InfoEdge Ventures
AI Hackath💡n 2024
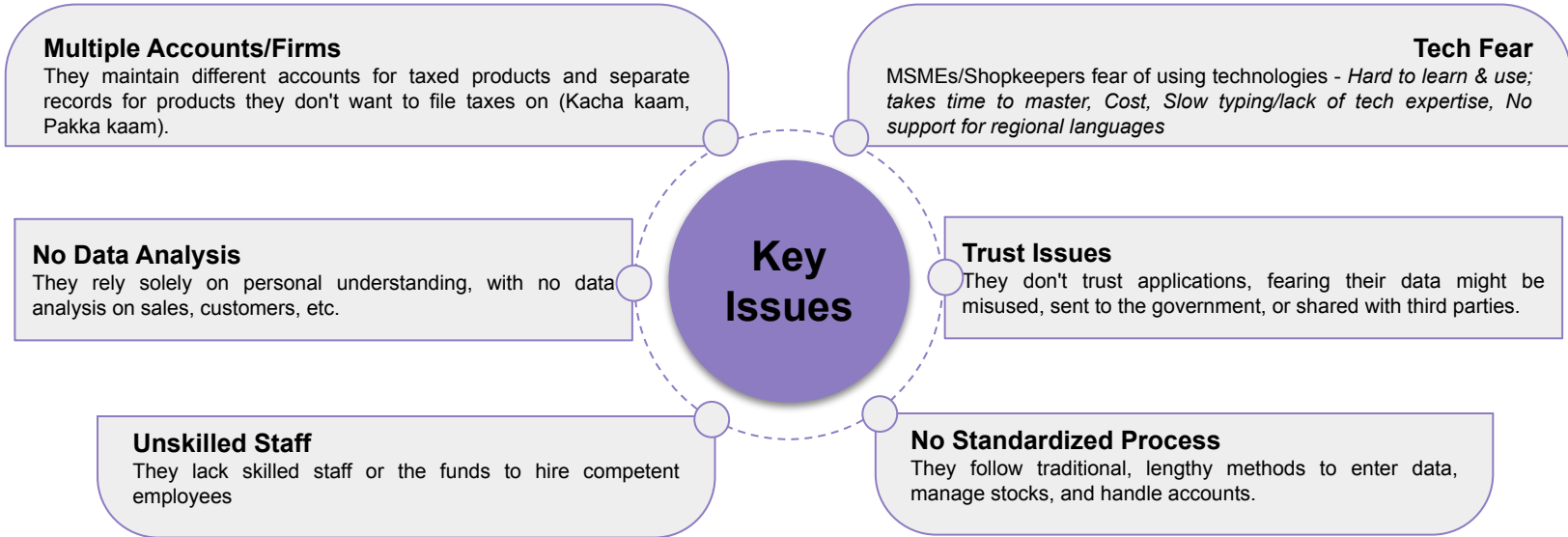Hack the future - Innovate with AI
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Team Details

    a.   Team name - *Cheeldhar*

    b.   Team leader name - *Shubham Udsaria*

    c.   Team Members - *Ritika Agarwal*

Problem Statement: **Retailers: Stuck in Analog?** (This highlights the contrast between the traditional, non-digital way of running a shop in rural areas and the potential of using technology to improve their operations.)

Multiple Accounts/Firms
They maintain different accounts for taxed products and separate records for products they don't want to file taxes on (Kacha kaam, Pakka kaam).

Tech Fear
MSMEs/Shopkeepers fear of using technologies - *Hard to learn & use; takes time to master, Cost, Slow typing/lack of tech expertise, No support for regional languages*

No Data Analysis
They rely solely on personal understanding, with no data analysis on sales, customers, etc.

Key Issues

Trust Issues
They don't trust applications, fearing their data might be misused, sent to the government, or shared with third parties.

Unskilled Staff
They lack skilled staff or the funds to hire competent employees

No Standardized Process
They follow traditional, lengthy methods to enter data, manage stocks, and handle accounts.

Because of these issues, they remain dependent on extensive paperwork, leaving no time for family, no room to think about business growth, and enduring long hours of tedious work.

Brief about the Idea : <u>AI Baniya</u> (A Simplified Shop Management System. Just say the word.)

What Are We Offering?

We provide an easy-to-use, comprehensive shop management solution with a voice-enabled application.

01	User Experience and Accessibility

- **Regional Language Support:** Accessible for non-English speakers (Hindi etc. supported by LLMs).
- **User-Friendly Interface:** Simple and intuitive design.

02	Advanced Technology

- **Voice-Based Controls (USP):** No typing needed; control everything with your voice. Just say the word, and we'll handle the rest.
- **Smart Vision Search:** Find products with just a photo.

03	Support and Security

- **Personal Assistance:** Our team will teach you the tech basics and set up your system.
- **Data Security:** End-to-end encryption and local storage ensure full control over your database with paid cloud sync option

04	Business Management

- **Data Analysis:** Gain insights into sales, inventory, and future trends.
- **Staff Management:** Separate logins and attendance tracking for staff and owners.
- **Dual Storage Options:** Keep separate records for "Kacha" and "Pakka" sales.

This solution reduces manual paperwork, eliminates redundancy, bridges technology gaps, decreases stress, and frees up family time. It increases productivity, business growth, available time, and access to crucial data with Proposed One-time nominal cost for basic features and subscription-based advanced features (PaaS).

Opportunities

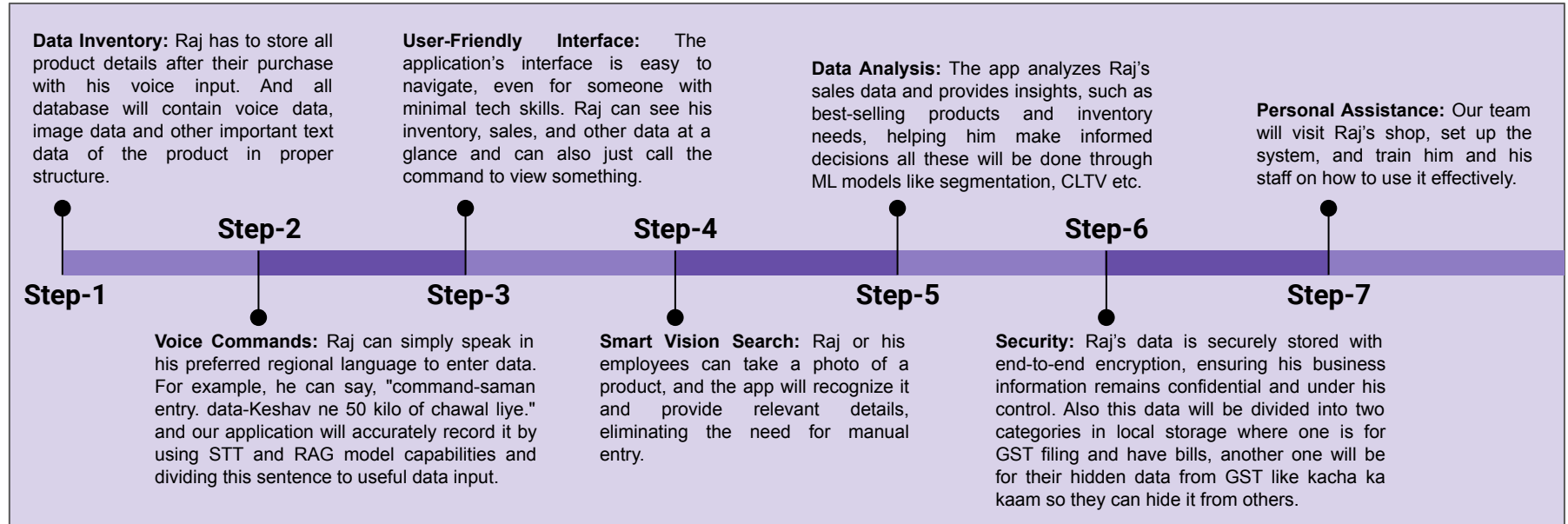| How is it different from existing idea? | How will it solve the problem? | Unique Selling Proposition (USP) |

Today, we have good accounting software like Tally, Khatabook, Dukan, and Cashbook. However, these often require a skilled accountant, except for Khatabook, which still faces issues with shop owners' and cashiers' typing speeds. Other approaches, like barcode scanning and handwriting recognition, have their own problems. Barcoding requires labeling each product, which takes time and extra staff lso not possible for retail items. Handwriting recognition struggles with accuracy due to varying writing styles and languages. Additionally, solutions like reMarkable lack proper data access for written notes on notepad.

Our application addresses these issues by taking inputs directly from the user's voice in supported languages. Our Speech to Text (STT) algorithm offers better accuracy with continuous improvements, making it easier for business owners to use compared to other options, based on our discussions with them. While product details need to be added occasionally, it's not a nightly task like barcoding. This application provides advanced, cutting-edge features to enhance business operations.

STT is not new, with technologies like Alexa and Siri existing for a decade. However, our key innovation is using Contextual STT, with RAG model. This means our algorithm accesses user data, allowing it to understand the context and provide more accurate results instead of predicting random words. Apart from that smart search and data analytic capabilities enhances the usability of application.

How Will We Achieve This? (Let's Understand with an Example)

Imagine a shop owner named Raj who faces difficulties managing his inventory and sales because of his limited typing skills and language barriers. Our solution is designed to help Raj overcome these challenges.
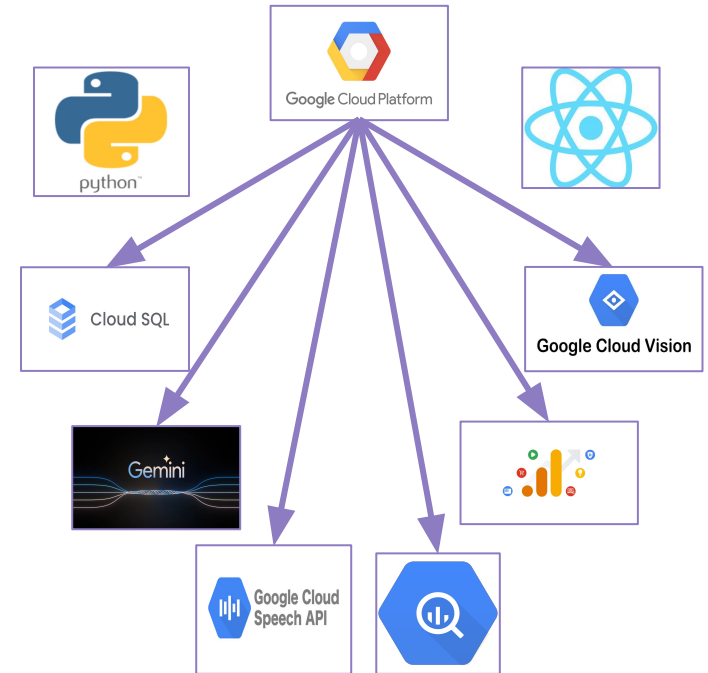
Data Inventory: Raj has to store all product details after their purchase with his voice input. And all database will contain voice data, image data and other important text data of the product in proper structure.

User-Friendly Interface: The application's interface is easy to navigate, even for someone with minimal tech skills. Raj can see his inventory, sales, and other data at a glance and can also just call the command to view something.

Data Analysis: The app analyzes Raj's sales data and provides insights, such as best-selling products and inventory needs, helping him make informed decisions all these will be done through ML models like segmentation, CLTV etc.

Personal Assistance: Our team will visit Raj's shop, set up the system, and train him and his staff on how to use it effectively.

Step-2

Step-4

Step-6

Step-1

Step-3

Step-5

Step-7

Voice Commands: Raj can simply speak in his preferred regional language to enter data. For example, he can say, "command-saman entry. data-Keshav ne 50 kilo of chawal liye." and our application will accurately record it by using STT and RAG model capabilities and dividing this sentence to useful data input.

Smart Vision Search: Raj or his employees can take a photo of a product, and the app will recognize it and provide relevant details, eliminating the need for manual entry.

Security: Raj's data is securely stored with end-to-end encryption, ensuring his business information remains confidential and under his control. Also this data will be divided into two categories in local storage where one is for GST filing and have bills, another one will be for their hidden data from GST like kacha ka kaam so they can hide it from others.

By addressing Raj's specific needs with advanced yet user-friendly technology, we help him streamline operations, save time, and focus on growing his business.

Technologies to be used in the solution

- **Python Language** - To develop the Task Execution Engine , UI, and integrate all the APIs & Data.
- **GCP services or any other affordable service**-
  - **Gemini 1.5 pro API (RAG Multi model)/Custom Multi model** - Use to process the prompt and guide system what to execute.
  - **Vision Warehouse/Vision models/AutoML model** - Use to process videos/images and audios to store the vector data and search into them.
  - **Vertex AI pipeline and cloud function** - To create and host application and run all the things on cloud.
  - **BigQuery/Cloud SQL/Cloud bucket/SQL Server** - To Store Temporary and permanent data to use in further.
  - **Cloud Instances** - To deploy ML models and backend-frontend services.
- **Contextual Speech to Text model (Hindi, other languages)** - Convert the Voice task, words into Text to fetch. Using Whisper model with RAG.
- **Security** - OAuth 2.0 / OpenID/ JWT Connect For secure authentication. Encryption Libraries Such as AES for encrypting data stored locally.
- **GIT, JIRA** etc. Tools to track development cycle.
- **Flutter/React Native/PyQT/ASP.Net** - To develop cross platform UI with backend APIs.

** Technologies can vary according to application requirement and costs.

Process-flow diagram
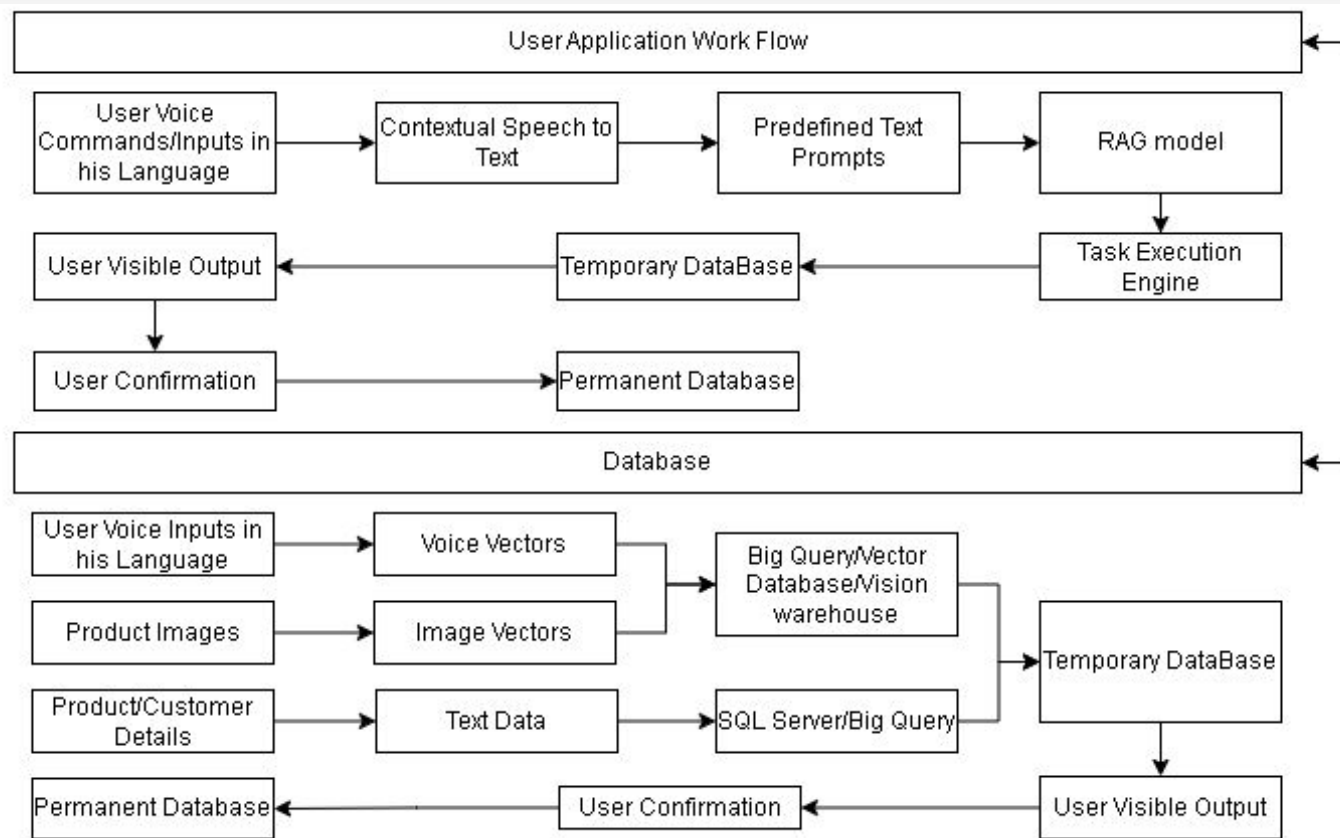
Wireframes/Mock diagram
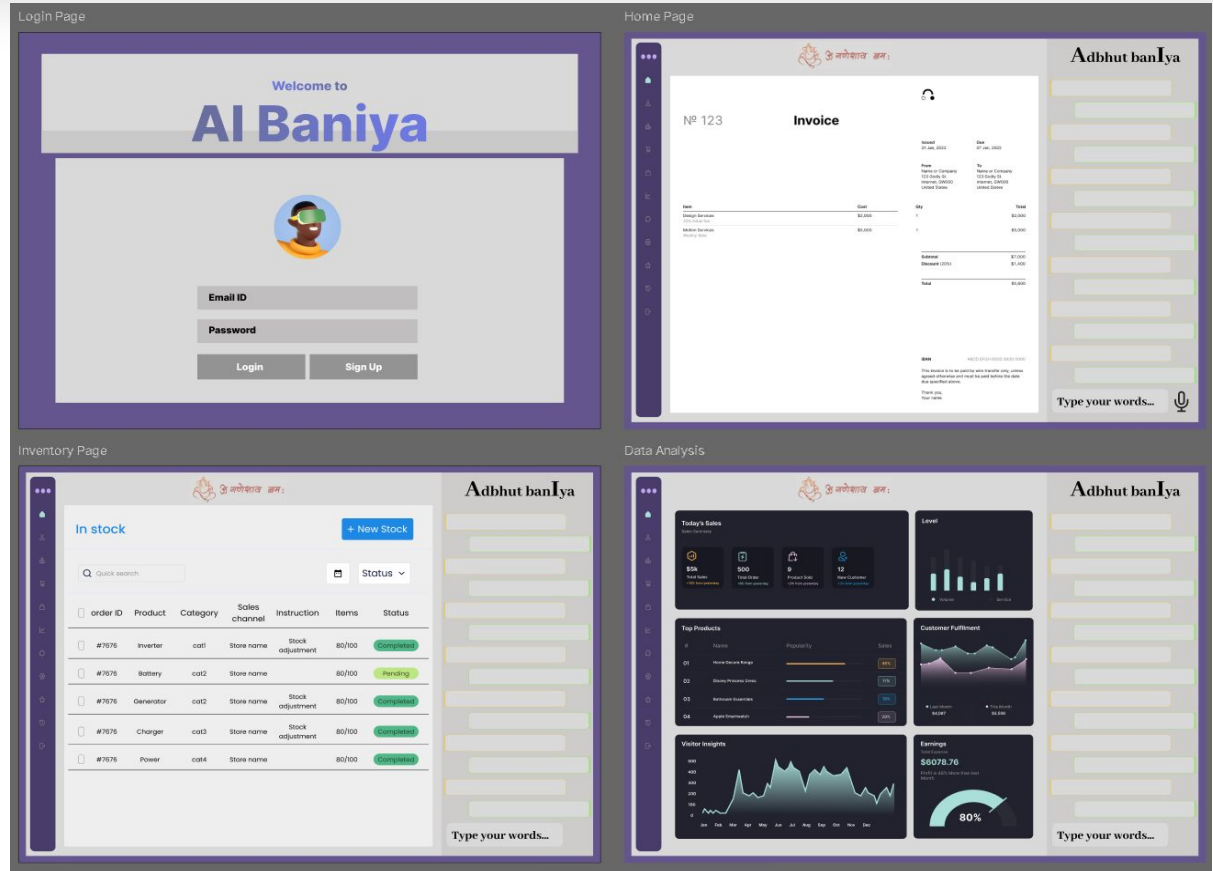
Technical Architecture diagram

User Application

Interface and App Hosting

- Text Input
- Voice Input
- Command/Features

User Visible Output

Backend Process

- Contextual STT + Text Prompts
- RAG Model
- Data Processing
- Temporary Database
- Data From User
- Processed Output
- Command From User
- Data Analysis/ Customer Add/ Inventory Add/ other feature commands

Database

- Customer Data
- Inventory
- Supplier Data
- Sales Data
- Market Analysis/News

Estimated Development Cost

Category	Team	Cost (in Rs)
Management & Finance	Product Manager/ Tech Lead	2 L/month
	Finance/Business Expert	1 L/month
	HR agency	50k/month
Tech/Developers	Data Scientist (LLM capable)	1.5 L/month
	Cloud ML Ops Engineer	1 L/month
	Full Stack Developer	1 L/month
Training/Courses		1 L
Cloud Resources		2 L/month
Other Tools/Expenses (JIRA etc)		50k/month
Total		9 L/month + 1 L = 10 L

Cost to User Estimate

Category	Cost for Subscription (Just an Estimate)
Basic/Demo Users (include basic data entry tasks)	5000/year
Advance Users (some extra features like basic analytics etc.)	10000/year
Pro Users with advance analytic tools	10000/year + 2000/month

** Per month resources cost for application may vary but can cost approx ~= 4000 rs/month but will shift work to local system from cloud will reduce this cost.
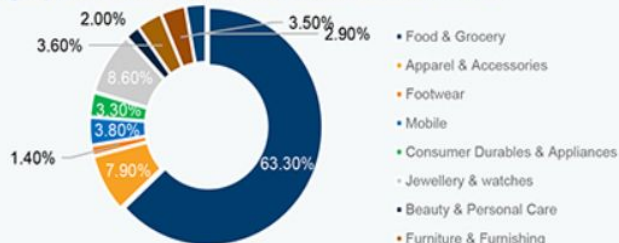** These all costs are just estimation as per team understanding and can vary while development.
** CSV file for cloud resource cost estimation : https://drive.google.com/file/d/1XD0gAXRQ85TqQHMw-T3Vzk5oQrnvFx7p/view?usp=drive_link , https://docs.google.com/spreadsheets/d/1czI-Mmn3txhcp-jnFArsaNhF6gMhRwrjCndDkDq71I4/edit?usp=sharing
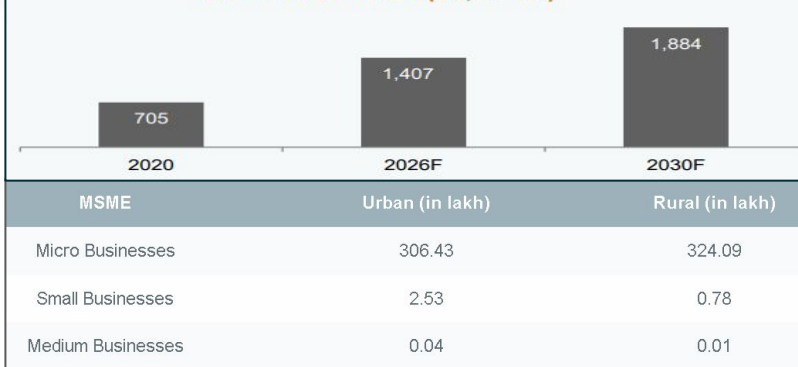
** Development can take upto 3 months so total cost will be approx. ~= 30L. Recurring cost will differ from development cost after final product launch. Cost can be reduced with further research.

Snapshots of the prototype
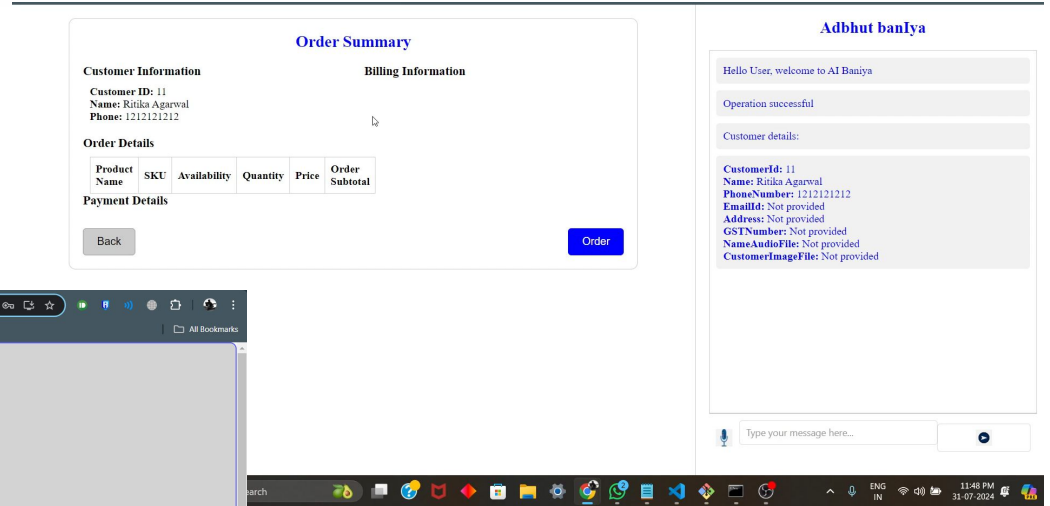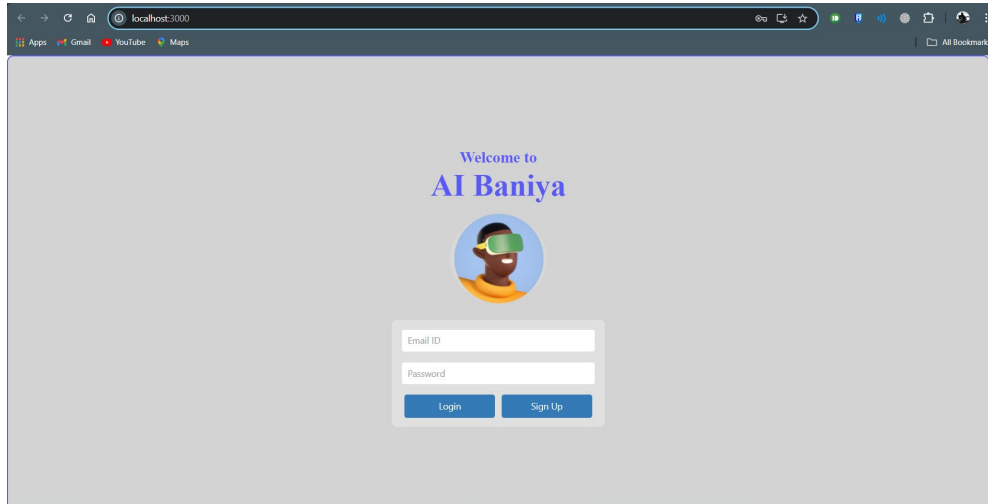
Prototype Performance
Report/Benchmarking/Business Insights

Category-wise Break-up of Total Retail Market in FY22

- Food & Grocery — 63.30%
- Apparel & Accessories — 7.90%
- Footwear — 1.40%
- Mobile — 3.80%
- Consumer Durables & Appliances — 3.30%
- Jewellery & watches — 8.60%
- Beauty & Personal Care — 3.60%
- Furniture & Furnishing — 2.00%
- 3.50%
- 2.90%

Retail market in India (US$ billion)

Year	Value
2020	705
2026F	1,407
2030F	1,884

MSME	Urban (in lakh)	Rural (in lakh)
Micro Businesses	306.43	324.09
Small Businesses	2.53	0.78
Medium Businesses	0.04	0.01

Business Owner		Cost Before this App	Cost After this App
Money Cost	**Basic Accountant**	7000	0
	Accountant for ITR	12000	5000
	Existing Business Management Apps	6000 (silver subscription)	5000 (Yearly Subscription for basic advanced features)
Time/Effort Cost		No life rather than just work >__<	More time for family and new business expansion ^o^

** This cost is based on village's shops survey done by Team.They are ready to pay upto avg 5000-10000 rs per year for app. (20 Lac+ business revenue owners)

Challenges

Solutions

Challenges		Solutions
Background noise can lead to poor input quality.	Background Noise	Provide noise-cancelling microphones and implement noise reduction algorithms.
Lack of existing datasets for contextual inputs.	Context Without Data	Create large datasets from various cities and improve LLMs to enhance contextual accuracy over time.
Limited developers and reliance on Python for initial development.	Developer Resources	Develop the MVP using Python, and then transition to Dart for Flutter to support cross-platform development.
Customizing the application for different merchants incurs extra developer & management costs. High computation costs for RAG models & ML features.	Cost and Customize	Focus initially on key features and gradually expand customization options. Develop custom low-end models to reduce costs and optimize cloud servers.
India has many small regional languages, making it infeasible to support all. And Using standard STT and RAG models separately.	Regional Language Future Models	Start by supporting a few prominent regional languages and expand over time. Develop a contextual STT model with an integrated pipeline.

Future Development

Data Analytical Tools - Add advanced data analysis tools and strategies to provide deeper insights and support business growth.

Business Models - 1 . *Finance Products:* Include options for loans, tax-saving methods, and ITR filing.

2. *Advertisements*: Offer product advertisements within the app.

3. *Data Utilization:* With user permission, analyze market trends using collected data and sell insights to third parties to improve products.

4. *UPI and Transactions*: Integrate UPI and other transactional methods directly within the application.

Robust Solutions for Big Players - Create advanced solutions using cutting-edge technology for larger retailers like D-Mart.

By addressing these challenges and implementing the suggested solutions and future enhancements, the application can become a comprehensive and valuable tool for merchants, providing robust features while managing costs and resources effectively.

GitHub, Demo video and Support URLs

- KhataBook case study - https://medium.com/@anoopjoyjoy/khatabook-app-to-superapp-f2b452255598

- LLM Automation - https://www.youtube.com/watch?v=EsCa_bO-MuY, Task Execution Engine (TEE) -

  https://medium.com/@manoranjan.rajguru/building-a-task-execution-engine-with-llm-279ec88f0157, Contextual STT -

  https://github.com/TzurV/rag-langchain-audio-data/blob/main/Retrieval_Augmented_Generation_directly_using_Whisper.ipynb

- Source of Images and graph in ppt - python image: Wikipedia, Google services: Google Images, InfoGraph, some are my own UI and data,

  https://www.ibef.org/industry/retail-india/infographic, https://www.forbes.com/advisor/in/business/msme-statistics/.

- **My GITHUB link -** https://github.com/anonymousTechpreneur/AI-Baniya

- **My Drive Link -** https://drive.google.com/drive/folders/1Aa7UhKnwJmKBIDJ-b6Tq61d7Nw0aT4ra?usp=drive_link

- **New Demo Recording -** https://drive.google.com/file/d/1R6SzWcrDRH2JICW6BJoOUHpz_Br4mH6V/view?usp=drive_link

- **Old Demo (not relevant) -** https://drive.google.com/file/d/197iUvFNc-sHbOwp82Arq6ZCj7mRNasuT/view?usp=drive_link,

  https://drive.google.com/file/d/1eFx_C3-NQiMH4blJI2zuFE61jtGgv0ks/view?usp=drive_link

- **Business Strategy Doc -** https://docs.google.com/document/d/1MXxN3TY1QUrJ1qxA83KB1PPBx0gIp4Mlw7AzSXN06yI/edit?usp=sharing