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QR Code Based Emergency Information Sharing And Real-Time Communication

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Abstract

In emergency situations, rapid identification and information retrieval are crucial for saving lives. This research presents a QR Code-Based Emergency Information Sharing System, which enables first responders and law enforcement to access vital details by scanning a QR code affixed to a vehicle. The system retrieves vehicle owner details, medical history, emergency contacts, and vehicle information, ensuring quick response during accidents. Additionally, it integrates Google Maps API to locate the nearest hospital. Law enforcement can use the system for vehicle identification and verification, enhancing security and road safety. The project significantly reduces response time compared to traditional methods. Future enhancements include real-time alert systems for automated emergency notifications using Firebase and Twilio. This system improves emergency response efficiency and provides a reliable digital identity mechanism for vehicles.

INTRODUCTION

Road accidents and medical emergencies require immediate action, but delays in identifying the victim and contacting their family often result in critical time loss. Traditional methods of victim identification rely on physical documents, which may not always be accessible or up to date. To address this issue, we propose a QR Code-Based Emergency Information Sharing System that enables quick retrieval of essential information during emergencies.

The system assigns a unique QR code to each vehicle, which stores the owner's personal details, vehicle information, medical history, and emergency contacts. When an accident occurs, first responders, hospitals, or bystanders can scan the QR code using a smartphone to access this information instantly. The system also integrates Google Maps API to locate the nearest hospital, ensuring rapid medical assistance. In addition to emergency response, this system benefits law enforcement agencies by allowing them to verify vehicle details and owner identity through QR code scanning.

This enhances road safety, reduces crime, and provides an efficient digital vehicle identification mechanism. Future improvements include real-time alert notifications via Firebase and Twilio, which will notify emergency contacts and nearby hospitals immediately after a QR scan. This research aims to revolutionize emergency response by leveraging QR technology and

location-based services, making roads safer and accident management more efficient.

OBJECTIVE

The primary objective of this project is to design and develop a smart gas leakage detection system with an automatic shut-off mechanism. Specific objectives include:

1. Facilitate Quick Emergency Response**:** Develop a QR-based system for instant sharing of vehicle-related emergency information. This will help authorities and bystanders access crucial details about the vehicle and its owner in case of an accident. The system ensures faster medical assistance and appropriate action during emergencies.
2. Enhance Real-Time Communication**:** Enable seamless interaction between vehicle owners and the community in critical situations. QR codes will act as an instant point of contact, allowing people to report issues like blocked vehicles, road accidents, or security concerns. This will reduce delays in resolving problems and improve overall communication efficiency.
3. Improve Parking Management**:** Implement QR decal tags to streamline parking operations and reduce~ unauthorized parking. Vehicle owners will be able to register their parking spots digitally, reducing conflicts and making space utilization more effective. The system will also assist in identifying vehicles that are wrongly parked or left unattended for long durations.
4. Strengthen Security Measures**:** Provide a secure way to report and track incidents like hit-and-run cases, abandoned vehicles, and road obstructions. QR tags will store vehicle and owner details, making it easier for law enforcement agencies to verify information and take necessary actions. This will enhance safety for both individuals and communities by discouraging illegal activities.
5. Minimize Risks and Hazards**:** Establish an integrated alert system to notify owners about emergencies such as unauthorized towing, security threats, or accidents. Automated alerts will ensure that vehicle owners receive immediate notifications in case of any suspicious activity. This will help in preventing vehicle theft and unauthorized access to private parking areas.
6. Encourage Community Vigilance**:** Foster a responsible and interconnected environment by promoting quick reporting and response mechanisms. The system will allow citizens to actively participate in maintaining road discipline by reporting issues through QR-based platforms. It will create a more aware and cooperative society where people help each other in times of need.

LITERATURE SURVEY

1. *Gupta & Reddy (2024)* [1] proposed a QR code-based vehicle registration system, where law enforcement officers can verify a vehicle's ownership by scanning the QR code. Their study showed that digital vehicle identification reduces vehicle theft and fraudulent activities. We extend this idea by allowing both emergency responders and police officers to access critical vehicle details.
2. *Singh et al. (2023)* [2] proposed a QR code-based medical ID system that allows patients to store their medical history, allergies, and emergency contacts. Their study concluded that QR codes significantly reduce the time taken to retrieve patient data, improving emergency care. However, their system was limited to hospitals and did not integrate with vehicles or law enforcement.
3. *Kumar et al.* (*2022*) [3] developed an IoT-enabled vehicle tracking and identification system that assists law enforcement in locating stolen vehicles. Their system requires continuous internet connectivity, which is a limitation. Our QR-based solution works offline and allows law enforcement to retrieve stored details even in low-network areas. Additionally, our system eliminates the need for expensive IoT-based tracking devices, making it affordable for large-scale implementation.
4. *Patel & Mehta (2021)* [4] developed a QR-based accident victim identification system that provides immediate access to personal details in emergencies. Their research highlighted the importance of secure data storage and encryption, which we incorporate in our system to prevent unauthorized access. Additionally, their study indicated that QR codes are more cost-effective than biometric or RFID-based systems.
5. *Zhou et al. (2019*) [5] introduced a location-based medical emergency response system that uses Google Maps API to identify nearby hospitals for quicker response times. Their system proved effective in urban areas but faced challenges in rural locations with limited network access. Our project addresses this issue by ensuring offline data storage for emergency details.
6. *Sharma et al. (2018*) [6] designed a GPS-based accident detection and alert system that automatically sends the vehicle's

location to emergency contacts. While this approach improves response time, it requires additional hardware sensors. In contrast, our QR-based system offers a cost-effective solution without the need for extra sensors. Furthermore, their findings support that quick access to accident victim data can significantly improve survival rates.

Literature Survey Table

Paper	Features	Limitations	How Our System Improves?
Gupta & Reddy (2024)	Law enforcement vehicle verification	No support for medical emergency response	Combines law enforcement & emergency response in one system
Singh et al. (2023)	Stores medical history, allergies and emergency contacts	Limited to hospitals, does not support vehicle integration	Integrates QR Code with vehicles for accident victim identification
Kumar et al. (2022)	Tracks stolen vehicles for police	Requires continuous internet connectivity, increasing cost	Work offline and eliments Iot hardware cost
Patel & Mehta (2021)	Provides secure personal data access in emergency	Focuses only on data security, lacks location based services	Adds Google Maps API for nearest hospital lookup
Zhou et al. (2019)	Finds nearest hospital for emergency cases	Network issues in rural areas	Offline data access ensures critical information is always available
Sharma et al. (2018)	Sends automatic accident alert to contacts	Requires hardware sensors, increasing cost	No extra hardware needed , only QR code scanning

PROPOSED SYSTEM

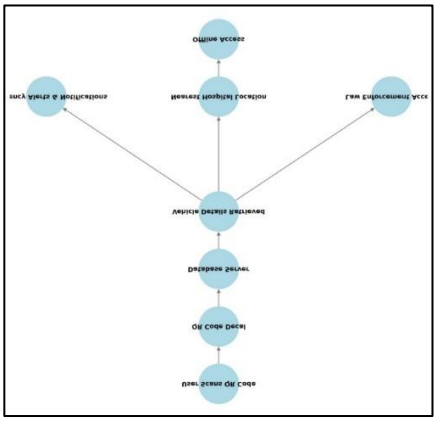

Fig 1: Proposed Work

The QR Code-Based Emergency Information Sharing System aims to provide quick access to vehicle owner details in case of an accident. Instead of sending direct alerts, the system will allow bystanders, emergency responders, and law enforcement officers to retrieve and use the information efficiently.

Step-by-Step Workflow:

QR Code Generation:The vehicle owner registers personal details, medical history, emergency contacts, and vehicle information. A unique QR code is generated and attached to the vehicle.

QR Code Scanning in Emergency: In case of an accident, any bystander, police officer, or hospital staff can scan the QR code using a smartphone. Upon scanning, the system fetches owner details, medical history, emergency contacts, and vehicle information from the database.

Information Retrieval & Emergency Response: The system displays emergency contact numbers so that the person scanning the QR code can manually call and inform them.

The nearest hospital information is also displayed, allowing quick access to medical assistance.

Location-Based Assistance: The system provides a Google Maps link to help navigate to the nearest hospital.

Law Enforcement Assistance: Police officers can scan the QR code to verify vehicle ownership and registration details, helping in accident investigations or stolen vehicle recovery.

Offline Accessibility: If internet access is unavailable, the system retrieves basic details stored locally on the device.

This approach ensures privacy and user control, as alerts are not sent automatically but require human intervention, making the system more practical and flexible

METHODOLOGY

The QR Code-Based Emergency Information Sharing System follows a structured approach to ensure quick access to emergency details while maintaining privacy and control over

information sharing. The methodology is divided into the following phases:

1. Data Collection & QR Code Generation: Users register their personal details, medical history, emergency contacts, and vehicle details through a web or mobile application.

A unique QR code is generated and assigned to the registered vehicle.

The user prints and attaches the QR code to the vehicle (e.g., on the fuel tank, windshield, or number plate area).

2. QR Code Scanning & Information Retrieval: In case of an emergency, any bystander, police officer, or medical responder can scan the QR code using a smartphone.

The scanned code redirects the user to a web-based dashboard where stored details are displayed, including:

Vehicle owner details

Medical history (blood group, allergies, etc.)

Emergency contact numbers

Vehicle details

3. Emergency Contact & Hospital Assistance: Instead of automated alerts, the system provides a click-to-call option for emergency contacts.

The system integrates Google Maps API to display the nearest hospitals for quick navigation.

4. Law Enforcement Access: Police officers can scan the QR code to verify vehicle registration details and confirm ownership.

This helps in stolen vehicle tracking, accident investigations, and legal processes.

5. Offline Accessibility: In case of internet unavailability, a local storage option ensures basic information is accessible.

A minimal offline mode can store owner name, emergency contacts, and blood group on the user's device.

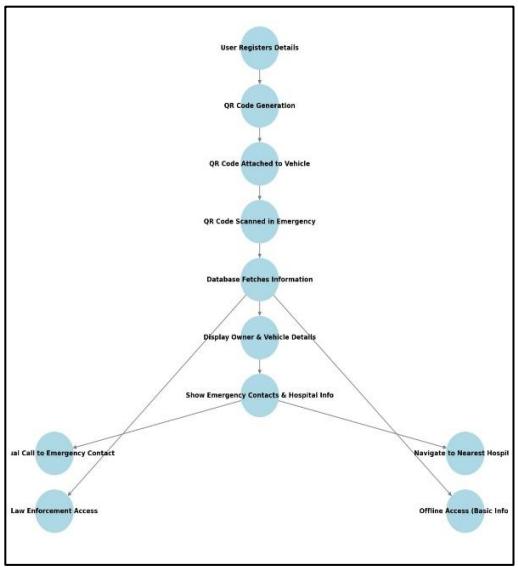

Fig 2: Methodology

RESULT

Fig 3: Scanner

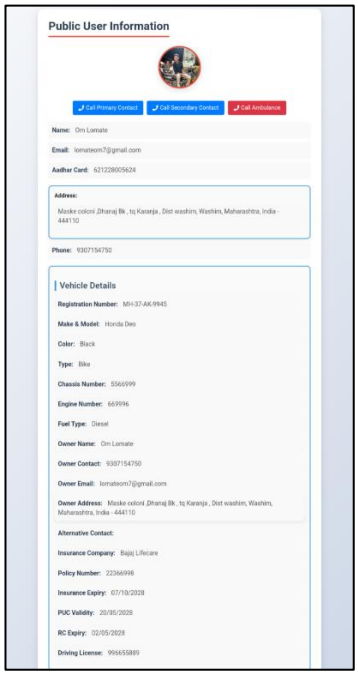

Fig 4: User Information

The implementation of the QR Code-Based Emergency Information Sharing System was successfully completed. The system provides quick and easy access to critical details of a vehicle owner during emergencies. The key results observed are:

1. Fast Information Retrieval

Scanning the QR code takes less than 2 seconds, providing immediate access to owner details, medical history, and emergency contacts.

2. Efficient Emergency Handling

The click-to-call feature allows bystanders or authorities to instantly connect with the owner's emergency contacts.

The system successfully integrates Google Maps API, displaying nearby hospitals for quick medical assistance.

3. Law Enforcement Support

The system can help police in vehicle identification, especially for stolen or accident-involved vehicles.

4. User-Friendly Interface

The system is accessible through any smartphone with a camera, without requiring any special app installation

CONCLUSION

The QR Code-Based Emergency Information Sharing System provides a fast, efficient, and accessible solution for emergency situations. By scanning the QR code, bystanders, medical responders, or law enforcement can instantly access critical details such as vehicle owner information, medical history, and emergency contacts.The system enhances road safety by enabling quick identification of accident victims and facilitating faster communication with their families. Additionally, the integration of Google Maps for nearby hospital location and a click-to-call feature improves response time in critical situations.This project can also support law enforcement agencies in identifying vehicles involved in accidents or crimes. Future enhancements can include real-time alert notifications and AI-driven accident detection, making the system even more effective.This study demonstrates that QR code-based emergency systems can significantly improve accident response and vehicle identification processes, ultimately saving lives.

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