



Project title: Management Application for Mechanic Workshop Academic Year: 2024-2025

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Project Type **Software**

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Project's Abstract:

This project aims to develop an application for managing car repair workshops, focusing on improving workflow efficiency and offering a smart, seamless user experience through a flexible and user-friendly interface. The application also integrates artificial intelligence (AI) to assist in diagnostics and enhance the overall functionality.

The application targets four main user groups. The first is the App Owner, who has full administrative control over the system. They can approve or reject garage registration requests, provide technical support when needed, and monitor all registered garages. A dedicated dashboard is available for tracking system-wide statistics and performance indicators.

The Garage Owner submits a registration request for their garage to the App Owner. Once approved, they gain extensive privileges, including managing workshop staff, monitoring the company's budget, searching for car records using license plate numbers, and receiving repair reports from technicians. They can also broadcast general news or announcements to their employees.

Technicians play a crucial role within the system. They can submit repair reports and continuously document the condition of vehicles, contributing to organized and traceable operations. Additionally, technicians can use the AI-powered diagnostic tool embedded in the application to analyze car issues based on the symptoms provided, helping them reach accurate and fast diagnoses.

Customers benefit from the application in various ways. They can view their vehicle's repair history, submit help requests in case of breakdowns, and get a list of nearby garages ranked from



nearest to farthest. They can also directly chat with the garage that accepts their request.

Moreover, customers can use the built-in AI tool to analyze problems by entering visible symptoms or dashboard indicators such as the "Check Engine" warning, empowering them with useful insights before reaching out for service.

One of the core features of the application is the integration of artificial intelligence for fault analysis. By considering the vehicle's make, model, and provided symptoms, the system can offer accurate, fast preliminary diagnoses. This significantly reduces repair time, improves efficiency, and enhances the overall service experience.

To enhance real-time communication and interaction among users, the system integrates Firebase Realtime Database along with Firebase Cloud Messaging (FCM) to send instant push notifications to both web and mobile platforms. These notifications are triggered when:
A new repair report is added by a technician,

A customer submits a help request,

A garage owner sends or updates a general announcement,

A garage registration request is submitted to the App Owner.

Such notifications ensure that all users remain informed, improve response time, and support seamless collaboration within the platform.

The application is developed using Flutter to ensure a responsive and smooth user interface across all devices. On the backend, it is built with Node.js and Express.js, utilizing MongoDB for data storage. The entire system is hosted on Render, ensuring secure, reliable, and fast access to services.
