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Refurbished Goods Shopping Agent

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Abstract: The increasing demand for refurbished electronic products has created challenges in product discovery, pricing transparency, and efficient management due to variations in condition and availability. Traditional e-commerce systems depend on manual search and filtering, which often leads to increased user effort and reduced clarity. This paper proposes Second Life, an agentic AI-based refurbished goods shopping system that enables conversational interaction for both product exploration and management. The system employs a language model to interpret user intent and invokes validated backend tools to perform database operations such as retrieving product details, checking availability, applying discounts, and updating or removing listings. A structured service–repository architecture is adopted to ensure secure execution and data consistency. The developed system demonstrates improved interaction efficiency, accurate data handling, and reduced manual intervention. The results indicate that agentic AI can effectively support refurbished e-commerce platforms by enhancing usability and automating operational workflows.

Keywords: Agentic AI, Refurbished Electronics, Conversational AI, Tool-Based Execution, ECommerce Automation, Database Management.

I. INTRODUCTION

Keeping The rapid advancement of electronic technology has led to an increased demand for affordable alternatives to new devices, making refurbished electronics a viable option for many users. Refurbished products offer cost benefits and contribute to environmental sustainability by extending the lifecycle of electronic devices. However, users often face difficulties in identifying reliable refurbished products due to unclear condition descriptions, inconsistent pricing, and limited availability information. This paper presents Second Life, an agentic AI based refurbished goods shopping system that enables users to interact through natural language. The proposed system automates product search, availability verification, price updates, and listing management by integrating a language model with a structured backend architecture. The aim of this work is to demonstrate how agentic AI can improve usability and efficiency in refurbished ecommerce platforms

II. LITERATURE SURVEY

Several studies have examined consumer behavior and system design challenges related to refurbished electronic products. Research on refurbished product marketing highlights that customer trust is strongly influenced by transparent pricing, warranty information, and clear communication of product condition. These studies indicate that uncertainty in refurbished goods often discourages potential buyers, even when products are cost-effective. Other works have focused on identifying key decision-making factors in refurbished product purchases. Factors such as retailer credibility, brand reputation, perceived quality, and aftersales support have been shown to significantly affect user confidence. Data-driven approaches in these studies emphasize the importance of structured and easily accessible product information to improve purchasing decisions. Recent advancements in artificial intelligence have introduced agent-based systems that go beyond traditional chatbot functionality. Research on agentic AI demonstrates how intelligent agents can reason over user intent and perform controlled actions through external tools. These systems separate language understanding from execution logic, improving reliability, safety, and task accuracy in real world applications. Studies on tool-integrated AI architectures further emphasize that combining language models with backend execution mechanisms enables automation of complex workflows

III. METHODOLOGY

A. Architectural Approach

The proposed Refurbished Goods Shopping Agent is designed using a layered architecture to clearly separate user interaction, decision logic, and data processing. Instead of requiring users to navigate multiple menus and filters, all interactions are centralized through a conversational interface. This approach shifts operational complexity from the

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user to the system, allowing users to communicate their requirements using natural language while the system handles data interpretation and execution internally. The architecture ensures modularity, scalability, and ease of maintenance.

B. The Agentic Workflow

At the core of the system lies an Agentic AI module that functions as the intelligent decision-making component. Unlike rule-based or keyword-driven systems, the agent performs intent recognition to understand the purpose of each user query. When a user submits a request such as checking product availability or applying a discount, the agent extracts relevant entities including product name, category, condition, or price parameters. Based on the identified intent, the agent autonomously selects the appropriate backend tool and initiates the required operation. This automated tool selection eliminates manual confirmation steps and enables seamless task execution.

C. Backend Services and Data Handling

We The backend is implemented using a serviceoriented design, where each service is responsible for a specific function such as product retrieval, availability verification, price updates, or record deletion. A repository layer manages interactions with the database, ensuring data consistency and validation. This separation of concerns improves system stability and allows concurrent requests to be handled efficiently without affecting performance. The structured design also simplifies future enhancements and integration
with additional services.

D. Real-Time Analytics

All refurbished product data is stored in a structured database that maintains detailed records including product condition, pricing, availability, warranty, and supplier information. Database operations are executed in real time, ensuring that responses reflect the most recent state of the system. Queries such as product search or availability checks are processed dynamically, allowing users to receive accurate and up-todate information at the moment of interaction. This real-time processing capability enhances reliability and supports effective product management.

IV. SYSTEM IMPLEMENTION

System implementation involves converting the system design into an operational software solution. This chapter explains how each module of the Property Service Agent—Frontend, Backend, Agent layer, Tools, and Database—was implemented. The implementation follows a structured Agentic AI architecture for safety, modularity, and ease of extension. The system implementation phase involves converting the planned design and methodology into a functioning software system. This includes developing the Refurbished Goods Shopping Agent, creating the backend database, integrating the AI conversational interface, and enabling user interactions with product data.The implementation ensures that all system components work together seamlessly to achieve the expected functionality such as searching for refurbished products, checking availability, and updating inventory through natural language commands. This chapter explains how each module of the project is implemented using Google Agentic AI, Fast API, and a SQLite database. It also discusses the coding strategy, tool integration methodology, and the algorithm used for executing backend operation.

The implementation is based on the concept of Agentic AI, where the conversational agent processes the user's message, selects an appropriate tool, and performs the corresponding task using the backend services. The system is modularly implemented in different layers to ensure maintainability and interaction efficiency. The backend is developed using Fast API to manage server requests and responses. A SQLite database is used to store product details including product name, category, condition, price, and availability. The service layer contains logic for interacting with the database, while the tool functions are used by the agent to trigger actions like fetching or updating products.

The conversational component is implemented using Google Agentic AI with Gemini LLM. The model interprets user queries, validates required parameters, and runs the correct backend tool. The final output is then delivered to the user in natural language. This methodology guarantees that users receive accurate results and meaningful responses.

V. RESULT AND DISCUSSION

The heading of the Result analysis is carried out to evaluate how well the Refurbished Goods Shopping Agent performs in real-time usage and whether the developed system fulfills the expected goals. The primary aim of this analysis is to understand the efficiency, correctness, and effectiveness of the conversational agent when interacting with users and performing backend operations. The results are compared with the intended functional requirements such as searching

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products by category, checking availability, updating price, and removing listings. This analysis helps verify that the system delivers a smooth user experience and accurate output through natural language communication.

The Refurbished Goods Shopping Agent was designed to simplify the process of searching, analyzing, and managing refurbished products using natural language queries. The test results show that the system successfully performs all essential operations through conversational interaction, including retrieving products by category or condition, checking availability, updating price, and removing listings from the database. During evaluation, the system responded correctly to most user requests with relevant product data and proper backend actions. The conversational interface enhances user experience by eliminating the need for navigation through multiple screens or dropdown menus. The integration of the database with the agent tools ensures accurate information retrieval and real-time updates, which demonstrates the reliability of the system for shopping assistance. A few challenges were observed, such as occasional misinterpretation of query wording and constraints related to complex sentence structures. However, these limitations can be minimized with further improvements in language understanding and intent mapping. Overall, the observed results indicate that the implemented agent behaves intelligently and helps users
perform operations quickly and efficiently.

Operational Performance The Refurbished Goods Shopping Agent was evaluated through multiple real-world usage scenarios to verify whether an agentic AI approach can effectively replace traditional filter-based and form-driven e-commerce interactions. The evaluation focused on the system's ability to manage the complete product interaction cycle, starting from natural language queries to backend database execution and response delivery. The results showed that the agent consistently understood user intent across various scenarios such as retrieving products by category, checking availability, applying discounts, and removing items from listings. Unlike conventional platforms that require users to navigate multiple filters and pages, the conversational approach significantly reduced interaction effort, allowing users to obtain accurate information using simple queries.

VI. CONCLUSION AND FUTURE SCOPE

The Refurbished Goods Shopping Agent was developed with the objective of making refurbished product exploration simpler, faster, and more user-friendly through conversational interactions. The system successfully integrates a backend database with an intelligent agent capable of handling real-time queries related to product search, category filtering, availability checks, supplier information, price updates, and removal of listings. The results show that the agent delivers accurate responses and performs operations effectively, eliminating the need for users to navigate complex interfaces.This project demonstrates how conversational automation can enhance user experience and support decision-making in the refurbished electronics market. By reducing manual effort and delivering instant information, the system increases accessibility for users and potential customers. The overall implementation indicates that the solution is practical, efficient, and suitable for real-world usage where smart product assistance is needed.
The results show that integrating agentic AI with a structured backend improves usability, efficiency, and data reliability for both users and administrators. The system reduces effort, minimizes errors, and enhances transparency in refurbished product management.

Future Work

Although the system has achieved its primary goals, several improvements and enhancements can be included in future versions:

1. Implementation of user authentication and role-based access to secure product updates and administrative actions.
2. Integration of secure online payment options to support complete purchase flow.
3. Improving natural language understanding to support more complex and ambiguous queries.
4. Addition of image-based product search using computer vision to enhance product discovery.
5. Expansion of the product dataset to include more categories and multiple suppliers for better real-world coverage.
6. Implementing recommendation algorithms to help users choose the best refurbished deals based on affordability and condition.
7. Multi-language conversational support to make the system accessible to a wider audience.
8. Deployment as a mobile application for increased convenience and market reach.

With these extensions, the Refurbished Goods Shopping Agent can evolve into a comprehensive smart shopping assistant, capable of handling advanced e-commerce operations and providing
a seamless refurbished product purchasing experience.

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