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REPAIR ORDERS INVENTORY AGENT

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Abstract: Effective coordination of the repair activities and inventory management is important towards increasing service efficiency. The methodical repair activities performed by a typical repair center are only record-based and lack integration or automation. This results in a significant expenditure of time by the technical and managerial personnel to manually follow up on the status of the ongoing repairs, along with inventory discrepancies that cause setbacks.

This article proposes the design of the Repair Orders Inventory Agent software system. The software provides a modular structure made up of a database service and a central service. The central service has a repair orders service and a repair service. The software employs a service-oriented architecture. It uses the SQLite database. The software has been developed in Python. It is a software platform used in the repair of goods. It provides automated validation as well as repair lifecycle management. It has capabilities of real-time inventory update.

In fact, experimental analysis proves that the Repair Orders Inventory Agent contributes towards increased accuracy, error reduction, as well as increased transparency levels of repair and inventory management. One of the significant areas that this proposed system showcases is related to real application uses of backend modularity in servicing con

Keywords Repair Order Management, Inventory Synchronization, Service Automation, Python Backend Systems, SQLite Database, Intelligent Repair Systems

I. INTRODUCTION

The fast shift to digital tools in service and maintenance industries has led to more software-based systems for managing repair operations and inventory records. While many repair centers have moved from handwritten logs to simple digital tools, most existing solutions are limited to basic record storage and manual updates. These systems often do not have automation, workflow checks, or real-time syncing between repair activities and parts inventory.

Repair technicians and service managers often rely on manual tracking methods to keep an eye on repair progress, device history, and parts use. This can take a lot of time and is prone to mistakes. Similarly, inventory records are frequently updated separately, which results in mismatched stock levels, delayed repairs, and challenges in tracking part usage. These limitations lower operational efficiency and hinder timely decision-making in repair centers.

Recent developments in software automation and smart backend processing have created new chances to improve repair management systems. Modular service-oriented designs and agent-like processing logic allow systems to check workflows, automate repetitive tasks, and maintain consistent coordination between connected operations like repairs and inventory management.

In this setting, the Repair Orders Inventory Agent is suggested as a smart backend system that combines repair-order tracking with synchronized inventory control. This system lets users manage repair records, check repair status, and automatically update parts inventory using structured service logic. By merging automated checks with modular backend design, this proposed system aims to improve operational accuracy, lessen manual work, and boost reliability in repair and inventory management environments.

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II. RELATED WORK

In recent years, increasing attention has been received by repair management systems and inventory automation solutions. Several studies have focused on digital repair tracking platforms, techniques of workflow automation, and mechanisms of inventory coordination to support efficient service-center operations.

Cabral et al. produced a comprehensive review of intelligent service-management dashboards, focusing on the capacity to monitor repair progress and operational risks, as well as to highlight limitations related to scalability and real-time inventory synchronization. Park and Jo introduced one of the early service workflow dashboards and showed that the visual representation of the stages of repair helps technicians in their reflection upon task progress, even if efficiency improvements were not straightforward.

Wang et al. examined the application of predictive models within the context of maintaining schedules and spare demand forecasting. Although the results showed a promising level of accuracy, they could sometimes lack transparency as well as a user-friendly interface. The need to design service automation systems with a focus on a user-oriented approach has been emphasized by Alfredo et al.

Looking at previous research, it is evident that most of the available repair management solutions are primarily used for record maintenance and isolated inventory management. There is still a research gap when it comes to an integrated system that handles repairs and simultaneous inventories for consistent and timely operative feedback. The Repair Orders Inventory Agent closes this research gap

III. SYSTEM OVERVIEW AND ARCHITECTURE

System overview and architectureThe Repair Orders Inventory Agent is built as a modular backend system that ties together repair workflows and inventory tracking in a consistent way.Its layered structure keeps responsibilities clearly separated, which makes the system easier to maintain, scale, and extend as requirements grow. At a high level, the system is organized into four main layers.

Presentation layer
This is the entry point for technicians and managers using the system.It exposes a structured interface whether command-based or service-driven that allows users to submit requests such as creating a repair order, updating its status, or checking whether parts are in stock.The interface is designed so that users can perform these actions using clear, predictable inputs without needing to know how the underlying data or logic is implemented.

Processing logic layer
The processing layer receives incoming repair and inventory requests and decides what should happen next.It validates inputs, determines the required operation, and routes the request to the correct backend service or module.This layer effectively shields users and higher-level components from the complexity of internal data structures and orchestration logic.

Application logic layer
The application layer is where the core business behavior of the system lives.It applies business rules, enforces workflow steps, and coordinates interactions between the repair management and inventory components.Typical responsibilities at this level include managing the repair lifecycle, adjusting stock levels when parts are used, and ensuring that only valid and consistent data is processed.

Data storage layer Persistent
data is stored in an SQLite database, which provides a lightweight, file-based relational store.This layer holds information such as repair orders, customer records, and inventory details in structured tables. Repository-style functions are used to read and write data, helping to keep database access consistent and centralized while preserving data integrity.End-to end interaction flow.A typical interaction starts when a user sends a request through the interface for example, to open a new repair order or verify part availability.The request is first validated and interpreted in the processing layer, then passed to the application layer, which executes the appropriate business logic and interacts with the database as needed.Finally, the system returns a clear, structured response or status message back through the interface so the user immediately understands the outcome of the operation.

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IV. METHODOLOGY AND IMPLEMENTATION

The Repair Orders Inventory Agent System uses an organized and systematically applied approach that merges automatic management of the workflow and processing in the backend inventory database. The workflow process starts when a user makes a request via either the service interface or command interaction-layer entry.
Fig. 1 shows the sequence diagram for the Repair Orders Inventory Agent system that explains the interaction between the user, the request processing layer, the backend services layer, and the database layer. When the user makes a request related to the repair process, the request is received by the request processing layer that checks the request and decides the operation needed. The request will then be linked to the corresponding backend service function.

The backend service, developed using Python service logic, then processes the request and interacts with the database layer in order to accomplish a read or write operation. Repair information and inventory are read from or updated in the SQLite database by using a set of functions in the repository. After that, the backend process is accomplished, and a return of information is processed back to the processing layer in order for the status message to be prepared fordisplay. Based on the sequence, it is ensured that there is a smooth coordination between different components. Further, it also facilitates handling data related to the repair and inventory processes. The proposed method better deals with the reliability of the system. Additionally, it improves usability.

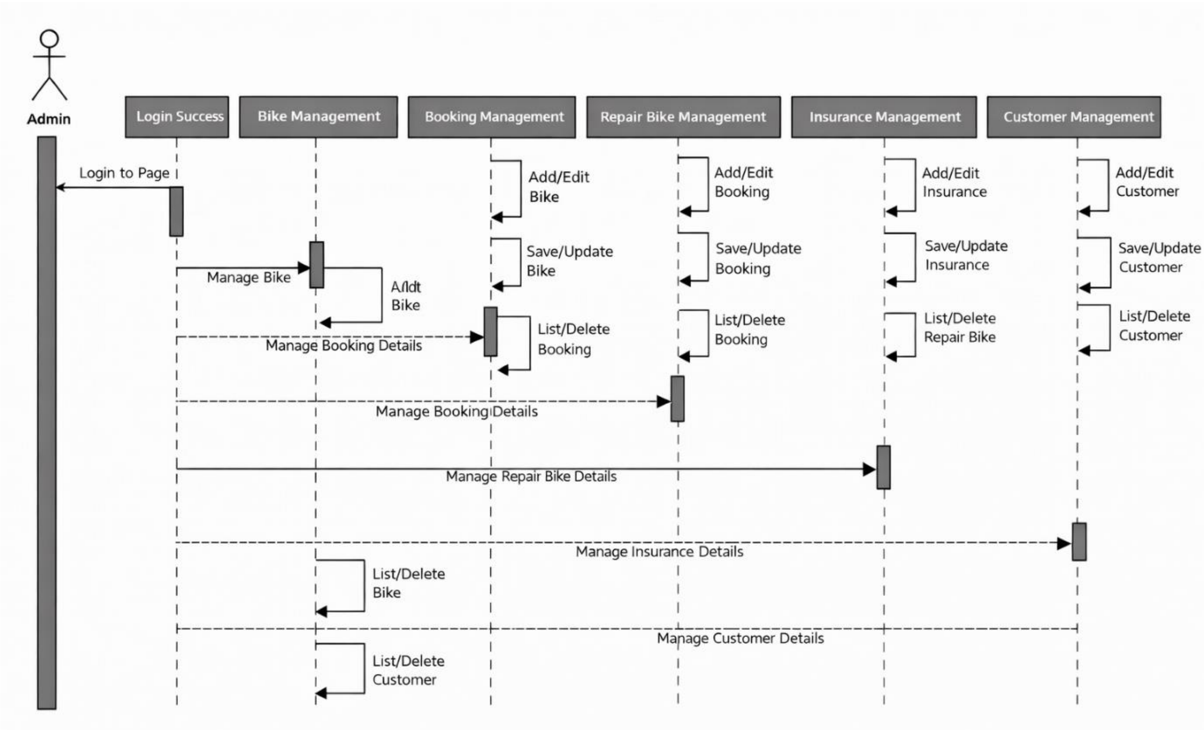

Fig 1: Sequence Diagram of the repair order inventory agent

V. RESULTS AND DISCUSSION

Performance testing of the functional accuracy, response efficiency, usability, and reliability of synchronized repair and inventory operations were evaluated in Repair Order Inventory Agents. The test was simulated with real-world usage by service technicians and repair managers using simulated repair datasets.

Fig. 2: Repair Orders Inventory Agent interface forms a structured format of repair and inventory records. It allows one to view the details concerning any particular repair, change its status, or administer inventory data with ease. An organized layout improves clarity by easily spotting pending repairs without having to verify manually from the records.

It showed efficient performance in the back end, with most of its repair and inventory operations taking minimal execution time. The system used modular Python services combined with a lightweight SQLite database to enhance fast data processing and dependable access.

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Figure 3 illustrates an example of how the system response was generated in the course of the operation of the system in the context of the repair workflow process. When users submitted their structured requests, such as checking the status of their repairs and availability of stock, the system was able to handle the request in the right way to produce the right response output.

The service managers mentioned a decreased effort with respect to monitoring the progress for repairs and the usage of the inventory summaries. The technicians had better visibility into the repair status and could easily interact with the system through structured operations.

From the results, the combined effects of automating repair workflow processes and synchronizing inventory systems prove to be beneficial in increasing usability, minimizing labor, and improving repair center operations clarity.

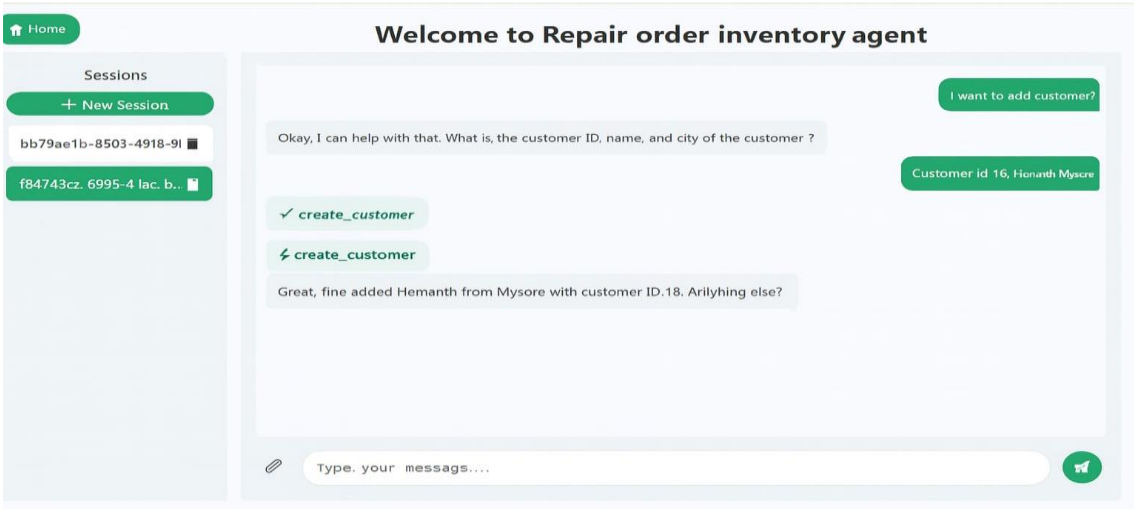

Fig. 2 User interface agent of repair order inventory

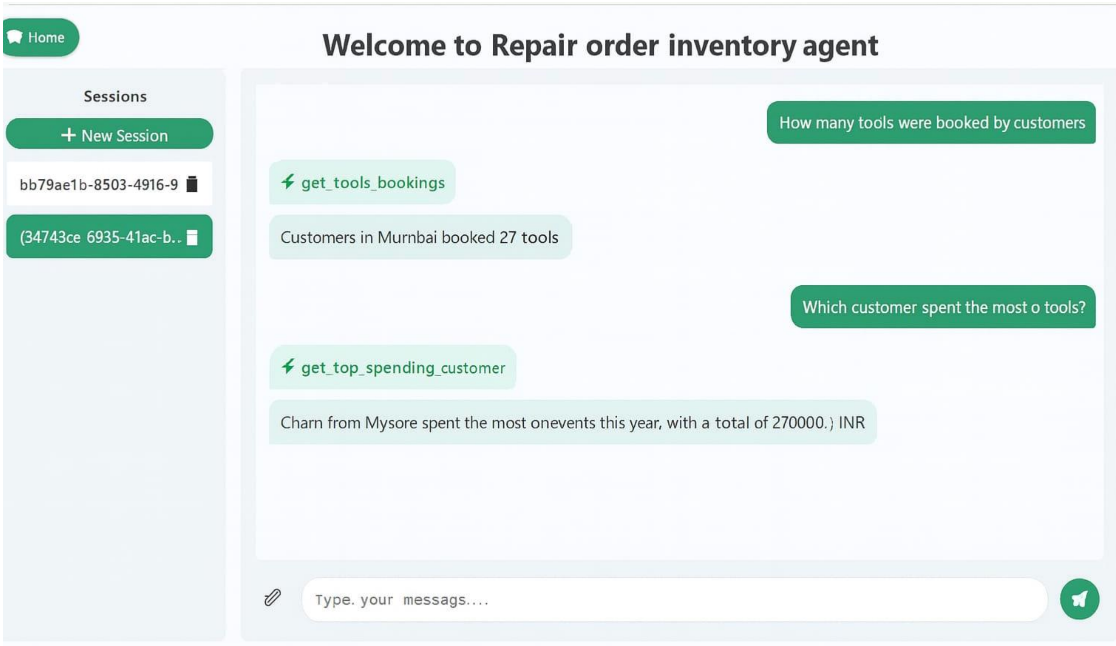

Fig. 3. Booking tools for repair order inventory

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VI. CONCLUSION AND FUTURE WORK

Conclusion

This paper presented the Repair Orders Inventory Agent, an automated repair and inventory management system that integrates structured repair processing with synchronized stock coordination. By combining Python-based backend service logic, SQLite database storage, and modular workflow automation, the system enables efficient handling of repair records through structured operations and validation-driven execution.

The proposed approach addresses limitations of traditional repair-center management methods by reducing manual tracking, improving operational accuracy, and ensuring consistent repair–inventory synchronization. Experimental evaluation confirmed that the system performs reliably, delivers correct workflow outcomes, and enhances usability for both technicians and service managers. The study demonstrates the practical applicability of modular backend automation in real-world service and maintenance environments.

Future Work

Future enhancements to the system include:

- Role-based access control for technicians, managers, and administrators
- Advanced reporting dashboards for repair and inventory visualization
- Cloud-based deployment for scalability and remote accessibility
- Mobile application integration for field technician support
- Predictive analytics for spare-parts demand forecasting
- Intelligent classification of repair issues using machine learning

These extensions would further strengthen the system and expand its applicability across diverse service and repair organizations.

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