



***IL213: Innovation Lab and Grand Challenge Studio
(Semester 3)***

***Tuckmeister
Technical Report***

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INTRODUCTION

Nestled within the heartbeat of Plaksha University, the Tuck Shop, intended as a sanctuary for quick snacks and student essentials, grapples with critical inefficiencies. The current reliance on outdated credit tracking methods via WhatsApp has birthed a tapestry of issues—missed payments and communication breakdowns paint a vivid portrait of operational challenges.

This predicament is not unique to our campus; it echoes globally, affecting store owners and patrons worldwide. The crux of the matter lies in the lack of an efficient system to track credit, leading to not only financial discrepancies but also a glaring absence of awareness regarding product demand.

As we delve into the intricacies of Plaksha's Tuck Shop, we strive not just to alleviate local concerns but to present a comprehensive solution that resonates globally—providing a beacon of efficiency, transparency, and seamless communication for Tuck Shops worldwide through our innovative mobile application - '**Tuckmeister**'.



MAIN RESEARCH QUESTION

How can the tuck shop streamline credit tracking methods to minimise payment discrepancies, (replacing the current WhatsApp-based system and ensuring a transparent and efficient processes) , bridge the communication gap between students and Aadam Bhaiya (fostering a seamless dialogue to mitigate service-related frustrations), and effectively raise awareness of product demand among students, ensuring a responsive inventory system and reducing instances of out-of-stock items?

UPDATED BACKGROUND AND RESEARCH INSIGHTS

Campus Tuck Shops Challenges:

Studies, including Forbes' research, have highlighted significant challenges in campus Tuck Shops, particularly outdated tracking methods leading to missed payments and communication issues. Inefficient inventory management has been identified as a cause of financial losses and student dissatisfaction.

Retail Digital Transformation Trends:

Globally, the retail sector is embracing digital solutions, showcasing increased sales, enhanced customer satisfaction, and more efficient operations. The adoption of e-commerce and digital platforms has become a standard trend in enhancing retail experiences, including those within Tuck Shops.

Mobile Apps in Retail Enhancement:

A notable shift toward mobile app adoption in grocery and retail businesses has been observed. These apps significantly improve user experience, offer personalized suggestions, and streamline transactions, aligning well with the needs of campus Tuck Shops.

Technology Integration in Traditional Retail (Kirana Stores):

Even traditional retail setups like Kirana stores are undergoing transformation through technology integration. Data science and technological implementations have enhanced efficiency and catered better to customer demands, indicating potential solutions for campus Tuck Shops.

Flutter and Firebase Integration Significance:

Flutter and Firebase technologies are prominently acknowledged for developing cross-platform applications with real-time database capabilities. This integration promises robust, responsive, and interactive applications, aligning with the solution requirements for TuckMeister.

Key Statistics Supporting Technological Adoption:

- E-commerce Growth: The projected global e-commerce market growth to \$6.4 trillion in 2024 signifies the escalating trend toward online transactions, pertinent to Tuck Shop transformations.
- Mobile App Preference: Research indicates that 67% of mobile users favour shopping via mobile apps, underlining the relevance and potential adoption scope for TuckMeister.

- Data-Driven Decision-Making Impact: Reports highlight the efficacy of data science in enhancing inventory management and customer satisfaction, offering insights for Tuck Shop operational improvements.
- Flutter and Firebase Popularity: The widespread popularity of Flutter and Firebase within the developer community confirms their effectiveness in building scalable and responsive applications, ideal for TuckMeister's objectives.

Integrating Insights into TuckMeister's Objective:

TuckMeister aims to strategically leverage technology to tackle the identified challenges within campus Tuck Shops, aligning with the ongoing trends in retail digital transformation. Incorporating mobile app solutions, integrating robust technologies like Flutter and Firebase, and adopting data-driven strategies resonate with broader industry shifts, promising to revolutionise the Tuck Shop experience.

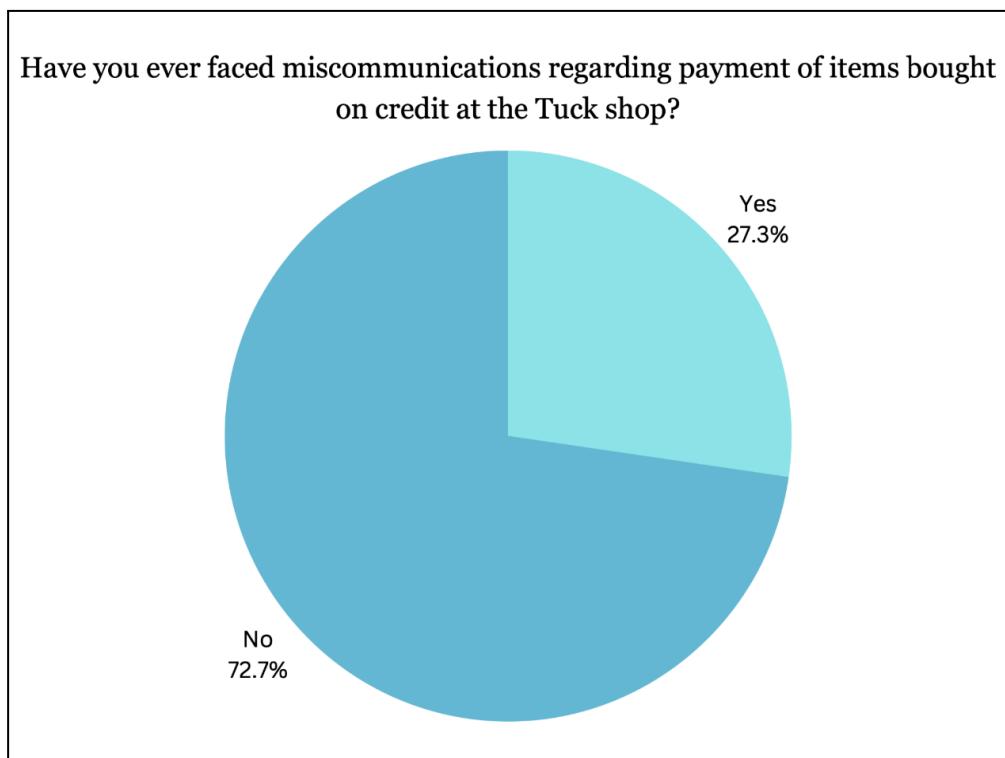
STAKEHOLDER INTERACTION

Initiation and Problem Discussion:

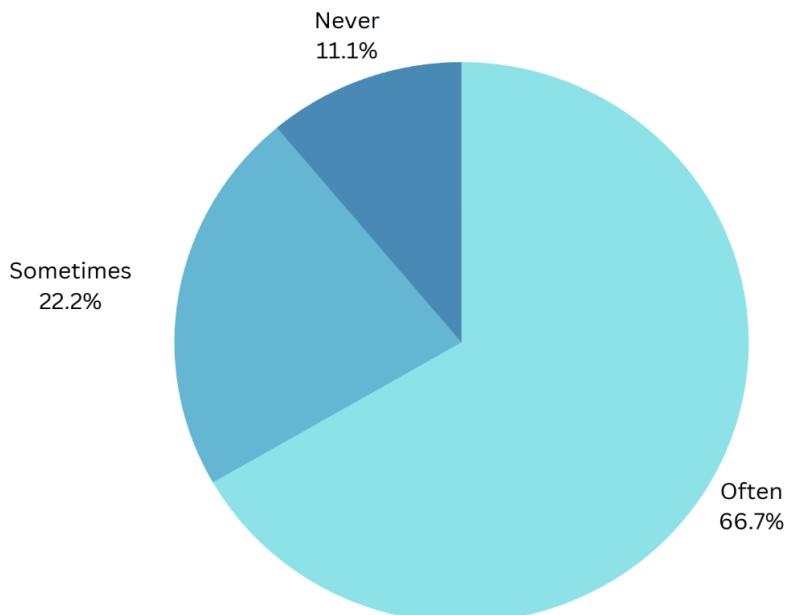
The project initiation involved a comprehensive brainstorming session among team members. Once the problem was identified, the team engaged in discussions with the stakeholder, Aadam Bhaiya, the Tuck Shop vendor at Plaksha University. This initial interaction aimed to understand the existing challenges, pain points, and expectations.

Feedback Collection from both stakeholders:

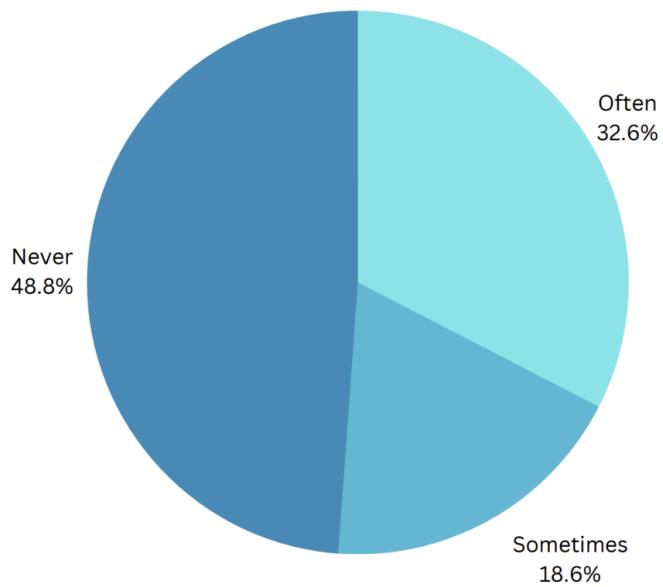
To gather insights from the primary user group, the students, our team conducted surveys. This was done to gauge how many people faced the problems that we are addressing through TuckMeister. 38 students of Plaksha University, studying in their second year responded. The results of the survey are as follows-



Are you ever confused about the status of the Tuck Shop(open/closed)?



Do you use the credit system of the Tuck shop (bought something and paid for it later)?



Inference for surveys conducted-

- 1) Have you ever faced miscommunications regarding payment of items bought at the Tuck Shop?

27.3% of students responded with yes. This is a considerable percentage because miscommunication regarding payments is an event that should ideally never occur.

- 2) Are you ever confused about the status of the Tuck Shop(open/closed)?

66.7 % of the respondents said often and 22.2% said sometimes. This indicates that most students are often confused about the status of the Tuck shop. We can also infer this by looking at the Plaksha Bulletin, where there are around 10 messages every day asking about the status of the Tuck Shop.

- 3) Do you use the credit system of the Tuck Shop (bought something and paid for it later)?

Around 50% of the respondents use the credit system. This makes it a considerable system that can be improved.

Also, Aadam Bhaiya's feedback was crucial in understanding the intricacies of the credit tracking system, inventory management, and communication challenges. So, he was also interviewed regularly to ask for feedback. We asked him about what challenges he faced in the Tuckshop and how we could improve the features we added to the application.

Progress Updates:

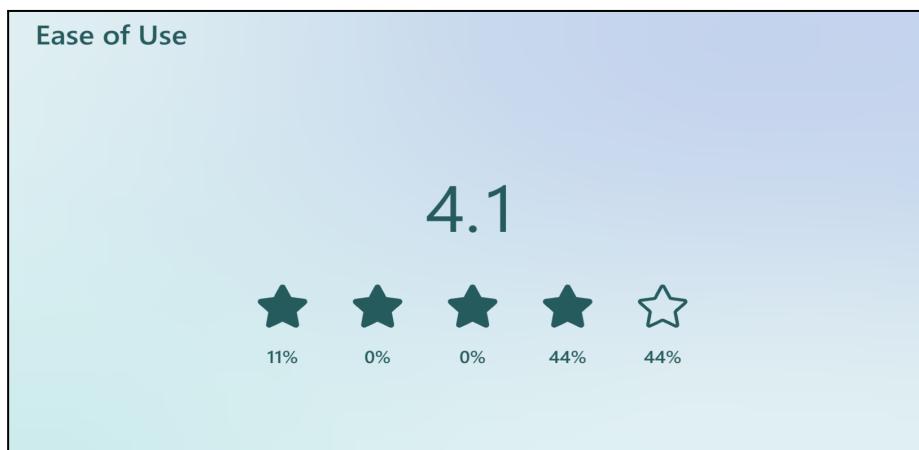
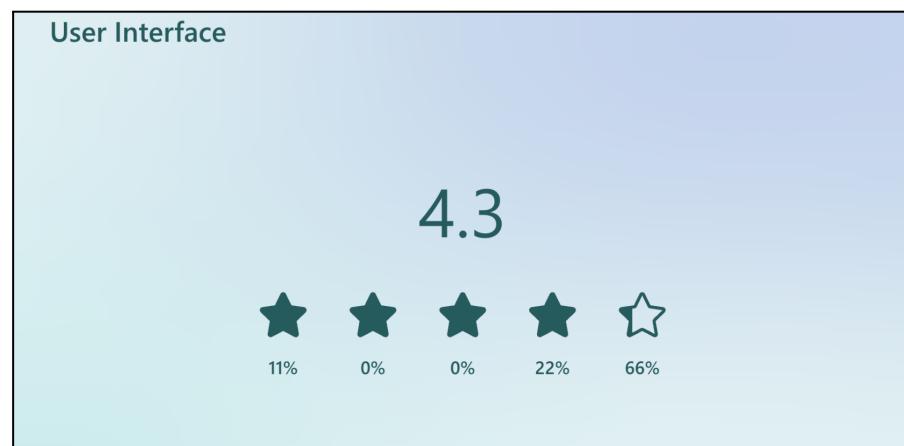
Regular progress updates were communicated to Aadam Bhaiya, keeping him informed about the development stages. This iterative approach allowed for ongoing feedback and ensured that the final product aligned with the stakeholder's vision.

Technical Feedback Response:

Aadam Bhaiya provided technical feedback on aspects such as the credit tracking system, inventory management module, and overall user interface. The team actively responded to this feedback, implementing necessary adjustments, and ensuring that the technical solutions met the operational requirements of the Tuck Shop.

User Testing and Feedback Loops:

User testing sessions were conducted to validate the application's usability and gather additional feedback. Both Aadam Bhaiya and students participated in these sessions, ensuring that the final product addressed their needs and preferences. The ratings received on the application are as follows-



Design

4.3



Final Feedback and Approval:

The final feedback from Aadam Bhaiya played a crucial role in refining the application before the official launch. The team incorporated the last set of adjustments based on this feedback, ensuring that the TuckMeister application met the expectations of the primary stakeholder.

Throughout the project lifecycle, the team maintained open lines of communication with Aadam Bhaiya, fostering a collaborative approach to problem-solving and ensuring that the developed solution was tailored to the specific needs of the Tuck Shop environment at Plaksha University.

DESIGN AND CONCEPT

Concept Research

The foundational concept of TuckMeister underwent rigorous exploration after going through the user interface, backend technologies employed, and the essential aspects of the various mobile and web applications such as Khata Book, ShopUp, QueueBuster, 1K Kirana Bazaar, Vayana Network, EnKash, Bazaar, DigiKhata. Our research was multifaceted, delving deeply into modern credit tracking methodologies, transparent inventory management, and enhanced user communication for Tuck Shops.

While certain team members dedicated their efforts to investigating innovative credit tracking systems, others focused on finding an efficient way to refine communication channels. This collaborative research approach mirrored our commitment to developing TuckMeister as a holistic solution to streamline Tuck Shop operations, ensuring efficiency, transparency, and an elevated user experience.

By the end of research, here were some of the **Objectives, Key Results and Key Performance Indicators** that we defined throughout this process:

Objective 1: Enhancing Tuck Shop Efficiency

- **KR1:** Reduce customer wait times at the Tuck Shop by 20% during peak hours.
 - **KPI:** Average customer wait time during peak hours.
- **KR2:** Increase order accuracy to near perfect levels.
 - **KPI:** Order accuracy rate based on customer feedback and order records.

Objective 2: Improving Inventory Management

- **KR1:** Reduce instances of out-of-stock items by 30%.
 - **KPI:** Percentage of time when all listed items are in stock.
- **KR2:** Increase inventory turnover rate by 15%.

- **KPI:** Inventory turnover rate, calculated as (Cost of Goods Sold / Average Inventory Value).

Objective 3: Enhancing User Experience

- **KR1:** Achieve a user satisfaction rating of 4.5 out of 5 based on customer feedback.
 - **KPI:** User satisfaction score from post-purchase surveys.
- **KR2:** Reduce customer complaints due to payment and order issues by 25%.
 - **KPI:** Number of customer complaints related to payment and order issues.

Objective 4: Promoting Product Innovation

- **KR1:** Launch three new products based on student requests within the next quarter.
 - **KPI:** Number of new products launched in response to student requests.
- **KR2:** Increase student engagement in suggesting and voting on new products by 50%.
 - **KPI:** Percentage increase in student participation in product suggestions and voting.

Objective 5: Ensuring Data Security and Privacy

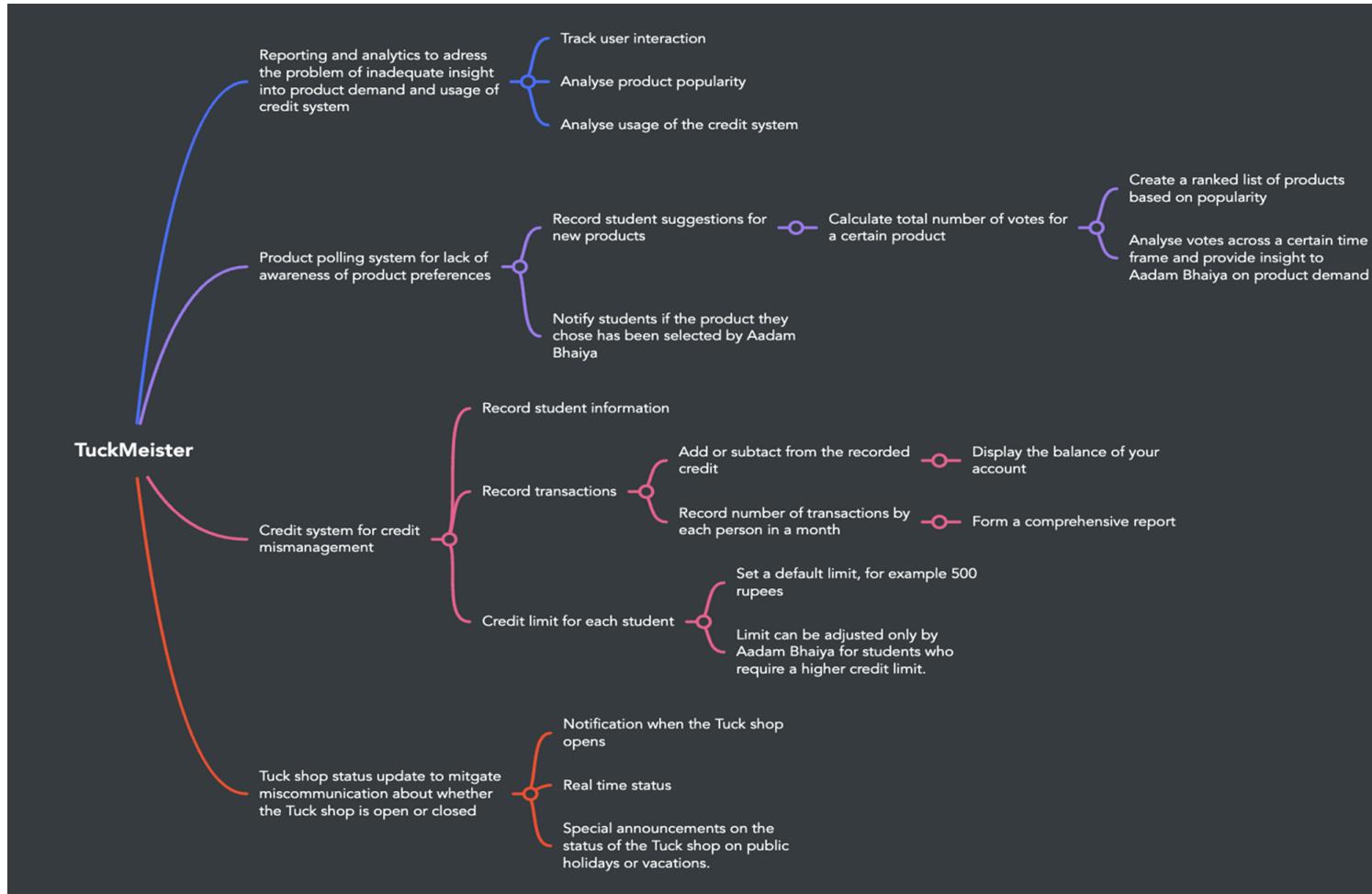
- KR1: Achieve a 100% compliance rate with data protection regulations.
 - KPI: Compliance audit results and regulatory assessment.
- KR2: Zero reported data breaches or privacy incidents.
 - KPI: Number of reported data breaches or privacy incidents.

Concept Design and Development

By the end of the initiation and research phase of our project, we decided to create two applications, one for the administrators, support staff, and Aadam bhaiya and titled it the Master Application, and one for the customer. Both these applications will work synchronously and have their respective needs

(such as the administration of credit tracking will be done by Aadam bhaiya only but the customer can view any changes that are made on Aadam bhaiya's part instantly) defined for them in an efficient and effective manner.

We created a mind map, which underwent various changes throughout this course, which helped us develop the application and keeping in mind the needs that we are aiming to resolve.



This is the link to website where you can view the mind map in a presentation format :

<https://mm.tt/app/map/2974259808?t=j2kDZRDUqx>

Prototype Development

Flutter, Flutter flow and Firebase were the platforms that we mainly employed to develop the application and link the database to the final user interface. We ran multiple simulations and tests to solve through any potential bugs. We finalised on the app interface and backend support for the app after iterating through numerous sketches, getting immediate feedback on aspects such as usability, aesthetics, etc. from Aadam bhaiya, the students of Plaksha University and our professors and teaching assistants during the weekly update sessions.

PRODUCT (MVP)

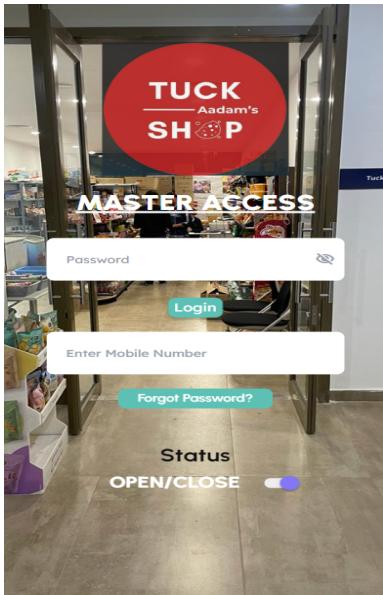
Before revealing the application design, let's identify the essential modules of this application, which would then help us go through the app interface and the need for certain elements with context:

Target	Steps	Results
Create Credit System	<ul style="list-style-type: none">• Record transactions• Calculate credit due• Display amount due and a log of transactions• Set credit limit• Notify student when credit limit is about to be reached	<ul style="list-style-type: none">• Increased transparency of transaction• Mitigates arguments between both stakeholders
Real time Tuck shop status	<ul style="list-style-type: none">• Aadam Bhaiya will update status of Tuck shop from his phone• A notification will be sent when the tuck shop opens.• Provision for special announcements on holidays	<ul style="list-style-type: none">• Awareness of whether the Tuck Shop is open or not• Saves time and effort of students
Product Polling System	<ul style="list-style-type: none">• Gather votes on products• Rank products according to votes• Notify students if the product they voted for was brought into the shop.	<ul style="list-style-type: none">• Insight into student preferences• Provide a clearer image of product demand.
Reporting and Analytics	<ul style="list-style-type: none">• Record transaction data• Keep track of user interaction with the app	<ul style="list-style-type: none">• Performance reports• Data-driven insights into the credit system and product polling system.

Now having giving background to every aspect, let's go through the app interface:

Master Application

Flutter link : <https://app.flutterflow.io/run/0Rhv0q5CTH1xxZAL4e31>

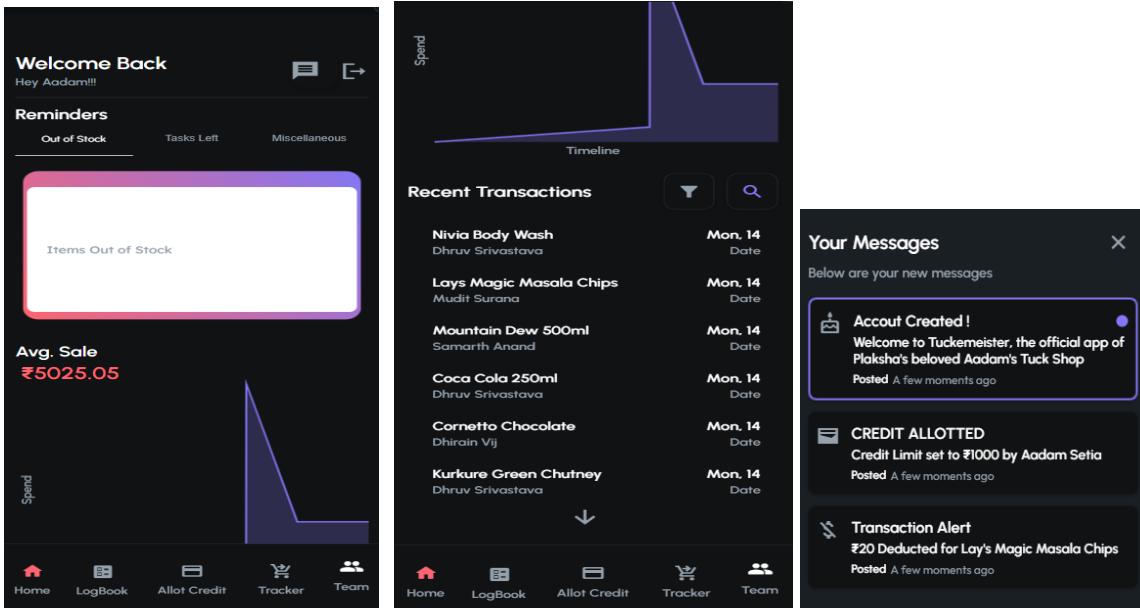


Login Page

The owner logs in with just a password, where there is also the failsafe incase he/she forgets the password. The status of the shop can be updated dynamically on the login page itself, saving time.

Welcome Page

The login page opens to the welcome page, which has functionalities such as writing notes (about the out of stock, tasks left, and other thing for reminder) , monitoring of the average sales, getting any new important notifications and also getting an overview of the recent items bought and its respective buyer.



Log Book

This is the log book window, where the owner gets a more elaborate view on the items bought, the date, the buyer and the amount deducted for it. This will help the owner verify and double check any deduction that's made on the credit application.

Log Book			
Add and Monitor Student Credit			
Search			
Nivia Body Wash Dhruv Srivastava	Mon. 14 Dec. 23	+₹100	
Lays Magic Masala Chips Mudit Surana	Mon. 14 Dec. 23	+₹20	
Mountain Dew 500ml Samarth Anand	Mon. 14 Dec. 23	+₹40	
Coca Cola 250ml Dhruv Srivastava	Mon. 14 Dec. 23	+₹20	
Cornetto Chocolate Dhirain Vij	Mon. 14 Dec. 23	+50	
Kurkure Green Chutney Dhruv Srivastava	Mon. 14 Dec. 23	+₹20	
Refund Dhruv Srivastava	Mon. 14 Dec. 23	-₹100	

Credit Tracker

This is the credit tracker window, where the owner can monitor all the current users of the credit system and their details. The owner can add new customers who want to start their credit account at the Tuck shop easily by pressing on the “+NEW” button and filling in the required credentials. The owner can then easily edit the name, change the credit limit, deduct the amount when a purchase is made, and etc by just clicking on the name of the person on the list.

Student List			
Add and Monitor Student Credit			
Name	Credit Limit	Used	Payable
Dhruv Srivastava	4000	2000	000
Mudit Surana	5000	4000	400
Dhirain Vij	1000	4000	400
Samarth Anand	2000	4000	400
Yash Sangtani	3000	2000	100
Sakarth Singh Brar	5000	4000	400
Bilawal Singh Deu	5000	4000	400



New Student Login

Student Name: Eg: Pepsi, Maggi

initial Credit Limit: 1000

ADD



Dhruv Srivastava

Student Name: Change

Credit Limit: 1000

Item: Please select...

Cost: Change

Remove

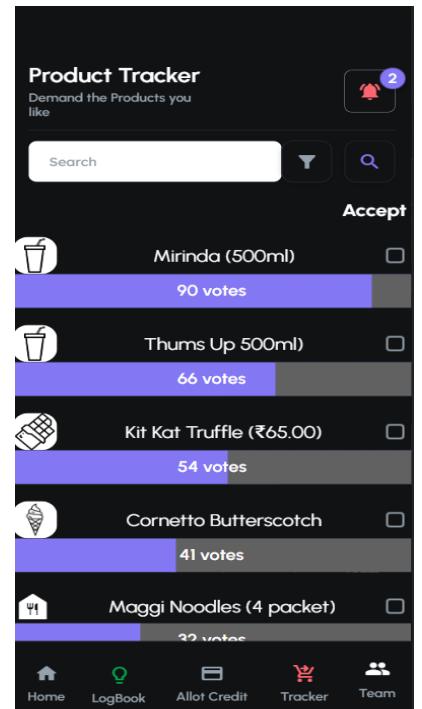
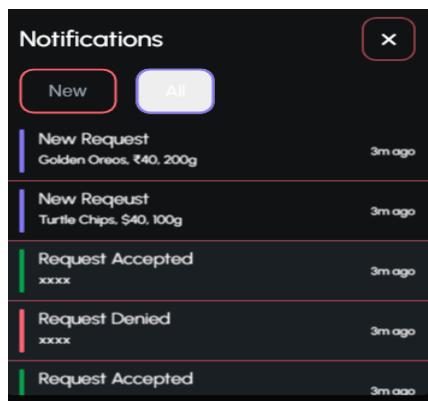
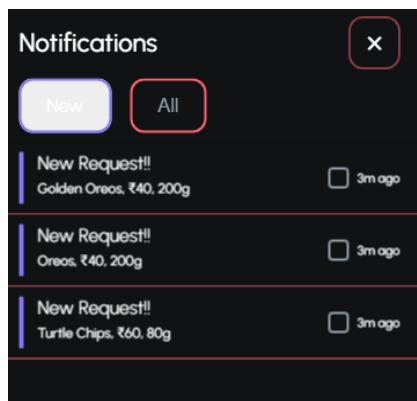
Send Alert

OK

Product Tracker

Through the product tracker window, the owner can get a real time view on the products that are on high or low demand by the customers and make better inventory management and purchase decisions.

The notification icon on this window gives alerts whenever any new request is made, where the owner has the discretion of whether adding it or not to this present list. The owner can also view the previous decision he/she made through the ‘All’ button on the notification window.



Team

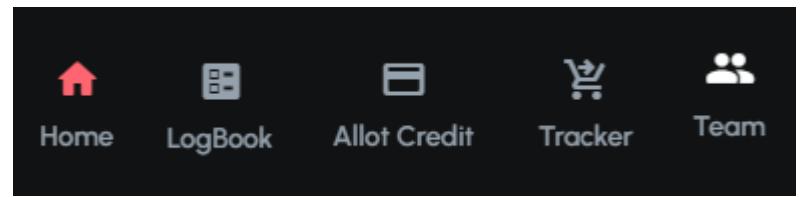
In this window, the owner can toggle between the status of the members of team ‘Tuckmeister’ which will then simultaneously updated on the customer application and help them decide who to approach and how when they face any issues.

Team Members		
Members of Team Tuckmeister		
Member Name	Status	
Adam Setia 09XXXXX	Inactive	
Mudit Surana mudit.surana@plaksha.edu.in	Active	Customer Support
Dhirain Vij dhirain.vij@plaksha.edu.in	Active	Customer Support
Samarth Anand samarth.anand@plaksha.edu.in	Active	Tech Support
Dhruv Srivastava dhruv@plaksha.edu.in	Active	Tech Support

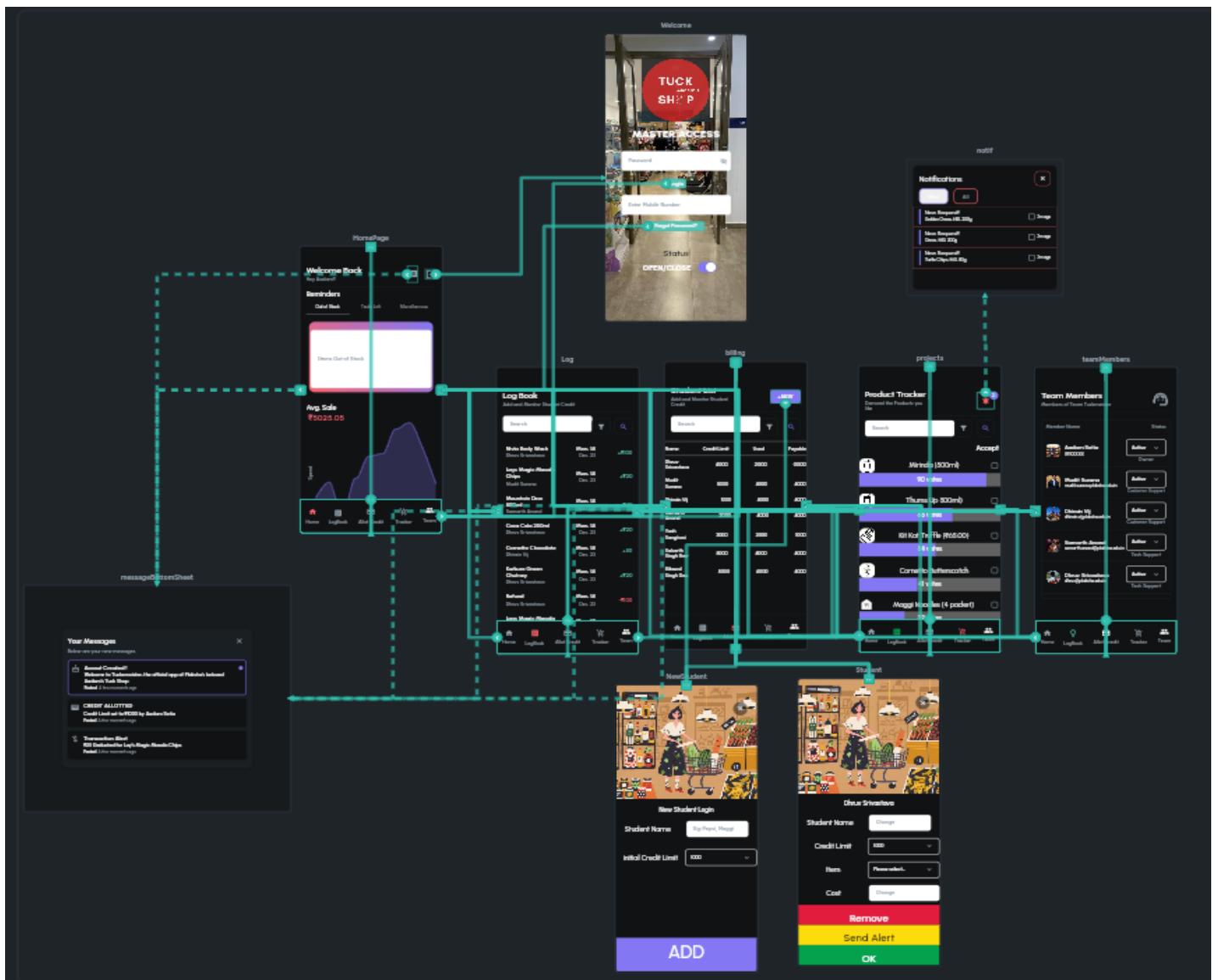
At the bottom, there are navigation buttons: Home, LogBook, Allot Credit, Tracker, and Team.

Navigation Bar

Through the pressing the respective icons on the navigation bar on the bottom of our page, one can move to whatever window he she desires to instantly.



Following is the **storyboard** for our master application:

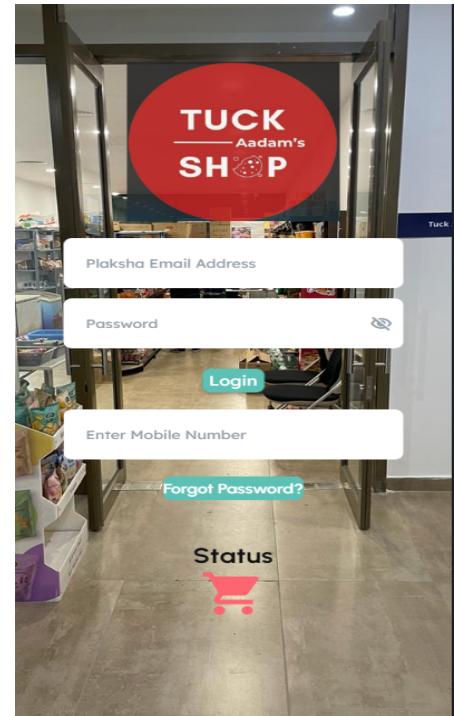


Customer Application

Flutter Link : <https://app.flutterflow.io/run/eU5vuhv8CPjqssmx7UYc>

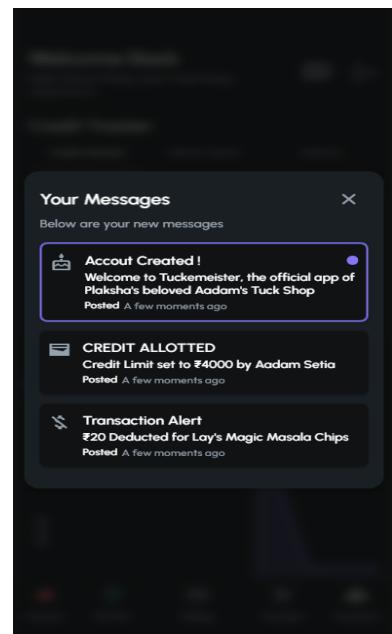
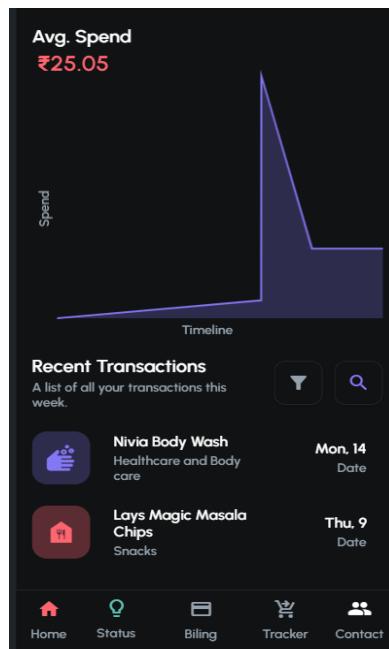
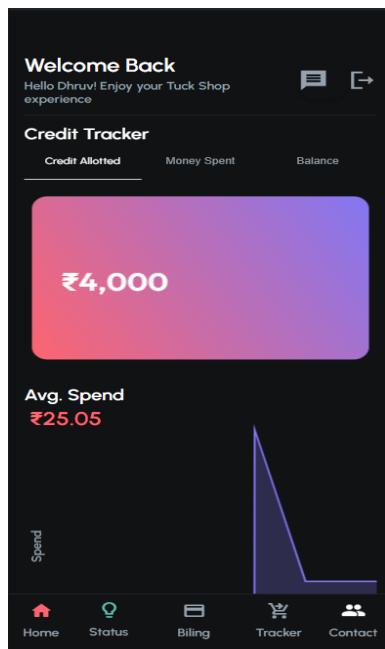
Login Page

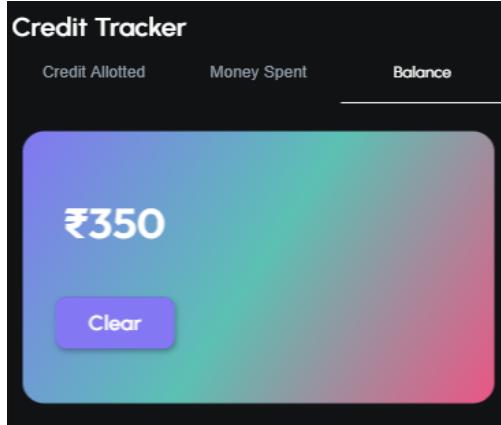
The customer logs in with their university email address or ID number and password. There is also a failsafe provided incase he/she forgets the password. The status of the shop is reflected on the login page itself, saving any hassle and confusion at the beginning itself. A Red color trolley indicates that the shop is closed, while a green color trolley indicates that its open.



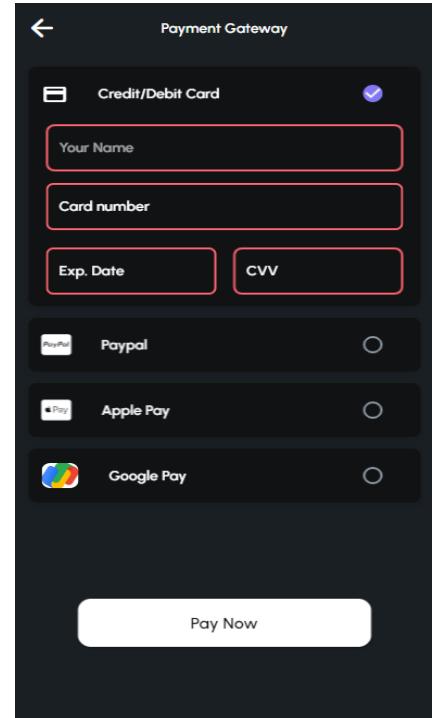
Welcome Page

The login page opens to the welcome page, where the customer can immediately monitor his notifications, the credit details (such as credit allotted, credit used, and the payable amount), the average purchase amount with a graph, and the recent items that are bought.





The dynamic credit tracker also has the option to clear the payable amount left by clicking on “Clear” button and getting redirected to the payment gateway page where you can chose from the selected options.,



Billing		
Please check the latest payments and your balance below.		
		
Amount borrowed		
Amount of money borrowed this month		
₹4000		
Amount paid		
Amount paid this month		
₹3650		
Amount due		
Amount of money yet to be paid at the Tuck Shop		
₹350		
Product Name	Amount	Date
Lays magic masala	₹20	11/12/23
Britannia Bourbon 60g	₹20	10/12/23
Gatorade 500ml	₹50	09/12/23
Lahori Zeera 160ml	₹10	08/12/23
Mountain Dew 400ml	₹20	07/12/23
Kurkure Green Chutney	₹20	07/12/23
Taj Greens and Oats	₹20	06/12/23
View Details		
Home	Status	Billing
Tracker	Contact	

Billing

In this window, the customer can get a full overview of the all the products that are purchased, their cost, and date. It also again reflects the credit details of the customer.

Product Tracker
Demand the Products you like

Product	Votes	Action
Mirinda (500ml)	90 votes	<input type="checkbox"/>
Thums Up 500ml	66 votes	<input type="checkbox"/>
Kit Kat Truffle (₹65.00)	54 votes	<input type="checkbox"/>
Cornetto Butterscotch	41 votes	<input type="checkbox"/>
Maggi Noodles (4 packet)	32 votes	<input type="checkbox"/>

+ADD

Search

Home Status Billing Tracker Contact

Product Tracker

In this window, the customer can view and his/her vote to demand any new product that's listed here. And if they want to add a new product, they can click on the “+ADD” button where they can send the request for approval and verification by the owner after filling all the required details about the product.

Request Window

Item Name	Eg: Pepsi, Maggi
Quantity	Eg: 100g, 250ml
Price	In Rupees
Category	Please select...

Request

Contact

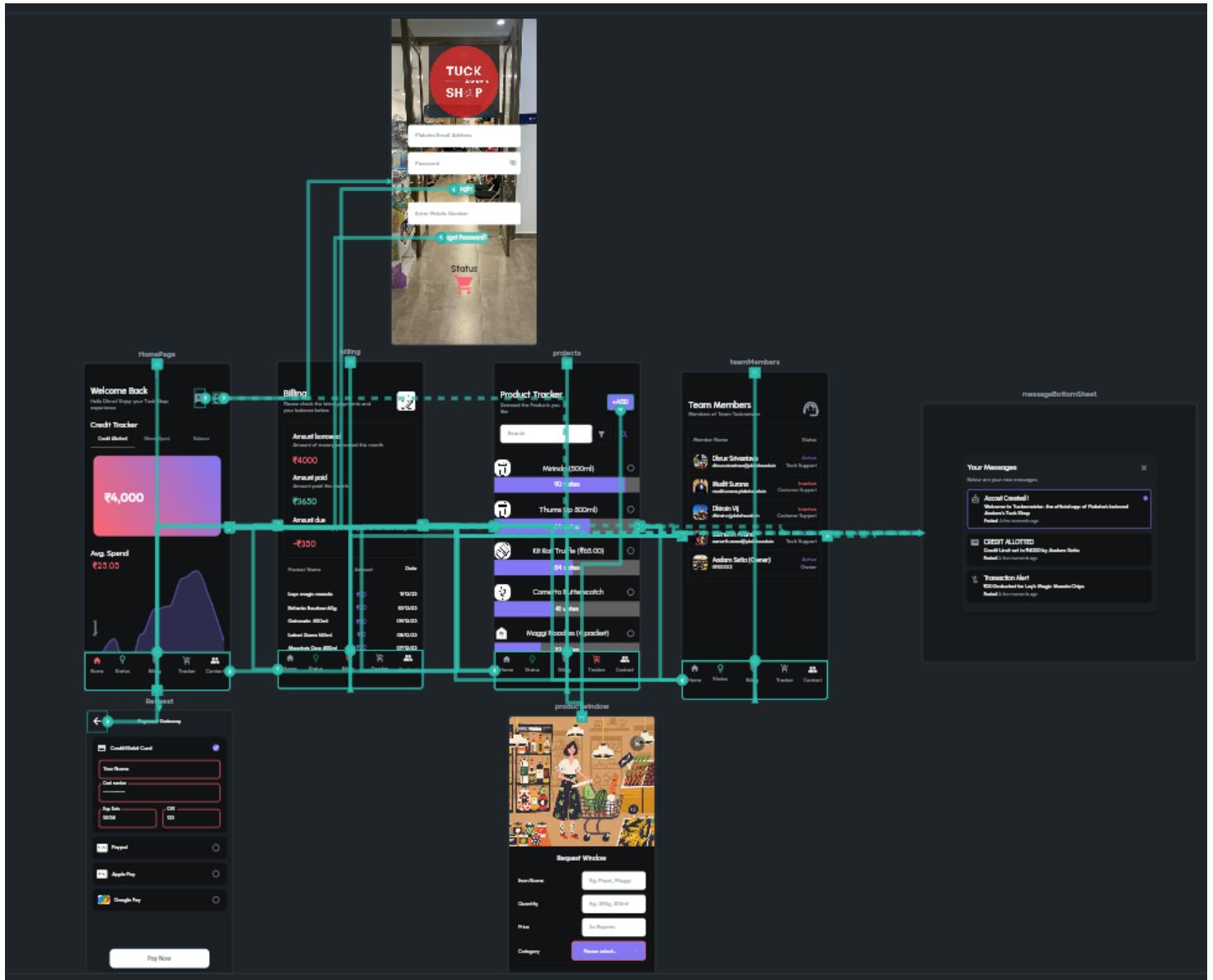
This window reflects the current status of all the members of team “TuckMeister” (developer team) and the owner and shows the email accounts or number through which you can contact them if there is any problem or query.

Team Members
Members of Team Tuckmeister

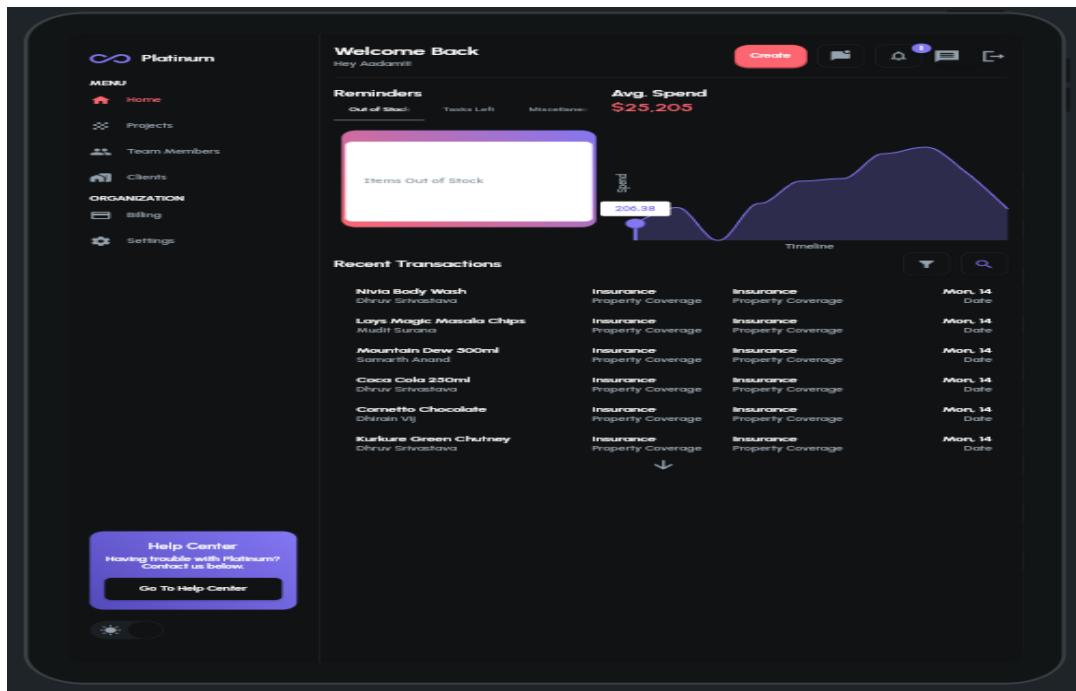
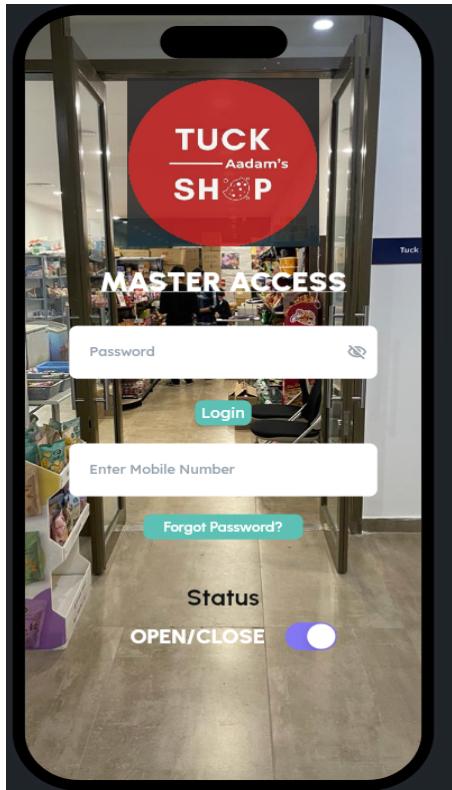
Member Name	Status
Dhruv Srivastava dhruv.srivastava@plaksha.edu.in	Active Tech Support
Mudit Surana mudit.surana@plaksha.edu.in	Inactive Customer Support
Dhirain Vij dhirain.vij@plaksha.edu.in	Inactive Customer Support
Samarth Anand samarth.anand@plaksha.edu.in	Active Tech Support
Aadam Setia (Owner) 09XXXXXX	Active Owner

Home Status Billing Tracker Contact

This was the final storyboard for the **Customer Application**:



And here are some of pictures of how the application windows would look at an average mobile phone, web application, or tablet:



CONCLUSION

The development and implementation of TuckMeister have yielded positive outcomes, transforming the Tuck Shop experience at Plaksha University. The project has successfully addressed the identified challenges, introducing innovative solutions that enhance operational efficiency, user engagement, and decision-making.

Key Results:

- Improved Operational Efficiency: The Credit Tracking System has streamlined financial transactions, providing real-time credit updates and automated alerts, thereby minimising manual tracking efforts.
- Enhanced User Engagement: The Product Polling System has successfully engaged students in the decision-making process, allowing them to suggest and vote for products, creating a more interactive and student-centric Tuck Shop experience.
- Effective Communication: Tuck Shop Status Updates have improved communication by offering real-time information on shop status and special announcements. Push notifications have ensured timely dissemination of critical information.
- Data-Driven Insights: The Reporting and Analytics module has provided valuable insights into user behaviour, product popularity, and inventory management, facilitating data-driven decision-making for Tuck Shop administrators.

The numbers are not yet available for the application as it has not been implemented at TuckShop yet.

FUTURE SCOPE

While the MVP marks a significant milestone, there are several avenues for future development and expansion:

- Barcode-based shopping feature: We could aim to include a barcode scanner in the TuckMeister application that scans the product and automatically updates it in the transactions column of the student's profile. This makes the process of adding transaction data into the student's profile much easier. Instead of having to manually enter the transaction, the process will become automated. Aadam Bhaiya will just have to select the student whose transactions have to be updated and then use the scanner to add the cost of the product bought by the students.
- More contextualised surveys: Quality is more important than quantity while taking a survey. We focused on getting the maximum number of responses for our questionnaires, whereas we should have focused on gathering responses for more important questions from our respondents. For example- One question that we surveyed for was Have you ever faced miscommunications regarding payment of items bought on credit at the Tuck Shop? We should have asked a follow-up question to this that asked about what situations facilitated the miscommunication.

App UI could be made slightly more user-friendly. The status of the Tuck shop should be prominently displayed in the application rather than having it as a small icon in the bottom of the screen.

- Integration with Payment Systems: Implementing secure and seamless payment options within TuckMeister can further enhance the user experience, allowing for cashless transactions and increased convenience.
- Machine Learning for Predictive Analytics: Leveraging machine learning algorithms can enable TuckMeister to predict product demand, optimise inventory management, and personalise user experiences based on historical data.
- Enhanced User Profiles: Developing more comprehensive user profiles can enable TuckMeister to offer personalised recommendations, promotions, and credit management features tailored to individual preferences.
- Scale and Adaptability: As Plaksha University grows, TuckMeister should be designed for scalability, ensuring it can handle increased transaction volumes, user interactions, and evolving Tuck Shop requirements.

- User Feedback Mechanism: Implementing a robust feedback mechanism will allow continuous improvement based on user suggestions and preferences, ensuring that TuckMeister remains a student-centric solution.

In summary, TuckMeister's MVP has successfully addressed the initial problem statement and demonstrated its potential to significantly enhance the Tuck Shop experience. The project's positive results as seen through surveys and future scope underscore its importance as a dynamic and evolving solution that can adapt to the changing needs of Plaksha University's Tuck Shop ecosystem. The journey continues with a commitment to innovation, user satisfaction, and the ongoing transformation of traditional processes through technology.

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