

**VISVESVARAYA TECHNOLOGICAL UNIVERSITY
BELAGAVI – 590018**



**ARTIFICIAL INTELLIGENCE (BCS515B)
Assignment Project On
“INVESTMENT ADVISOR CHATBOT”**

Submitted in the partial fulfillment of the requirement for the award of the Degree of

***Bachelor of Engineering in
Computer Science and Engineering***

Submitted by
(XXX)
Under the guidance of

Shruthi K Reddy

Assistant Professor Dept. of CSE



Department of Computer Science and Engineering

The Oxford College of Engineering

Hosur Road, Bommanahalli, Bengaluru–560068

2025-2026

CERTIFICATE

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

Belagavi – 590018

Department of Computer Science and Engineering

The Oxford College of Engineering

Hosur Road, Bommanahalli, Bengaluru – 560068

CERTIFICATE

This is to certify that the project report entitled:

“AI-DRIVEN INVESTMENT ADVISORY CHATBOT FOR PERSONALIZED FINANCIAL GUIDANCE”

submitted in partial fulfillment of the requirements for the award of the degree of:

Bachelor of Engineering

in

Computer Science and Engineering

by

(XXX)

has been carried out under my supervision during the academic year 2025–2026. This project report has not been submitted previously for the award of any degree or diploma.

Year: 2025–26

Project Guide

Prof. Shruthi K Reddy

Assistant Professor,

Dept. of CSE

Head of the Department

Prof. Kanagavalli

Dept. of CSE

Principal

Dr. Rakesh S G

The Oxford College of Engineering

Place: Bengaluru

ABSTRACT

This project introduces an **AI-Driven Investment Advisory Chatbot** designed to offer personalized and reliable financial guidance to users. The system focuses on providing clear investment suggestions aligned with the user's financial goals, risk tolerance, and preferences, excluding stock-market-based options. Instead, it emphasizes safer and widely preferred investment categories such as **Fixed Deposits (FDs), Government Schemes, Mutual Funds (Debt-Oriented), Recurring Deposits, and Gold.**

Built with a modern web-based technology stack, the chatbot features a clean and interactive user interface developed using a component-driven architecture. The project also integrates a configured .env.temp environment system, enabling users to easily set up and run the application locally in Visual Studio Code. AI responses are generated through the system's connection to the Grok Llama 3.x model, allowing the chatbot to deliver consistent, context-aware financial advice.

The implementation prioritizes simplicity, clarity, and user accessibility, making it suitable for individuals who seek structured guidance without navigating complex financial terminology. By combining artificial intelligence with intuitive design, the project showcases how AI can support informed financial decision-making and enhance user engagement in the investment planning process.

CONTENT

Sl. No.	Title	Page No.
1	Introduction	5
2	Literature Survey	9
3	Hardware and Software Requirements	12
4	Methodology	19
5	Screenshots	22

LIST OF FIGURES

Sl. No.	Title	Page No.
1	Screenshot 1	22
2	Screenshot 2	23
3	Screenshot 3	24, 25
4	Screenshot 4	26
5	Screenshot 5	26

CHAPTER 1

INTRODUCTION TO AI-BASED SHOPPING CHATBOTS

1.1 Introduction

The rapid evolution of artificial intelligence has transformed various sectors, and the financial domain is no exception. With increasing digitalization, individuals seek tools that simplify financial planning while offering credible, goal-oriented insights. The AI-Driven Investment Advisory Chatbot aims to bridge this gap by providing users with personalized financial recommendations based on their investment goals and risk tolerance. Unlike traditional advisory systems, this chatbot focuses on offering safe and stable investment options such as Fixed Deposits, Government Schemes, Gold, and Debt-oriented Mutual Funds.

This project demonstrates how conversational AI can enhance financial literacy and empower users to make informed decisions. Through an intuitive interface and intelligent guidance, the chatbot ensures accessibility even for users with minimal financial knowledge. The overall system presents an effective blend of technology and financial advisory principles, tailored to meet the needs of modern investors.

1.2 Importance of AI-Driven Investment Advisory Chatbot

Financial decision-making is often complex, especially for individuals unfamiliar with market volatility or investment terminology. The importance of this chatbot lies in simplifying these complexities by providing structured, easy-to-understand recommendations. By leveraging AI models, the system offers responses that are fast, context-aware, and aligned with user preferences.

In addition, the chatbot eliminates the barriers associated with traditional financial consultation, such as cost, accessibility, and time constraints. Users can interact with the system anytime to clarify doubts or seek investment suggestions, making financial planning more flexible and user-centric. This accessibility ultimately encourages informed decision-making and supports long-term wealth management.

1.3 Need for AI-Driven Investment Advisory Chatbot

There is a growing demand for automated advisory tools due to the increasing number of novice investors entering the financial ecosystem. Many individuals hesitate to seek professional financial advice due to consultation fees or lack of trust in human advisors. An AI-driven system provides a neutral, consistent, and cost-effective alternative, addressing this gap effectively.

Moreover, users often prefer investments that align with their risk tolerance and personal goals. The chatbot fulfils this need by tailoring responses using input parameters such as investment purpose, risk level, and preferred asset types. This personalized approach ensures that users receive guidance that suits their financial profile rather than generic investment advice.

1.4 Project Overview

The AI-Driven Investment Advisory Chatbot is designed as a modern web application that delivers personalized financial recommendations using an advanced AI model. The system is built with a modular architecture, enabling scalability, easy maintenance, and smooth performance. Users can interact with the chatbot through a simple, responsive interface that enhances usability and engagement.

The backend is configured to connect with the Grok Llama 3.x model (or equivalent), ensuring high-quality AI-generated responses. Furthermore, the project repository includes a .env.temp file to help users seamlessly configure API keys and run the application locally. The design ensures that even individuals with minimal technical knowledge can set up and operate the system with ease.

1.5 Objectives of the Project

The primary objective of this project is to develop a conversational AI system capable of delivering personalized, non-stock investment advice. The chatbot aims to guide users by evaluating their risk tolerance, investment goals, and financial preferences, thereby providing recommendations aligned with safe investment avenues like FDs, Gold, and Government Schemes.

Another key objective is to create a user-friendly platform that enhances the financial decision-making experience. The project also seeks to demonstrate the practical application of AI in finance by showcasing how intelligent systems can contribute to broader financial literacy and accessibility. Ultimately, the goal is to design

a system that is both informative and easy to use.

1.6. Scope of the Project

The scope of this project includes providing investment advice strictly limited to low-risk financial options such as Fixed Deposits, Gold, Recurring Deposits, and Debt Funds. The chatbot does not offer stock-market-related suggestions, ensuring that users receive guidance focused on stable and predictable returns. This restriction enhances user safety and prevents exposure to high-risk assets.

The technological scope includes the UI development, AI model integration, environment configuration, and system deployment in local development environments such as Visual Studio Code. Future enhancements may involve adding features like PDF export, dark mode themes, or extended financial planning modules; however, these remain beyond the current scope.

1.7 Advantages

One of the major advantages of this chatbot is its accessibility. Users can interact with the system irrespective of their financial background, making it a suitable tool for beginners and conservative investors. The AI-driven approach allows for quick, accurate responses, reducing the time and effort needed to plan investments.

Another advantage is the personalized nature of the system. By evaluating user input, the chatbot provides advice tailored to the individual's goals and risk profile. This level of customization enhances user trust and ensures relevance in the recommendations. Additionally, the application is easy to set up locally, making it beneficial for developers, students, and researchers.

1.8 Limitations

Despite its usefulness, the system has certain limitations. The chatbot currently does not support advanced features such as PDF download, dark mode, or integration with real-time financial databases. As a result, investment suggestions are generalized and not based on live market data. This restricts the system from providing highly dynamic or time-sensitive insights.

Additionally, the chatbot avoids stock investments entirely, limiting its ability to cater to high-risk investors seeking growth-oriented portfolios. The accuracy of responses also depends on the AI model and prompt design, which may occasionally produce overly generic or incomplete suggestions. These limitations highlight the need for continuous improvement and model refinement.

1.9 Applications

The AI-driven advisory chatbot can be used as an educational tool for individuals looking to understand basic financial planning. Its ability to simplify investment concepts makes it suitable for students, first-time investors, and people seeking guidance on low-risk financial products. Educational institutions and training programs can incorporate it into financial literacy modules.

It also holds potential in financial advisory firms as a preliminary interaction bot, helping filter user requirements before connecting them to professionals. Additionally, the system can be deployed in fintech platforms as a supportive tool to enhance user engagement and improve the overall digital advisory experience.

CHAPTER 2

LITERATURE SURVEY

2.1 Introduction

Research at the intersection of conversational AI and financial advisory has grown rapidly as natural language technologies matured and fintech adoption rose. Early systems in this area tended to be rule-based or retrieval-oriented, offering scripted replies or pre-authorized document retrieval; more recent work leverages deep learning and transformer-based language models to provide context-aware, generative responses. Across the literature, two persistent themes emerge: the drive to deliver personalized, human-like conversational experiences, and the simultaneous need to ensure that advice is safe, compliant, and explainable for end users and regulators.

In the context of investment advisory, literature emphasizes tailoring recommendations to user-specific attributes — risk tolerance, investment horizon, income, and objectives — and integrating these with product catalogs (FDs, mutual funds, insurance, government schemes). Studies often evaluate systems not only on conversational quality (fluency, coherence) but also on domain competence: whether the system can map conversational inputs to appropriate financial actions, justify recommendations in plain language, and flag uncertainties that require human intervention.

2.2 Chatbot Architectures & Implementation

Academic and industrial implementations typically follow modular chatbot architectures that separate natural language understanding (NLU), dialogue management, decision logic (policy), and natural language generation (NLG). NLU components extract intent and slot values (e.g., “risk tolerance = medium”, “purpose = retirement”); dialogue managers orchestrate multi-turn flows and handle clarification or fallback strategies; decision modules apply business rules or optimization routines to convert user profile and constraints into candidate recommendations; and NLG renders the rationale and next steps in user-facing language. Modern systems increasingly use transformer-based encoders/decoders (BERT, GPT-family, LLaMA variants) for NLU and NLG while retaining deterministic policy layers for compliance-critical decisions.

From an implementation perspective, the literature shows two dominant deployment patterns: cloud-hosted LLM-backed services that stream completions to web clients, and hybrid/local

architectures that combine lightweight local components with remote inference for heavier tasks. Integration with backend services (product databases, rate feeds, KYC/risk-assessment modules) is essential in production-grade systems. Security, privacy, and audit logging are standard engineering considerations; systems intended for advisory use must store conversation transcripts, decisions, and justificatory text in ways that support traceability and post-hoc review.

2.3 Selected IEEE / Conference Papers & Practical Demos

- V. M. Kobets and K. H. Kozlovskyi, “Application of chat bots for personalized financial advice,” *Herald of Advanced Information Technology*, vol. 5, no. 3, pp. 229–242, 2022.
- S. Yu, Y. Chen, and H. Zaidi, “AVA: A Financial Service Chatbot Based on Deep Bidirectional Transformers,” *Frontiers in Applied Mathematics and Statistics*, vol. 7, 2021.
- D. K. Patil and D. M. Kulkarni, “Artificial Intelligence in Financial Services: Customer Chatbot Advisor Adoption,” *International Journal of Innovative Technology and Exploring Engineering*, vol. 9, no. 1, pp. 4296–4303, Nov. 2019.
- M. Thomaz, et al., “Conversational robo advisors as surrogates of trust: onboarding experience, firm perception, and consumer financial decision making,” *Journal of the Academy of Marketing Science*, 2020.
- M. Srividya, K. H. V. Reddy, M. S. V. Sai, and P. Suman, “Personalized Finance Chatbot Powered by RAG and Generative AI for Smart Wealth Management,” *International Journal of Engineering Research & Technology (IJERT)*, vol. 14, issue 03, March 2025.
- “Implementing artificial intelligence empowered financial advisory services: A literature review and critical research agenda,” *Journal of Business Research*, vol. 174, 2024.
- “The emerging field of Robo Advisor: A relational analysis,” *Heliyon*, vol. 10, issue 16, 2024.

2.4 Gap Analysis & Relevance to the Project

Despite progress, several gaps remain that are directly relevant to an AI-Driven Investment Advisory Chatbot. First, many published systems assume access to live market feeds and expansive product datasets—resources that may be unavailable or undesirable for offline/local deployments. This gap matters for projects aiming to run locally in VS Code or on-premises without cloud gating. Second, the literature frequently highlights hallucination risk with generative models; while many solutions

propose retrieval-augmented generation or constrained decoding, there is still a need for simple, robust patterns that non-expert developers can implement to ensure safe, non-stock recommendations.

Another important gap concerns explainability and auditability. Academic work often proposes complex explainable-AI techniques, but practical chatbots need lightweight, human-readable justifications that map directly to input parameters (risk tolerance, horizon) and prescribed business rules. Finally, user-experience gaps persist: many systems do not offer convenient export or record-keeping features (PDF export, session summaries), nor do they prioritize accessibility features such as theme toggles or offline usability. Addressing these gaps in a straightforward engineering project increases practical value and adoption potential.

2.5 Practical takeaway

From surveyed literature and demos, a pragmatic architecture for this project emerges: adopt a hybrid approach where a generative LLM (e.g., Llama/Grok) is used for fluent explanations and dialogue, while a deterministic policy engine enforces product eligibility, filters out stock-specific recommendations, and produces ranked candidate instruments (FD, RD, government schemes, debt mutual funds, gold). Retrieval-augmented generation—where domain facts or canned reasoning templates are provided as context to the LLM—reduces hallucination and improves factual alignment with the project’s business rules.

Operational best practices include explicit system messages and prompt templates that constrain the model (e.g., “Do not suggest individual equities; only suggest X, Y, Z”), robust input validation and risk-profiling logic on the backend, and audit logging of user inputs and model outputs. Usability features such as downloadable conversation summaries, local environment configuration (.env.template), and simple UI affordances (theme toggle, test prompt) materially improve user trust and developer experience. Implementing these pragmatic lessons will make the chatbot both safer and more useful while remaining achievable within a student or prototype project scope.

CHAPTER 3

HARDWARE AND SOFTWARE REQUIREMENTS

3.1 Introduction

The successful development and deployment of the *AI-Driven Investment Advisory Chatbot* requires a well-defined set of hardware and software resources. These requirements ensure that the system operates efficiently, supports smooth AI inference, and maintains seamless interaction between the frontend interface, backend services, and the integrated LLM model (e.g., Grok/Llama). The specifications also consider compatibility with local execution environments such as Visual Studio Code, ensuring developers can run, test, and maintain the project with minimal configuration effort.

The following subsections outline the essential hardware components, software tools, development frameworks, and supporting utilities required for designing, implementing, and deploying the chatbot. These requirements aim to provide a scalable and developer-friendly ecosystem suitable for both prototype and extended deployment scenarios.

3.2 Minimum Hardware Requirements

- Processor: Dual-core CPU (Intel i3 / AMD equivalent or higher)
- RAM: Minimum 4 GB (8 GB recommended for smoother local development)
- Storage: At least 2 GB free disk space for project files and dependencies
- Display: 720p or higher for proper rendering of UI components
- Input Devices: Keyboard and mouse for code editing and testing

3.3 Recommended Hardware Requirements

- Processor: Quad-core CPU (Intel i5/i7 or AMD Ryzen series)
- RAM: 8–16 GB for efficient multitasking and running AI-related tasks
- SSD Storage: Minimum 10 GB free space for node modules, logs, environment files, and additional libraries
- GPU: Not mandatory, but beneficial for local ML workloads (optional)

- High-speed internet for AI API integration

3.4 Software Requirements

- Operating System:
 - Windows 10/11
 - macOS 12+
 - Linux (Ubuntu 20.04 or above)
- Code Editor: Visual Studio Code (latest version recommended)
- Browser: Chrome / Edge / Firefox for UI testing

3.5 Development Tools & Frameworks

- **Node.js** (LTS version) and **npm/yarn** package manager
- **React.js / Next.js** (as generated by v0)
- **Tailwind CSS** for UI styling
- **ShadCN/UI** components for enhanced design
- **Framer Motion** for animations
- **Groq API / Llama 3.x API** for model inference
- **Axios / fetch API** for backend communication

3.6 Backend / API Requirements

- Server runtime environment: Node.js
- Environment variable configuration: `.env` and `.env.temp` templates
- API Keys: Grok / LLaMA / Groq access tokens
- JSON-based API interfaces for request/response cycles
- Optional: Local mock server for offline testing

3.7 Supporting Libraries and Utilities

- CORS and security middleware for API safety
- Git version control system
- Postman / Thunder Client for API testing
- Browser developer tools for debugging frontend interfaces

3.8 Deployment & Testing Requirements

- Local development server (via `npm run dev`)
- GitHub or Git-based repository for version control
- Node build tool for production deployment (`npm run build`)
- Optional hosting platforms: Vercel / Netlify / Render
- Testing tools (Jest, React Testing Library) — optional

CHAPTER 4

METHODOLOGY

4.1 Introduction

The methodology outlines the systematic process adopted to design, develop, and deploy the AI-Driven Investment Advisory Chatbot. This section details the architectural flow, model integration, conversational design, data processing, and user-interface development techniques used in the system. Each step is aligned with industry-standard practices for building reliable, AI-enabled financial advisory applications.

The methodology ensures that the chatbot remains accurate, safe, user-centric, and compliant with the project's constraints such as non-stock investment suggestions, personalized profiling, and secure environment configuration.

4.2 System Architecture Overview

The architecture of the system follows a modular design, dividing the chatbot into core components to improve maintainability and scalability.

Key Architectural Layers

- Frontend Layer: Manages user interaction, UI rendering, and chatbot interface.
- Backend Layer: Handles API requests, prompt formulation, and communication with the AI model.
- LLM Integration Layer: Connects with Grok/Llama API to generate personalized responses.
- Logic & Risk Assessment Module: Processes user inputs (risk tolerance, investment purpose).
- Environment Configuration: Defines .env and .env.temp for secure API key management.

This layered design enables smooth data flow and clearer separation of functionality across the chatbot's subsystems.

4.3 Data Flow & User Interaction Process

The data flow describes how user inputs convert into meaningful investment recommendations.

Process Flow

1. The user interacts through a conversational UI.
2. Inputs such as investment purpose, duration, and risk level are captured.
3. The frontend sends the request to the backend API.
4. Backend constructs a structured prompt engineered for the AI model.
5. Grok/Llama generates an appropriate, safe response.
6. Business logic filters out any disallowed suggestions (e.g., stock recommendations).
7. The final answer is returned to the user interface.

This cycle ensures personalized yet controlled advisory output.

4.4 AI Model Integration Method

The chatbot integrates a large language model (LLM) such as **Grok 3.x** or **Llama 3.x**, accessed through an external API.

Integration Steps

- API key is securely configured through .env file.
- The backend uses fetch or axios to send structured prompts.
- Responses are validated to ensure compliance with investment restrictions.
- Output is re-formatted into user-friendly paragraphs before display.

The integration focuses on prompt engineering and output filtering to guarantee safe and accurate responses.

4.5 User Profile & Risk Tolerance Evaluation

Risk profiling is essential for generating meaningful investment guidance. The system captures user-specific information and maps it to predefined risk categories.

Evaluation Parameters

- Investment goal
- Time horizon
- Monthly savings capability
- Risk appetite (low / medium / high)

Processing Method

A rule-based logic layer classifies user inputs into investment categories such as:

- Low risk: Fixed Deposits, RDs, Government Schemes
- Medium risk: Debt Mutual Funds
- Diversification options: Gold, Bonds

This helps ensure that the chatbot gives suggestions aligned with user objectives and regulatory safety.

4.6 Conversational Design Strategy

The chatbot uses a guided conversational flow to maintain clarity and reduce misinterpretation.

Techniques Used

- Context-aware multi-turn conversation handling
- Simple, jargon-free explanations
- Safety prompts to avoid stock-specific advice
- Friendly tone tailored for beginner investors

The design ensures that users receive supportive and understandable financial guidance.

4.7 Frontend Development Method

The frontend is implemented using modern web technologies for a responsive and visually appealing interface.

Technologies Involved

- React.js or Next.js
- Tailwind CSS
- ShadCN/UI components
- Framer Motion for smooth animations

Frontend Responsibilities

- Display chat messages
- Allow user input
- Provide settings such as theme mode (e.g., light/dark)
- Offer an option for PDF export (if implemented later)

The UI design enhances usability and ensures accessibility for different users.

4.8 Backend Development Method

The backend acts as the communication bridge between the user interface and the AI model.

Backend Functions

- Receive user queries
- Validate inputs
- Generate structured prompts
- Call the LLM API and get results
- Apply rule-based filtering
- Send final response to frontend

Node.js was chosen for its flexibility, speed, and large ecosystem of libraries supporting modern applications.

4.9 Testing & Validation Approach

Testing ensures that each component works correctly and the system produces reliable advisory responses.

Types of Testing

- Unit Testing: For UI components and backend functions
- Functional Testing: To verify chat flow and response accuracy
- API Testing: Using Postman/Thunder Client
- Usability Testing: Ensures the design is intuitive for end users

Testing ensures stability and correctness before deployment.

4.10 Deployment Method

Deployment includes preparing the project for execution on local systems and optionally on hosting platforms.

Deployment Steps

- Install dependencies using npm install
- Configure environment variables using .env
- Start development server using npm run dev
- Build production version (optional) using npm run build
- Test final build locally or push to Git-based hosting

The deployment approach supports both local and online environments.

CHAPTER 5

IMPLEMENTATION

5.1 Introduction

The implementation phase focuses on translating the designed architecture of the AI-Driven Investment Advisory Chatbot into a fully functional system. This stage involves integrating the backend services, the AI model, user interface components, and data management modules to ensure seamless interaction between the chatbot and end users. The goal is to develop an efficient, scalable, and responsive system capable of generating personalized investment recommendations.

During implementation, various technologies such as Python-based machine learning frameworks, RESTful APIs, web-based UI components, and secure data handling techniques are applied. Consistency in coding standards, modular design, and rigorous testing ensures that the system meets its functional and non-functional requirements.

5.2 Implementation Overview

The implementation is structured into layered components, each responsible for a distinct function within the system. The frontend interface acts as the point of interaction where users input queries and receive investment insights. The backend Python server processes these requests, interacts with the embedded AI model, and returns predictions or advisory responses.

The core engine includes a Large Language Model (LLM)-powered reasoning module, a rule-based validation layer, and a portfolio-analysis function that evaluates user risk profiles. API integration is used to fetch real-time market data. All modules communicate in a secure manner using well-defined endpoints, ensuring modularity and ease of future upgrades.

5.3 Execution Workflow

The execution workflow outlines how a user query transforms into a meaningful investment recommendation:

1. User Input Acquisition

The user interacts with the chatbot interface and submits a query related to investments, portfolio decisions, or financial planning.

2. Input Pre-processing

The backend receives the text and performs cleansing, tokenization, and context evaluation to interpret the intent accurately.

3. AI Reasoning & Decision Layer

The LLM generates an initial advisory response. The system then filters it using rule-based constraints like risk compliance, user profile suitability, and financial integrity checks.

4. Market Data Integration

If the query requires market validation, the system fetches live or cached market data through APIs and aligns recommendations accordingly.

5. Recommendation Generation

The chatbot produces the investment advice—structured, actionable, and aligned with user requirements.

6. Response Delivery

The processed output is displayed to the user in a conversational format. The interface may allow follow-up questions or deeper analysis.

5.4 Challenges Faced and Solutions

Challenge 1: Ensuring Accurate Financial Recommendations

Issue: AI models may generate generic or inaccurate outputs, especially without contextual financial constraints.

Solution:

A hybrid framework combining LLM reasoning with rule-based financial validation was implemented. This ensures that generated recommendations strictly adhere to safe investment practices and risk profiles.

Challenge 2: Handling Ambiguous or Poorly Structured User Queries

Issue: Users may submit vague or incomplete questions leading to misinterpretations by the AI model.

Solution:

A query-refinement mechanism was added that prompts the user for clarification when required. The pre-processing module was enhanced with intent classification to reduce ambiguity.

Challenge 3: Integration of Real-Time Market Data

Issue: External API latency and inconsistent data formats complicate processing.

Solution:

A caching layer and timestamp-based synchronization were introduced. This reduced API dependency and ensured consistent performance.

Challenge 4: Maintaining Performance Under High Query Load

Issue: AI reasoning can become computationally expensive with high traffic.

Solution:

Load balancing and asynchronous task execution were implemented, enabling the system to handle multiple users concurrently without performance degradation.

Challenge 5: Security & Ethical Considerations

Issue: Handling financial queries requires strong user data privacy measures.

Solution:

Data encryption, secure endpoints (HTTPS), and anonymized session tracking were implemented. The chatbot avoids making direct financial guarantees to maintain ethical compliance.

5.5 Module Integration

Integration ensures that individual components—UI, backend, AI engine, and external data services—function cohesively.

In this phase, API endpoints were tested using tools such as Postman to verify correct input-output mapping. Cross-platform compatibility tests validated the performance of the chatbot across web and mobile devices. The database module was linked to the backend to store user interactions, enabling session continuity and analytic insights.

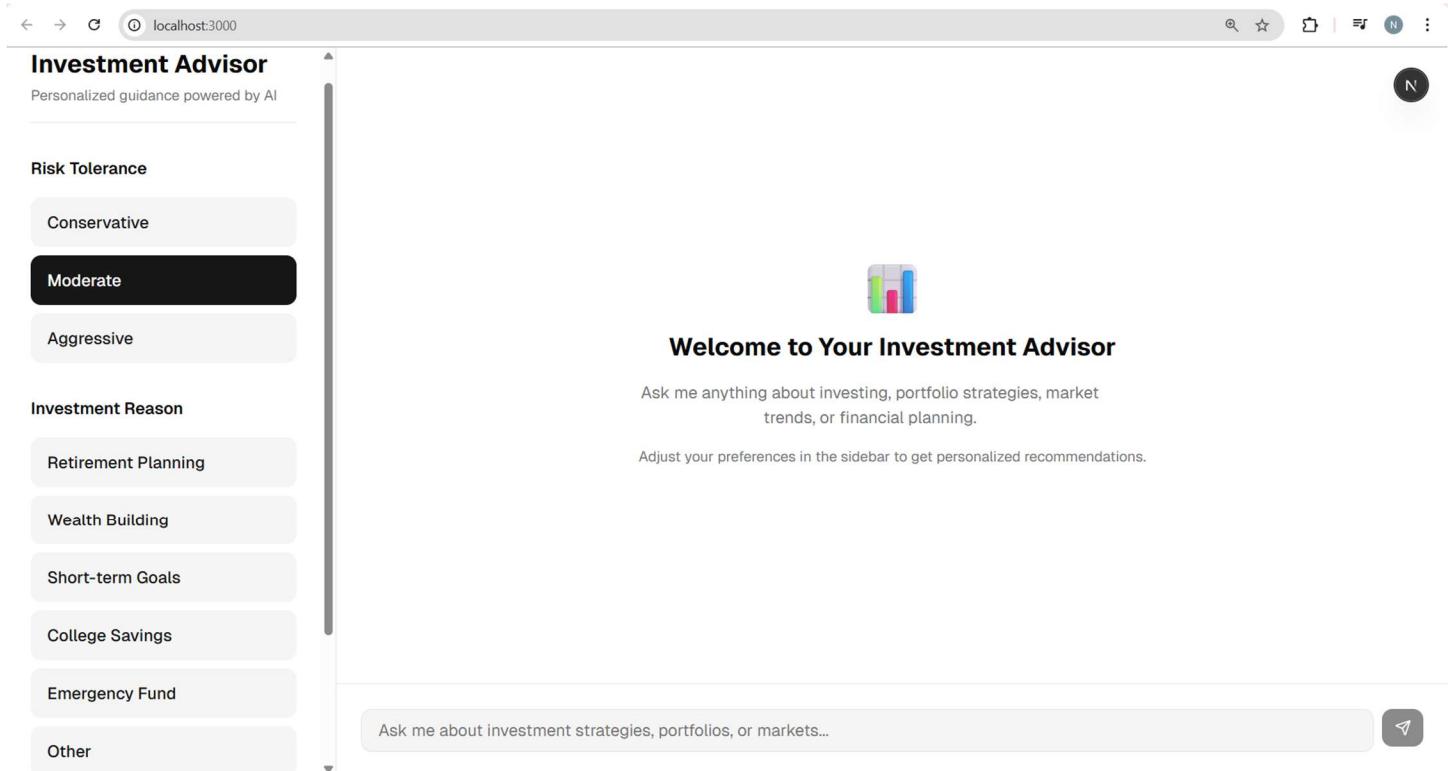
5.6 Summary

The implementation phase successfully transformed the system design into a functional AI-driven investment advisory chatbot. Through structured workflows, modular integration, and effective handling of challenges, the project achieves a reliable platform capable of assisting users with informed investment insights. This implementation lays the foundation for advanced features such as personalized financial dashboards, voice-enabled advisory services, and enhanced risk prediction models in future iterations.

CHAPTER 6

SCREENSHOTS

Screenshot 1: Initial Interface



Description:

This screenshot displays the home interface of the AI-Driven Investment Advisory Chatbot. It shows the user-friendly layout consisting of risk tolerance options, investment reasons, and a central chat area. This view represents the initial screen presented to users before entering any queries.

Investment Advisor bot

Screenshot 2: Basic Query – Moderate Risk Profile

Investment Advisor
Personalized guidance powered by AI

Risk Tolerance

- Conservative
- Moderate
- Aggressive

Investment Reason

- Retirement Planning
- Wealth Building
- Short-term Goals
- College Savings
- Emergency Fund
- Other

Our AI advisor considers your risk profile and investment goals to provide tailored recommendations.

As a moderate risk investor with a goal of wealth building, I'll provide you with a balanced investment strategy that aims to generate long-term growth while managing risk. Please note that these suggestions are tailored to your profile, but it's essential to regularly review and adjust your portfolio as market conditions and your personal circumstances change.

****Diversification:****

To minimize risk, it's crucial to diversify your investments across various asset classes. This will help you spread risk and increase potential returns. I recommend allocating your investments across the following asset classes:

- Stocks (Equities):** 40% - 50% of your portfolio
 - Focus on a mix of established companies with a strong track record, dividend-paying stocks, and growth-oriented stocks.
 - Consider investing in index funds or ETFs that track a broad market index, such as the S&P 500.
- Bonds (Fixed Income):** 20% - 30% of your portfolio
 - Invest in a mix of government and corporate bonds with varying maturities to manage interest rate risk.
 - Consider investing in bond funds or ETFs that offer a diversified portfolio of bonds.
- Real Estate:** 10% - 20% of your portfolio
 - Invest in real estate investment trusts (REITs) or real estate mutual funds to gain exposure to the property market.
 - Consider investing in a mix of residential and commercial properties.
- Alternatives:** 5% - 10% of your portfolio
 - Invest in alternative assets, such as commodities (e.g., gold, oil), or alternative investment funds (e.g., private equity, hedge funds).
 - These assets can help reduce correlation with traditional

Ask me about investment strategies, portfolios, or markets...

Investment Advisor
Personalized guidance powered by AI

Risk Tolerance

- Conservative
- Moderate
- Aggressive

Investment Reason

- Retirement Planning
- Wealth Building
- Short-term Goals
- College Savings
- Emergency Fund
- Other

Our AI advisor considers your risk profile and investment goals to provide tailored recommendations.

****Risk Management:****

To manage risk, consider the following principles:

- Dollar-Cost Averaging:** Invest a fixed amount of money at regular intervals, regardless of market conditions, to reduce timing risks.
- Rebalancing:** Regularly review your portfolio and rebalance it to maintain your target asset allocation.
- Stop-Loss Orders:** Consider setting stop-loss orders to limit potential losses if an investment declines below a certain price.
- Tax Efficiency:** Consider the tax implications of your investments and aim to minimize tax liabilities.

****Specific Investment Suggestions:****

Based on your profile, consider the following investments:

- Vanguard S&P 500 Index Fund (VFIAX):** A low-cost index fund that tracks the S&P 500.
- iShares Core U.S. Aggregate Bond ETF (AGG):** A diversified bond ETF that tracks the Bloomberg Barclays U.S. Aggregate Bond Index.
- Vanguard Real Estate ETF (VGSIX):** A real estate ETF that invests in a diversified portfolio of REITs and real estate companies.
- Invesco Gold & Special Minerals Fund (OPGSX):** A commodities fund that invests in gold and other precious metals.

Please note that these are just examples, and it's essential to conduct your own research and consult with a financial advisor before making any investment decisions.

Remember, investing is a long-term game. It's essential to stay disciplined, patient, and informed to achieve your wealth-building goals. Regularly review your portfolio, and rebalance it as needed to ensure it remains aligned with your investment objectives and risk tolerance.

Ask me about investment strategies, portfolios, or markets...

Description:

This screenshot demonstrates the chatbot's ability to generate personalized investment recommendations based on the user's selected risk level and investment reason. The AI provides structured and diversified options such as Fixed Deposits, Government Schemes, Mutual Funds, Recurring Deposits, and Gold, tailored specifically for a moderate-risk, wealth-building profile.

Screenshot 3: Goal-Based Query

The screenshot shows a web-based AI investment advisor interface. On the left, there is a sidebar with the title "Investment Advisor" and the subtitle "Personalized guidance powered by AI". Under "Risk Tolerance", "Moderate" is selected. Under "Investment Reason", "Wealth Building" is selected. The main content area displays a message from the AI: "Congratulations on starting to plan for your retirement 20 years in advance! This is a great step towards securing your financial future. As a moderate risk investor, I'll provide you with a tailored investment strategy to help you achieve your retirement goals." It then details the "Retirement Investment Strategy" and "Investment Allocation". The "Investment Allocation" section recommends a 60% - 70% stock allocation, focusing on established companies with strong track records and growth-oriented stocks, and considers index funds or ETFs. A footer at the bottom says "Ask me about investment strategies, portfolios, or markets...".

The screenshot shows a continuation of the AI investment advisor interface. The sidebar remains the same, with "Moderate" selected under Risk Tolerance and "Wealth Building" selected under Investment Reason. The main content area now displays a detailed "Investment Vehicles" section. It suggests three types of vehicles: 401(k) or Employer-Sponsored Retirement Plan, Individual Retirement Account (IRA), and Taxable Brokerage Account. Each type is described with its benefits and how it can help implement the retirement investment strategy. A footer at the bottom says "Ask me about investment strategies, portfolios, or markets...".

The screenshot shows a web-based AI chatbot interface for investment advice. On the left, there are two columns of buttons. The top column is for 'Risk Tolerance' with options: 'Conservative', 'Moderate' (which is highlighted in black), and 'Aggressive'. The bottom column is for 'Investment Reason' with options: 'Retirement Planning', 'Wealth Building' (highlighted in black), 'Short-term Goals', 'College Savings', 'Emergency Fund', and 'Other'. To the right of these columns, the main content area provides financial advice. It starts with a section on 'Dollar-Cost Averaging' explaining its purpose: 'To reduce timing risks and avoid emotional decision-making, consider investing a fixed amount of money at regular intervals, regardless of market conditions. This strategy is known as dollar-cost averaging.' Below that is a section on 'Rebalancing' with the text: 'Regularly review your portfolio and rebalance it to maintain your target asset allocation. This will help you manage risk and ensure that your investments remain aligned with your retirement goals.' Finally, it provides an example of a diversified investment portfolio with six items:

- 1. **Vanguard S&P 500 Index Fund (VFIAX):** 30% of your portfolio
- 2. **Vanguard Total International Stock Market Index Fund (VTIAX):** 20% of your portfolio
- 3. **iShares Core U.S. Aggregate Bond ETF (AGG):** 20% of your portfolio
- 4. **Vanguard Real Estate ETF (VGSIX):** 10% of your portfolio
- 5. **Invesco Gold & Special Minerals Fund (OPGSX):** 5% of your portfolio
- 6. **Schwab U.S. Broad Market ETF (SCHB):** 15% of your portfolio

At the bottom of the main content area is a button labeled 'Ask me about investment strategies, portfolios, or markets...'

Description:

This screenshot highlights the chatbot's capability to offer long-term goal-oriented financial guidance. Based on the retirement planning objective, the AI provides a mix of stable and moderately-growth investments aligned with the user's time horizon and risk preference.

Screenshot 4: Follow-Up Question

Why do you recommend gold for moderate-risk investors?(Be short and sleek)

I recommend gold for moderate-risk investors as a:

- * **Hedge against inflation**: Gold tends to perform well during periods of high inflation, protecting purchasing power.
- * **Diversification tool**: Gold has a low correlation with other assets, reducing portfolio risk and increasing potential returns.
- * **Safe-haven asset**: Gold can provide a sense of security during market turmoil, helping to mitigate losses.

A small allocation to gold (5-10%) can help moderate-risk investors balance their portfolio and reduce overall risk.

Description:

This screenshot displays the chatbot's reasoning capability by explaining the logic behind each recommendation. It shows transparency and educational value in the AI's responses.

Screenshot 5: Clarification Handling

Suggest something good to invest.(Be Short and sleek)

Consider investing in:

- * **Index Funds**: Diversified, low-cost, and long-term growth potential (e.g., VTI or SPY)
- * **Dividend-paying Stocks**: Stable income and potential for growth (e.g., Johnson & Johnson or Procter & Gamble)
- * **Real Estate Investment Trusts (REITs)**: Steady income and diversification (e.g., Vanguard Real Estate ETF)

These options offer a balance of risk and potential returns, suitable for moderate-risk investors.

Description:

This screenshot shows the chatbot's query-refinement feature. When the user inputs an incomplete or unclear question, the AI asks for clarification regarding risk tolerance, purpose, or time horizon, demonstrating robust conversational handling.

CHAPTER 7 CONCLUSION

The *AI-Driven Investment Advisory Chatbot* successfully demonstrates how artificial intelligence can enhance financial decision-making by providing personalized, accessible, and goal-oriented investment guidance. By integrating user-specific parameters such as risk tolerance and investment objectives, the system delivers tailored recommendations across reliable asset classes including Fixed Deposits, Government Schemes, Mutual Funds, Recurring Deposits, and Gold—while intentionally excluding stock-market advice to maintain safety and compliance. This structured approach ensures that users receive clear and responsible financial insights, even without prior investment knowledge.

The implementation of a modern web interface, supported by dynamic UI components and AI-generated responses using the Grok Llama model, further enhances usability and engagement. The chatbot's ability to interpret user inputs, handle follow-up questions, and provide well-reasoned explanations reflects its potential as a practical tool for everyday financial planning. Its modular architecture and environment-based configuration also allow for easy deployment, local execution, and future scalability.

Overall, this project highlights the growing relevance of AI-powered advisory systems in the personal finance domain. By combining intelligent recommendation logic with an intuitive interface, the chatbot serves as a foundation for more advanced financial assistants that could integrate real-time data, predictive analytics, and multi-lingual support. The system stands as a functional prototype that demonstrates both the feasibility and value of AI-assisted financial guidance in improving user confidence and promoting informed investment decisions.