CODECELL - CMPN, VESIT

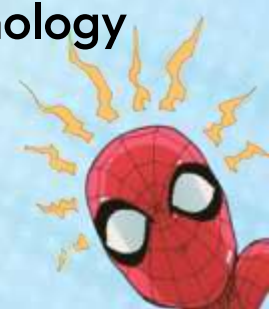
SYRUS HACKATHON 2025

Category Code: C5

Problem Statement Title: InvestmentGuardian - AI-Powered Stock Market Fraud Detection & Insights

Team Name: YugaNayaks

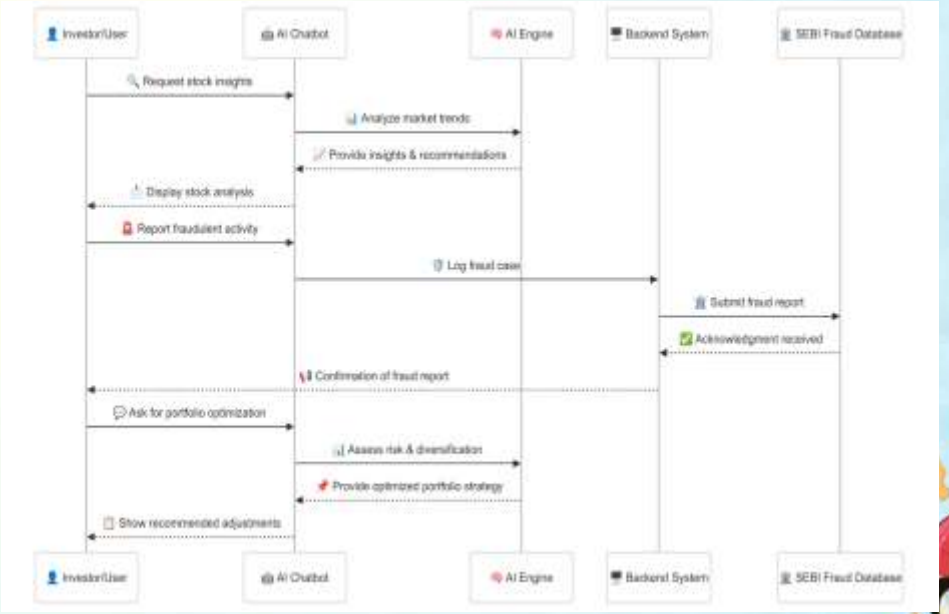
Institute Name: Vivekanand Education Society's Institute of Technology



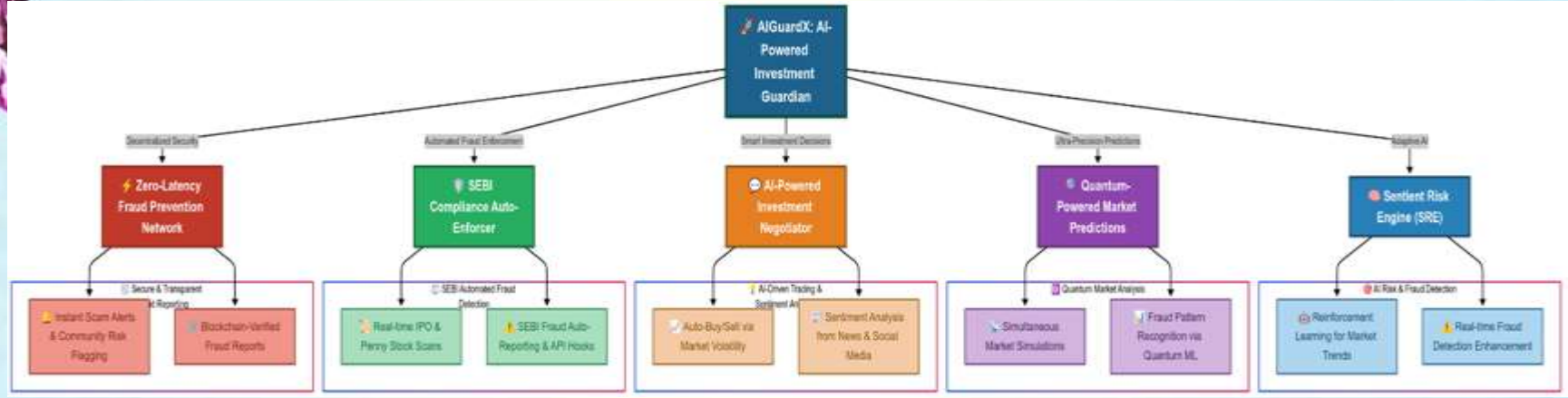
Idea / Approach details (& implemented features)

An **AI-powered platform** for **fraud detection, real-time stock insights, and automated fraud reporting** to **protect** retail investors.

- **AI Fraud Detection:** Looks for scams in news, social media, and stock data.
- **Personalized Insights:** risk-based stock recommendations powered by AI.
- **Automated Fraud Reporting:** Notifies brokers and SEBI of fraud.
- **Real-time scam alerts:** are provided by an AI chatbot on WhatsApp.
- **Smooth AI Integration:** Multi-agent data flow is managed by Uptiq AI Console.



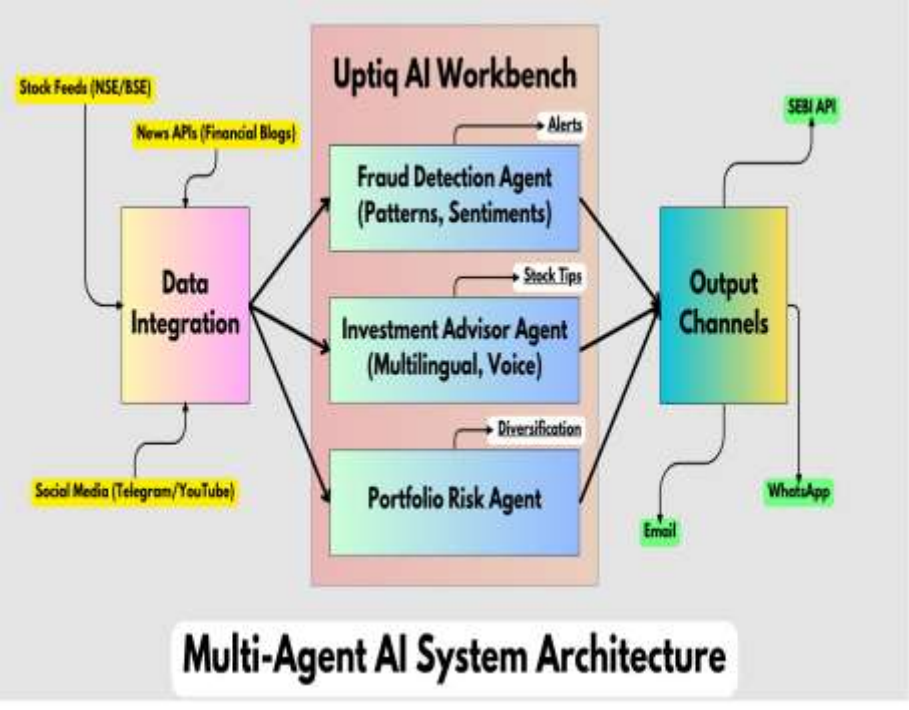
Innovation (Showstopper)



- ➔ **AI-Powered Insights** – Provides real-time, data-driven financial advice.
- ➔ **Smart Automation** – Streamlines investment and financial management with automated solutions.
- ➔ **Personalized Strategies** – Offers recommendations based on user preferences and risk profiles.
- ➔ **Seamless Integration** – Integrates with financial platforms for a hassle-free experience.

Implementation/Prototype/Use Case Diagram (screenshots)

- **Data Integration:** Fetches data from **Stock Feeds, News APIs, and Social Media.**
- **Uptiq AI Workbench:**
  - **Fraud Detection** → Flags anomalies.
  - **Investment Advisor** → Provides multilingual stock tips.
  - **Portfolio Risk** → Suggests diversification.
- **Output:** Insights via **Email, WhatsApp, SEBI API.**
- **AI-driven fraud detection, investment guidance & risk management.**



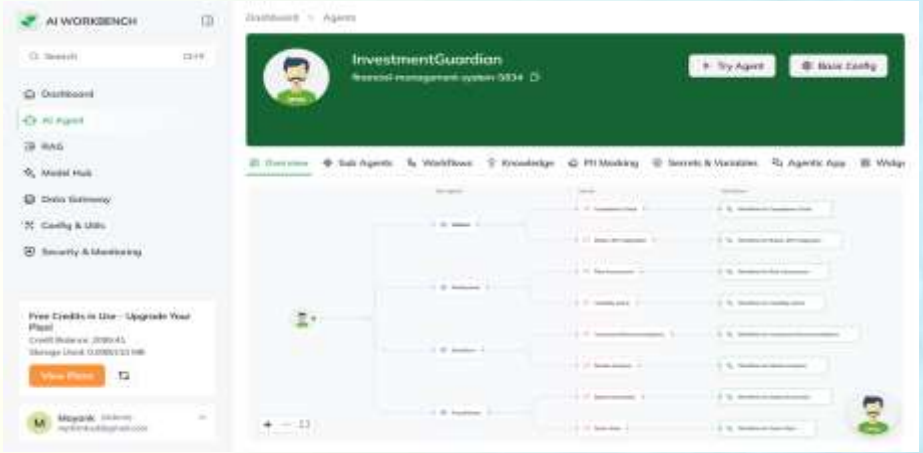
In case of Uptiq category - Your Uptiq Agent (explain in detail)

InvestmentGuardian is an AI-driven financial management system with specialized sub-agents for fraud detection, investment insights, risk assessment, and compliance reporting.

- **FraudHunter** – Detects scams using NLP & anomaly detection.
- **StockGuru** – Provides investment insights with risk-based filters.
- **RiskSentinel** – Monitors portfolio risks & alerts on volatility.
- **SEBIBot** – Ensures compliance with SEBI regulations via API.

Features:

Automated monitoring & real-time alerts
AI-powered market analysis
Seamless integration with NSE/BSE & broker APIs



Agent Name	Role	Uptiq Template	Key Config
FraudHunter	Scam Detection	Anomaly Detection Agent	NLP model + trading volume thresholds
StockGuru	Investment Insights	Predictive Analytics Agent	Risk-profile filters + multilingual NLP
RiskSentinel	Portfolio Safety	Decision Tree Agent	Correction matrices + volatility alerts
SEBIBot	Compliance Reporting	Rule-Based Agent	SEBI fraud schema + broker API hooks

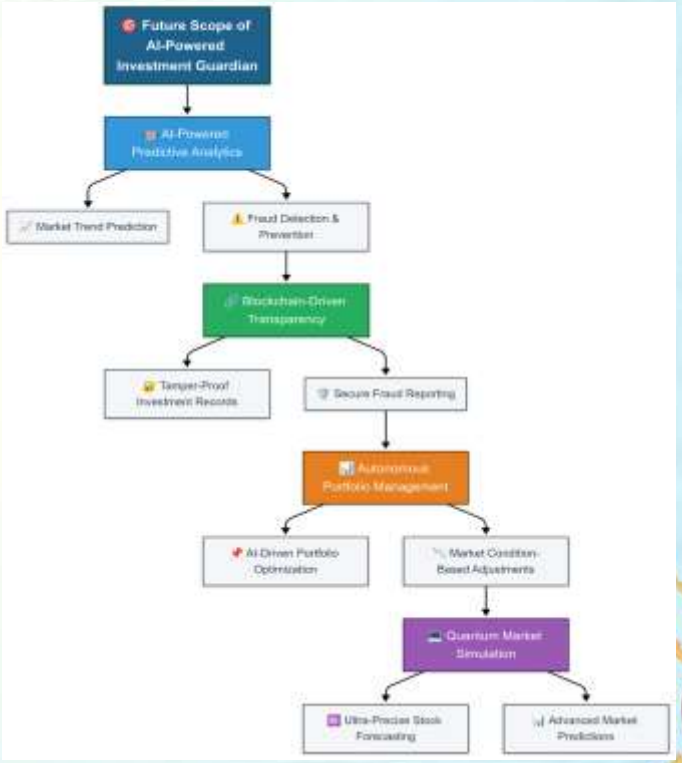
Future Objectives

AI-Powered Predictive Analytics – Employ deep learning to predict market trends and identify nascent fraud patterns before they scale.

Blockchain-Driven Transparency – Harness blockchain to provide tamper-proof investment histories and safe fraud reporting.

Autonomous Portfolio Management – Allow AI-driven, auto-tuning investment portfolios depending on market conditions and user risk levels.

Quantum Computing for Simulation of the Market – Leverage quantum algorithms to forecast stock market patterns for extremely precise risk calculation.



Feedback Received

1. **Improve Fraud Detection Accuracy**
   - **Challenge:** Initial fraud detection models had lower precision due to limited datasets.
   - **Action Taken:** Integrated additional financial datasets, refined NLP algorithms, and trained AI models on more real-world fraud cases.

2. **Enhance Portfolio Risk Analysis**
   - **Challenge:** Users wanted a more detailed view of their portfolio risks and potential market threats.
   - **Action Taken:** Developed RiskSentinel to analyze risk factors and alert users in real-time.

3. **Improve User Engagement**
   - **Challenge:** Initial system lacked proactive communication with users.
   - **Action Taken:** Enhanced WhatsApp chatbot functionality to provide real-time fraud alerts and personalized investment tips.

4. **Ensure Compliance with SEBI Regulations**
   - **Challenge:** Regulatory compliance mechanisms needed better integration.
   - **Action Taken:** Integrated SEBIBot, which automates compliance checks and reports fraudulent activities directly to SEBI.

After Mentoring Session

Key Insights Gained:

- ❑ Enhanced focus on fraud detection techniques.
- ❑ Improved integration of AI models with financial APIs.
- ❑ Need for better user engagement through personalized alerts.
- ❑ Implement a User-Interface Model for easy user interactions.

Changes Implemented Based on Feedback:

- ❑ Strengthened AI fraud detection accuracy.
- ❑ Improved chatbot responsiveness for real-time alerts.
- ❑ Added compliance tracking enhancements.

Detail Workflow For Stock Guru Agent

Market Analysis Agent Workflow

1.Start Node (Workflow Initiation)

1. This node begins the market analysis workflow.
2. It collects user input, such as stock ticker symbols, sectors, or financial metrics of interest.
3. Tagged as *Conversational* and *InvestmentGuardian*, indicating it is designed for financial insights.

2.Prompt (LLM Processing)

1. A *Large Language Model (LLM)* processes the user's request.
2. It interprets financial terms, refines queries, and generates structured requests for data retrieval.

Detail Workflow For Stock Guru Agent

1.API Call (Fetch Market Data)

1. The workflow sends a request to *Alpha Vantage* (https://www.alphavantage.co/query).
2. Retrieves real-time stock prices, forex data, cryptocurrency details, and market indicators.
3. Uses parameters like stock ticker symbols and timeframes based on user input.

2.JavaScript Processing (Data Handling & Computation)

1. Executes JavaScript to process the API response.
2. Extracts relevant data, such as price trends and volume.
3. Performs additional calculations or formatting for better visualization.

3.Display Nodes (Presenting Data to the User)

1. Two display nodes show the results:
    1. **Main Display:** Presents refined financial insights.
    2. **Secondary Display:** Could show raw API responses or intermediate calculations.

4.Conditional Paths (Handling Success or Failure)

1. **Success Path:** If the API call works, data moves to the JavaScript node for processing.
2. **Failure Path:** If the API fails (e.g., invalid stock ticker or API limit exceeded), an error message is displayed.

Workflow for Compliance Check

Purpose:
Ensures that all trading activities, investments, and financial transactions comply with legal and regulatory standards set by financial authorities such as:
•Securities and Exchange Commission (SEC) **(USA)**
•Securities and Exchange Board of India **(SEBI)**
•Financial Conduct Authority (FCA) **(UK)**
Functionality:
1.Regulatory Screening:

1. Checks user transactions against predefined rules (e.g., insider trading, suspicious transactions).
2. Verifies compliance with anti-money laundering (AML) laws.

2.Audit & Reporting:

1. Keeps a log of transactions and flags anomalies.
2. Generates reports for financial regulators.

3.Automated Compliance Alerts:

1. Sends real-time alerts when a trade violates financial laws.

Workflow for Broker API Integration

Purpose:
Facilitates seamless communication between a trading platform and stock brokerage firms by allowing real-time trading, portfolio management, and market data retrieval.

Functionality:

1.Account Authentication:

1. Uses OAuth or API keys to securely connect user accounts to brokerage firms (e.g., Zerodha, Interactive Brokers, TD Ameritrade).

2.Trade Execution:

1. Allows users to place buy/sell orders directly via the platform.
2. Retrieves real-time bid/ask prices from brokerage APIs.

3.Portfolio Management:

1. Fetches and displays holdings, past transactions, and profit/loss statements.

Workflow for Risk Assessment

Purpose:
Analyzes investment risk by evaluating market volatility, portfolio diversification, and potential losses.

Functionality:

1.Portfolio Risk Calculation:

1. Uses *Value at Risk (VaR), Beta coefficient, and Standard Deviation* to measure risk.

2.Scenario Analysis:

1. Simulates market downturns to assess portfolio performance.

3.Risk-Based Recommendations:

1. Suggests safer asset allocations based on user risk tolerance.

Workflow for Volatility Alerts

Purpose:
Monitors stock market fluctuations and alerts traders when volatility exceeds pre-set thresholds.

Functionality:

1.Technical Indicator Analysis:

1. Tracks **Bollinger Bands, ATR (Average True Range), and VIX (Volatility Index)** to assess volatility.

2.Alert System:

1. Sends **email, SMS, or push notifications** when stocks experience extreme price movements.

3.Historical Data Comparison:

1. Compares past and present volatility levels to identify trends.

Workflow for Investment Recommendations

Purpose:
Provides AI-driven stock and investment suggestions tailored to individual financial goals.
Functionality:
1.Personalized Stock Picks:

1. Uses **fundamental analysis (P/E ratio, EPS, revenue growth)** and **technical indicators (RSI, MACD, SMA)** to recommend stocks.

2.AI-Powered Insights:

1. Leverages **machine learning** to identify undervalued stocks.

3.Sector-Wise Investment Ideas:

1. Suggests high-growth industries like AI, renewable energy, and healthcare

How Implementation Should Be Done

Data Collection & Preprocessing
•Gather stock market data from APIs and social media platforms.
•Clean and preprocess data for NLP-based fraud detection.

AI Model Development
•Train NLP and anomaly detection models using labeled fraud data.
•Implement reinforcement learning for continuous improvement.

System Integration
•Develop backend services in React.js and Node.js to process AI predictions.
•Connect to PostgreSQL for data storage.
•Build frontend dashboards using HTML and Tailwind CSS.

Real-time Alerts & Reporting
•Automate fraud reporting to SEBI via API integration.
•Deploy real-time fraud detection services.

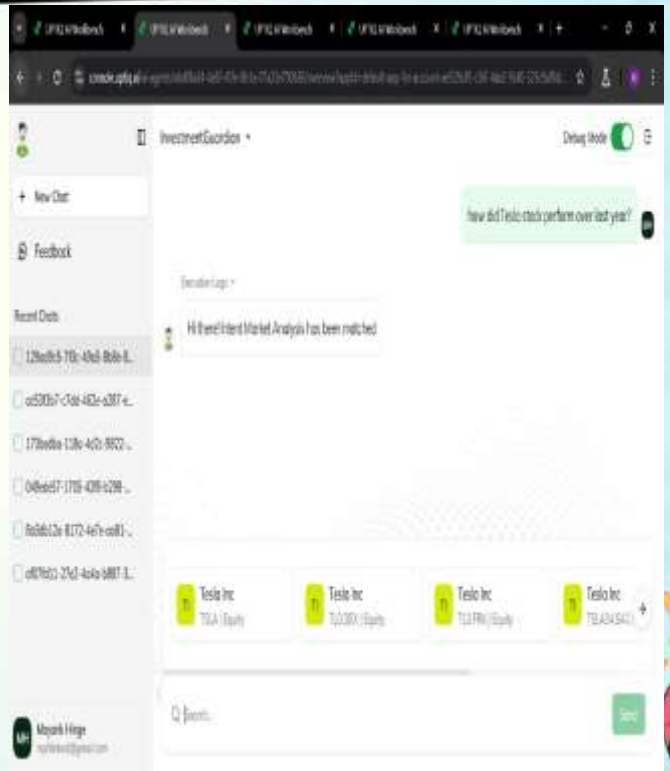
Working Of Agent

Observations from Execution Logs

1. **Intent Matching:** The agent correctly identified the query as related to Market Analysis, meaning the LLM successfully understood the context.

2. Stock Symbol Recognition: The system retrieved multiple stock listings for Tesla Inc. across different exchanges:

- **TSLA | Equity (NASDAQ)**
- **TL0.DEX | Equity (Likely a European exchange)**

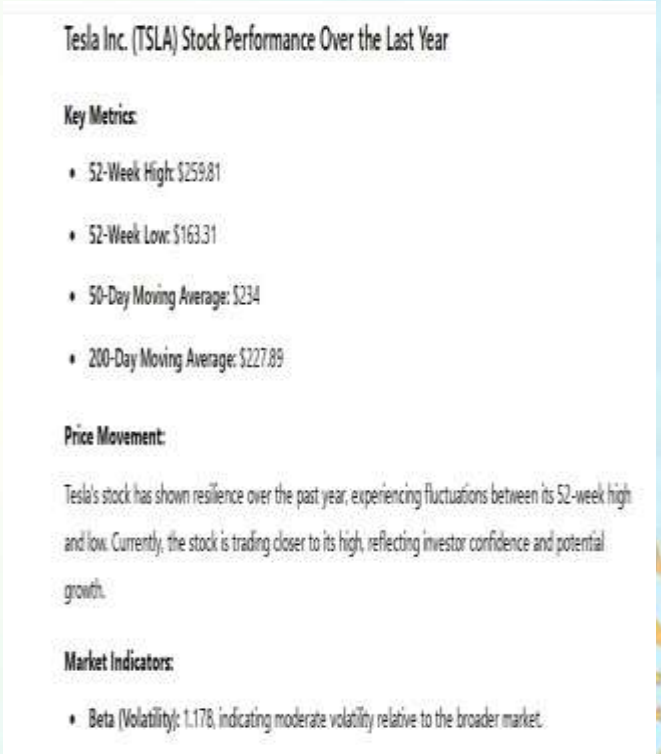


Working Of Agent

3. Detailed Summary Report: The AI agent generates an in-depth analysis of Tesla's stock performance, including:

- **Price trends over the past year**
- **Key highs and lows**
- **Volatility and trading volume**
- **Market sentiment analysis**

4. Debug Mode Enabled:
This means you can track how the agent processes the query, making it easier to troubleshoot issues if needed.



Tesla Inc. (TSLA) Stock Performance Over the Last Year

Key Metrics:

- 52-Week High: $259.81
- 52-Week Low: $163.31
- 50-Day Moving Average: $234
- 200-Day Moving Average: $227.89

Price Movement:

Tesla's stock has shown resilience over the past year, experiencing fluctuations between its 52-week high and low. Currently, the stock is trading closer to its high, reflecting investor confidence and potential growth.

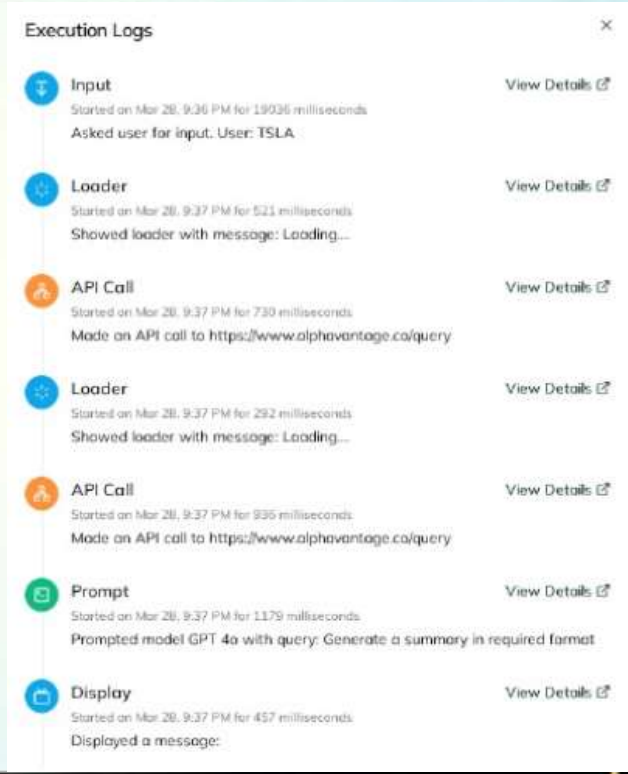
Market Indicators:

- Beta (Volatility): 1.178, indicating moderate volatility relative to the broader market.

Execution Steps Involved In Working

Execution Flow

- User Input (TSLA Query)Time: 9:36 PM
- The agent asks for the stock symbol (TSLA).
- Loader (Loading State) Displayed a "Loading..." message to inform the user that data retrieval is in progress.
- API Call (Alpha Vantage)Time: 9:37 PMThe agent makes a request to Alpha Vantage (https://www.alphavantage.co/query) to fetch Tesla stock data.
- Loader (Second Loading Message)Another loading message appears, likely due to a second API request or data processing.
- API Call (Second API Request)Another request to Alpha Vantage, possibly fetching different time frames (e.g., historical vs. real-time).
- Prompt (GPT-4 Processing)Time: 9:37 PMThe AI agent processes the fetched data and formats it into a summary.
- Display (Final Response)The AI generates a structured response and displays it in the chat

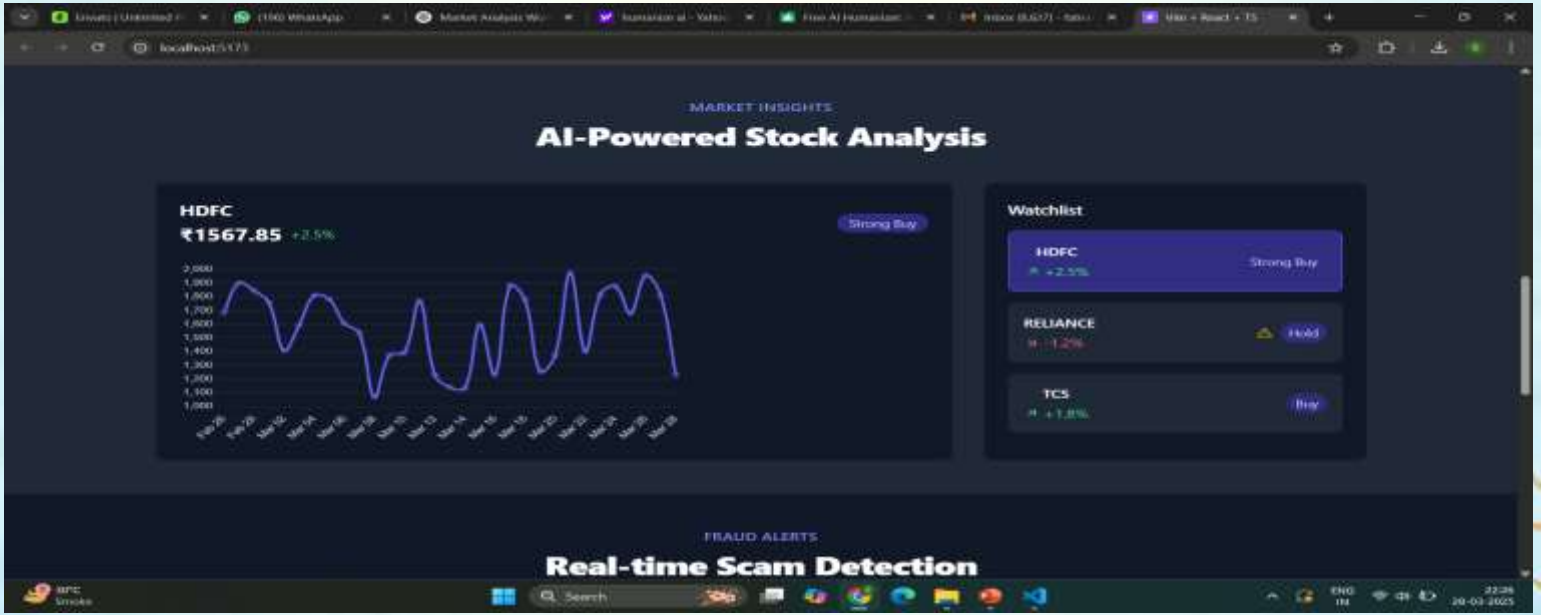


Implementation Screenshots

Enhanced focus on fraud detection techniques.

Implementation Screenshots

Improved integration of AI models with financial APIs.



Implementation Screenshots