary based on worker demand and leave days will be developed. After that, we'll move on to the UI design of the reminders and notifications area. We will learn how to send push notifications via email and external applications to notify users when a due date or money limit is approaching.
* Month 4: We will finally start working on our final big part — the expenditure analysis dashboard. The dashboard is designed to provide a statistical summary of the user's costs and revenue in the form of visual tools such as a pie chart, bar graph, and so on, based on the information given by the user. A tool will be built to adjust the timeline here as well, and the user will be provided tips on how to save more money depending on their spending habits. Following that, we shall go to several main sub-functionalities. We will begin building the export excel report function, which will provide the whole information of the user's budget in one excel file.
* Month 5: In order to use the receipt scanning feature, we'll need a dataset for handwriting recognition. Following the acquisition of the dataset, we will pre-process it before training a machine learning model. The model will then be tested on various datasets to check that it is operating properly. Finally, we will include this functionality into our application. This would help customers to save time and effort by auto-filling their costs or income based on photographs when creating. Any outstanding tasks will be done. Bug fixes and product testing will take place at various stages. The UI will be provisioned depending on the time available, and extra functionality such as rapid app demo and multi factor authentication will be included. The app will be tested and shipped to the market.
  1. Ethics, Privacy and Moral Issue

By accessing this app, we assume you accept these terms and condition: 1. Budgetomatic reserves all the intellectual property right present on app. Any attempt to republish, sell, copy, distribute, reproduce, rent or sub license the brand name, logo, or visual content is subject to copyright and will be strictly taken actions against under the scrutiny of laws. 2. Budgetomatic may ask for permissions for enabling app notifications and alerts if the user wishes to utilize some features. The user will be prompted with such requests as and when any attempts are made to use those features. 3. We may collect and keep record of the following data about you: a. Information that you provide by registering onto the account. This includes information provided at the time of registration to Budgetomatic or subscription to any service use our site, posting material or requesting further services. Any such data is considered personal and will not be shared with any third party unless under the scrutiny of laws. b. We may request for more information if the user wishes to report certain content present on app. To improve the user experience, we may also ask you to complete optional surveys and maintain analytics of your visit to our servers and the resources you access. 4. Advertising policy: Budgetomatic makes use of advertisements to keep it accessible to the masses for free. Any personal information is not sold off to any third-party advertisers. The only data shared is user behavior on the app tracked through cookies. All the ads on this app are already reviewed using a combination of automated and human evaluation to make sure they pass quality standards and do not display any prohibited content. We care about user’s ad experience from start to finish—including the URL that ad links to. Any advertisements that require people to give away sensitive information without verification or link to pop ups or start automatic downloads into someone’s device are not allowed in Budgetomatic. 5. Payment terms and conditions: Budgetomatic reserves the absolute right to accept or refuse any payments made in any form. The site also doesn’t guarantee the availability of a service. All paid services can be cancelled within three working days after receiving the payment and a refund of 80% of paid amount will be made to user’s account. Budgetomatic cares about the user’s security. It doesn’t hold any credit/debit card details. They are held by trusted third party payment providers who have more experience with online transactions. No payment is made without user’s consent before hand. 6. Changes to terms: Budgetomatic may change, discontinue, temporarily or permanently suspend any service, feature or aspect of the app at any time, including, but not limited to availability, equipment and content needed for use or access. We may terminate these services.

1. SYSTEM ANALYSIS AND DESIGN

This section describes in detail about the design part of the system.

* 1. Overall Description

This project is an attempt to implement our knowledge of Java and a hands-on on softwares: Mongo DB, Node js and Android Studio to make a working mobile application. Providing the users an authentication feature that helps them to secure the app so that no one else can violate their privacy. The entered data provided by the user will be stored in Mongo DB for sign-in. All the record maintenance, expenditures and analysis would be done in the runtime environment with the help of Node JS.

We aim to cut down the workload of users by providing certain features that help them in their day-to-day life. This app would decrease their mental pressure.

After the installation of the app user need to provide personal credentials to get authenticated, this would help them to keep their data safe from any risk factor. The users are provided with the features demo facilitation for easy handling of the user interface. The attendance or the personal book-keeping feature of the app would help them to keep a record of number of days of helper’s visits, this would help them distribute salaries.

|  |  |  |  |
| --- | --- | --- | --- |
| Type of helper | Cook | Driver | House help |
| 1 March 2022 | Checkmark | Close | Checkmark |
| 2 March 2022 | Checkmark | Checkmark | Checkmark |

The user needs to provide the dates of payments, bills, loans etc. in order to get alerts and reminders before the passing of the due dates. User can ask for the analysis report weekly or monthly for which he must provide expected expenditure and income.

For the smooth working of the app the user must have an android phone version 10 with free storage space.

This app will be very user-friendly and can be easily used by any non- tech person.

* 1. Users and Roles

Table 4: Users and Roles

|  |  |
| --- | --- |
| **User** | **Description** |
| Developers | A capstone team who is tasked with managing the front end and backend, creating the first release, and ultimately generating a firm process for applying these techniques to future user data. This is used for sub-stories and task needed to fulfill the true end user use cases. |
| End user | End user of the product who will be providing the data used and reaping the potential benefits from the expenditure analysis generated from the product. |
| Researcher | A team of researchers for developing new methods and procuring already established methods for improved and effective expenditure analysis and organization model. |

* 1. User Stories

1. As a customer, I want to register myself so that I can secure my personal data and access it on any device.
2. As a customer, I want to maintain records of manual helpers so that I can manage their salaries easily.
3. As a customer, I want timely due dates alerts so that I don’t have to face penalties.
4. As a customer, I want to be introduced to the app, so that I can get familiar with the app quickly.
5. As a customer, I want get expenditure analysis report so that I can track my expenses and pinpoint where I went overboard with purchases.
   1. Design diagrams/ UML diagrams/ Flow Charts/ E-R diagrams
      1. Use Case Diagrams

Diagram

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Figure 1: Use-case diagram

* + 1. Activity Diagram

Diagram

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Diagram

Description automatically generated

Figure 2: Activity Diagram

* + 1. Sequence Diagram

Calendar

Description automatically generated

Figure 3: Sequence Diagram

* + 1. Data Architecture

Diagram

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Figure 4: Data Architecture Diagram

1. User Interface
   1. UI Description

* The idea is to have a bottom pane for navigating to various windows or wider functionalities. And a top sliding pane for navigating to the window specific sub-functionalities.
* Bottom pane functionalities -
  + Expenses
  + Analytics
  + Alerts and reminders
  + My services (Attendance and salary management)
* Top pane and sub-functionalities -
  + Expenses - daily, calendar, monthly, weekly, total
  + sub-functionalities - expense creation, auto-filling expense through receipt scanning
  + Analytics - Income analytics, Expense analytics, transactions, accounts, wallets, stats,
  + Reminders/Due date alerts - Set alerts, take action, see warnings and recommendations
  + My Services - Take actions, pay salary, see all the service providers, add update and delete, check and mark attendance, and calculate, view and manage salary.
  1. UI Mockup

Graphical user interface

Description automatically generated with medium confidence

Figure 5: Registration Page

Text, letter

Description automatically generated

Figure 6: Expenses Home Page

Graphical user interface

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Figure 7: Alerts & Reminders

Letter

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Figure 8: My Services

A picture containing diagram

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Figure 9: Analytics

Table

Description automatically generated

Figure 10: Overview of All screens

Diagram, schematic

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Figure 11: All screen with interaction

1. Project Closure

This section elucidates the overall lookup at the project and some of the future works that may enhance the solution.

* 1. Startup Plan

The worldwide personal budgeting software bazaar was valued at ₹7900 crores in 2019 and is predicted to expand at a CAGR of 5.7 per cent from 2020 to 2027, coming to ₹1,210 crores by 2027. The expansion in customer need to track and manage their spending, as well as the growth of mobile applications all over the globe, are the major reasons driving the market's developments. Besides, a surge in the focus of institutions on digitalizing their monetary services, as well as an expansion in internet clients worldwide, fuel the market's growth. Moreover, rising reception of personal budgeting and accounting apps in developing economies is predicted to open up rewarding opportunities for market extension. The estimated cost of this project, with an assumption that it is medium sized and the development process of which will run for about 12 months is approximately ₹9,12,520. which is totally affordable for Budgetomatic to be a startup. Moreover, given the wide range of functionalities covered, combined with the fact that there are less alternatives in the personal budgeting app market offering what Budgetomatic has to provide, it has huge earning potential with a wide and diversified customer base. So, our team believes that Budgetomatic is capable of being a successful startup.

* 1. Self-Sustainability

Personal budgeting and accounting is an issue that is independent of the era we live in. In fact, in the coming years, as the world becomes more service and consumer driven, the importance of tracking expenditure will only escalate with time. To stay relevant, Budgetomatic utilizes cutting edge AI technology to provide best in class financial tools, tracking, recommendation and analytics, and it also plans to further innovate with other relevant tech for an exemplary customer experience. So, the idea and the domain which Budgetomatic is targeting is a sustainable one. Sustainability however depends on a lot of other factors as well. Some in our control and others out of it. Ones that are in our control are the quality of the features and the value generation provided by the product. Budgetomatic can create assets by incentivizing users with a combination of some or all of the following choices: 1. pay per click advertising (google AdSense) 2. selling ad space 3. selling sponsored posts - The use of advertisements will be very limited, and it will be made sure that the user experience is not compromised with. All the ad spaces and sponsored posts will also be related to objective problem that Budgetomatic tackles with. Advertisements will be avoided if the user opts for a paid account. Any data that the app may utilize will be informed of, as and when the user visits the app. 4. providing paid services - One way to generate profit is by hosting receipt scanning auto fill and expenditure report in excel format as a paid service. A cap can be put on the limit of data that can be stored in the cloud premises of the application. 5. accepting donations from visitors Other than that, for innovation, Budgetomatic can increasingly move towards integrating various payment gateways and services for automatic expense tracking in the future. This can guarantee success and sustainability to our project.

To get external funding, our team will go through the following steps: 1. Present your concept to angel investors, venture capitalists, business incubators, and friends/family. 2. Obtaining feedback 3. Partnerships (shares/equity) 4. Promote the initiative on social media platforms such as Instagram, Twitter, LinkedIn, and Facebook in order to raise funds. 5. Look for crowd-funding incentives (where possible) 6. Make an application for government loan schemes and grants.

* 1. Remaining Work

1. Shared Accounts: This feature may be useful for families that wish to track and analyze total expenditures made by all members of the family in order to better manage and control the family member who spends the most on irrelevant items.
2. Wallet Integration: With the aid of this function, customers' money will be immediately saved in the app. This will benefit users by removing the need for them to manually enter costs into the app, saving time and effort. This will also help them receive more accurate analysis because no spending will be overlooked if they use the connected wallet.
   1. Feedback

* “This tool can help you stay focused on your financial management. You will gradually establish the habit of not overspending on items and services that do not help to the achievement of your financial goals. Budgeting allows you to see what money is coming in, how quickly it is leaving, and where it is going. However, as a developer, I believe that building a receipt scanning functionality in the time frame provided is a little ambitious.” – Srishti Kabtiyal, Appsflyer, Data-driven expert in Ad Tech, Partner Engineering and Growth Analytics.
* “I really like the idea behind the project. As someone who is very careless with money and lazy about budgeting, I am extremely excited about Budgetomatic. I love that I will be able to auto scan receipts and keep attendance track of daily wager manual helpers. However, it would be helpful if the app is able to automatically detect online transactions.” - Mrinalini Bansal, Amazon
* “I have a busy schedule and it's difficult for me to track my day-to-day expenses. With your app it will become easy for me to keep an eye over all the purchases and dues. But everything here needs to be written and lack of time doesn't permit me to write every small expense. So, integration with Paytm and similar app would be a cherry on cake.” - Samarth Aggarwal, Cisco
* “There are already existing applications which are based on expense tracking. Although the idea of bookkeeping and receipt scanning seems novel, but you can incorporate some features like a digital wallet using which users can store and pay money directly from the app itself.” - Priya Dwivedi, Rapipay Fintech

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