

SMART ROAD ASSISTANT: SMART VEHICLE EMERGENCY ASSISTANCE FINDER WITH REAL-TIME LOCATION TRACKING

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ABSTRACT

Roadside vehicle emergencies such as breakdowns, accidents, flat tyres and fuel shortages can leave drivers without immediate access to suitable assistance. Smart Road Assistant is a web and mobile-oriented emergency assistance system designed to help vehicle users identify nearby service providers and communicate their emergency requirements using real-time location information. The proposed system provides location-based discovery of mechanics, towing services, hospitals and fuel stations, together with emergency request handling, provider notification, navigation and service-status tracking. An AI-based Roadside Assistant is also incorporated to provide conversational guidance for common roadside situations and help users identify the appropriate assistance. The system uses HTML, CSS, JavaScript, PHP and MySQL, with WAMP used as the development environment. The proposed solution aims to reduce the time required to find appropriate roadside support and provide a simple, centralized platform for emergency assistance.

Keywords: Smart Road Assistant, Real-Time Location Tracking, Emergency Assistance, GPS, Roadside Service, Navigation, Artificial Intelligence.

I. INTRODUCTION

The main objective of Smart Road Assistant is to provide a centralized platform for vehicle users who require immediate roadside assistance. During a vehicle breakdown or emergency, users may have difficulty identifying a nearby mechanic, towing service, hospital or fuel station, particularly when they are unfamiliar with the surrounding area. The proposed system addresses this problem by using the user's current location to identify relevant nearby services and by providing an emergency request mechanism.

The system allows users to log in, share or obtain their current location, select the type of assistance required and locate suitable service providers. It can support emergency situations including vehicle breakdowns, accidents, flat tyres and fuel shortages. Navigation and request-status information help users and service providers understand the progress of an assistance request. An AI Roadside Assistant is included to provide interactive guidance and support before or while assistance is being arranged.

II. LITERATURE REVIEW

Location-based applications have been widely used to identify services and destinations according to the user's geographical position. GPS and digital mapping technologies provide the basic infrastructure required for real-time location-aware services. Emergency response applications additionally require rapid communication, accurate location information and appropriate service selection.

Existing roadside assistance approaches may depend on telephone calls, separate applications or manual searching for service providers. Such approaches can increase the time required to identify an appropriate service, especially when the user is under stress. The proposed Smart Road Assistant combines service discovery, emergency requests, real-time location, navigation and AI-based conversational assistance within a single platform.

The literature direction relevant to the proposed system includes location-based service discovery, GPS-assisted service selection, shortest or nearby-service identification, emergency communication and intelligent conversational systems. These concepts provide the foundation for integrating location information with roadside assistance functions.

III. SYSTEM ARCHITECTURE OF SMART ROAD ASSISTANT

The Smart Road Assistant consists of a user interface, application server, database, location service, roadside service finder, emergency request module, navigation support, notification mechanism and administrative interface. The user interacts with the system through the web or mobile-oriented interface. The application obtains the user's location and uses it to identify nearby assistance options.

Figure 1 System architecture of Smart Road Assistant

The user module manages authentication and emergency-service selection. The location module obtains the current latitude and longitude and passes the information to the service-finder component. The service-finder module identifies nearby mechanics, towing services, hospitals and fuel stations. The emergency module records the assistance request and makes the request available to the relevant provider. The navigation component supports movement from the user's location towards the selected service. The administrator module supports management of users, providers, requests and system information.

IV. REAL-TIME LOCATION TRACKING

Real-time location tracking is one of the important functions of the proposed system. The browser or supported device location service can provide the user's current latitude and longitude after location permission is granted. The location information is used to determine nearby roadside services and to support navigation.

The location page can display the user's latitude and longitude and provide map-based navigation. The fuel-station service similarly uses the user's geographical position to retrieve nearby fuel stations. Accurate location information is particularly important during an emergency because the user may not know the exact road, landmark or nearby service provider.

V. ROADSIDE SERVICE FINDER

The roadside service finder provides location-based access to assistance categories required during common vehicle emergencies. The major service categories include mechanics, towing services, hospitals and fuel stations. A user can select the required category and view relevant nearby options.

For a vehicle breakdown, the user can search for a mechanic or towing service. In an accident-related situation, nearby hospitals and emergency assistance can be identified. When the vehicle has insufficient fuel, nearby fuel stations can be located. The module reduces the need for the user to search for individual services manually.

VI. EMERGENCY REQUEST AND PROVIDER NOTIFICATION

The emergency request module allows the user to submit an assistance request by selecting the required emergency or roadside



service. The request can contain the user's location and the type of assistance needed. The system stores the request information in the database so that the service provider can process it.

Provider notification helps communicate the request to the appropriate service provider. Request status can be used to represent the progress of assistance, allowing the user to track whether the request is pending, accepted or being handled. This provides a structured communication process between the vehicle user and roadside service provider.

VII. AI ROADSIDE ASSISTANT

The AI Roadside Assistant is an intelligent conversational component intended to provide guidance for common roadside situations. It can interpret a user's description of a problem and provide suitable next-step guidance, while directing the user towards the appropriate emergency-assistance feature when required.

The assistant can support situations such as vehicle breakdowns, flat tyres, fuel shortages and accident-related assistance. The AI component is intended to complement, rather than replace, emergency services or professional roadside support. For serious accidents or situations involving immediate danger, the user should seek appropriate emergency assistance.

VIII. METHODOLOGY

- Step 1: Develop the user interface using HTML and CSS.
- Step 2: Implement client-side interaction and validation using JavaScript.
- Step 3: Configure the PHP server-side environment using WAMP.
- Step 4: Create the MySQL database for users, service providers, emergency requests and related system information.
- Step 5: Implement user authentication and session-based access control.
- Step 6: Obtain the user's geographical location using the supported location service.
- Step 7: Connect the location information with nearby-service finder functions.
- Step 8: Implement emergency request creation and provider notification.
- Step 9: Add navigation and request-status tracking features.
- Step 10: Integrate the AI Roadside Assistant for conversational roadside guidance.
- Step 11: Test the major modules individually and then test the complete workflow.
- Step 12: Verify the system using different roadside-assistance scenarios.

IX. SOFTWARE DESIGN

The proposed system is designed as an integrated roadside assistance platform containing separate modules for authentication, location tracking, emergency assistance, service discovery, navigation, notifications, AI assistance, administration and feedback. PHP provides server-side processing and MySQL is used for persistent data storage. JavaScript handles client-side interactions and location-related operations.

The system is organized to reduce the number of steps required during an emergency. After authentication, the user can access the current location, choose an assistance category and submit a request. The system then provides relevant service information and supports the subsequent navigation and tracking process.

Figure 2 Flowchart for Smart Road Assistant

X. RESULT AND DISCUSSION

The proposed Smart Road Assistant provides a unified approach for handling common roadside emergencies. The system can obtain the user's current location and use it to identify relevant nearby services such as mechanics, towing services, hospitals and fuel stations. Emergency requests can be recorded and communicated to service providers, while navigation and status tracking support the assistance process.

The integration of the AI Roadside Assistant adds a conversational layer to the application. Instead of requiring the user to understand every system function before requesting help, the assistant can guide the user towards the relevant service or emergency workflow. The combination of real-time location, service discovery and emergency communication makes the proposed system suitable for a practical roadside-assistance scenario.

Figure 3 Smart Road Assistant user interface

Figure 4 Real-time location and nearby service view

XI. LIMITATIONS

The effectiveness of location-based service discovery depends on the availability and accuracy of the device's location service and internet connectivity. If connectivity or location permission is unavailable, real-time service discovery and navigation may be limited. The availability and accuracy of roadside-service information also depend on the underlying service data.

The AI Roadside Assistant provides guidance and should not be considered a replacement for professional emergency responders, medical professionals or trained roadside technicians. In a severe accident or life-threatening situation, appropriate emergency services should be contacted immediately.

XII. FUTURE SCOPE

The system can be extended into a complete mobile application with continuous background location tracking and push notifications. Future versions can include automatic accident detection using mobile sensors, vehicle diagnostic information, live provider tracking, estimated arrival time and more advanced route optimization.

The AI Roadside Assistant can be enhanced with voice input and voice responses, multilingual support and more specialized roadside troubleshooting. Additional integration with mapping, vehicle telematics and verified service-provider networks can further improve the reliability and usefulness of the system.

CONCLUSION

Smart Road Assistant has been designed as a location-aware emergency assistance platform for vehicle users. The system brings together real-time location tracking, nearby roadside-service discovery, emergency request handling, provider notification, navigation, status tracking and AI-based roadside guidance. By providing these functions through a centralized system, the proposed solution can reduce the effort and time required to obtain appropriate assistance during vehicle emergencies.

The project demonstrates how web technologies, database management, location services and artificial intelligence can be combined to create a practical smart-roadside assistance solution. With further development and integration with verified service networks and mobile technologies, the system can be extended into a more comprehensive real-time roadside emergency platform.

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