GUARDIAN-QR (QR-based vehicle Management and Communication platform)

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Abstract- This paper explores the idea of a QR code designed to connect directly to the owner, permitting seamless identification, authentication, and verbal exchange. The QR code acts as a virtual gateway that links physical items, locations, or occasions to the proprietor's non- public info, profile, or virtual property, imparting a short, stable method for customers to establish touch or get entry to information. With growing reliance on digital interactions and protection, this QR code system offers an efficient answer for personalised get admission to, customer engagement, and more advantageous statistics privateness. The implementation of such QR codes has implications in various fields, which include e-commerce, personal branding, occasion control, and secure transactions.

INTRODUCTION

In the ever-more digital world of today, QR codes have become a tool of great flexibility in closing the gap between the physical and the digital. The two-dimensional barcode is used across a broad spectrum of applications, from product information to payment processing. Yet, the potential of QR codes is greater than such simple uses. One new idea is the generation of QR codes that link directly to the owner, providing a secure, individualized interaction that is more than mere access to information.

An "owner-tying QR code" is a digital identifier linking physical objects, events, or locations to the profile, contact information, or other personal details of an individual. This innovation can potentially reshape the way we interact with diverse systems, making communication, verification, and experiences more efficient. Whether it is a business card, product tag, membership card, or even a personal item, the QR code builds an exclusive link to its owner that increases user involvement while protecting privacy and security.

As companies and individuals look for innovative means to reach their audience and provide safe, efficient interactions, QR codes linking directly to an owner represent a promising answer. This technology opens the door to a wide range of uses, from optimizing customer experience and making transactions easier to enhancing digital identity verification and personal branding. In this paper, we examine the idea, advantages, and potential uses of QR codes with a direct link to the owner. These days, individuals hold with them a range of personal accessories e.g., phones, wallets, purses, keys, and even identification cards—who are most commonly lost or misplaced. Very seldom is there a convenient method whereby the person finding a misplaced article can locate the owner thereof. Classic name tags or labels are not interactive and raise privacy issues if excessive personal data is openly displayed. This problem emphasizes the necessity of a more intelligent, secure, and easy-to-use solution. QR codes provide a contemporary solution by serving as virtual bridges between physical objects and their owners. By connecting a QR code to a safe digital persona or contact hub, any stranger who encounters a misplaced item is able to simply scan the code and contact the owner— without revealing sensitive personal information.

Beyond lost-and-found applications, this approach has uses in emergency conditions (e.g., medical alerting), animal identification, professional networking (in the form of electronic business cards), and asset tracking. The incentive is to use simple and inexpensive QR code technology to help close the space between anonymity and secure owner verification—enabling everyday life to be more joined-up, reactive, and responsive.

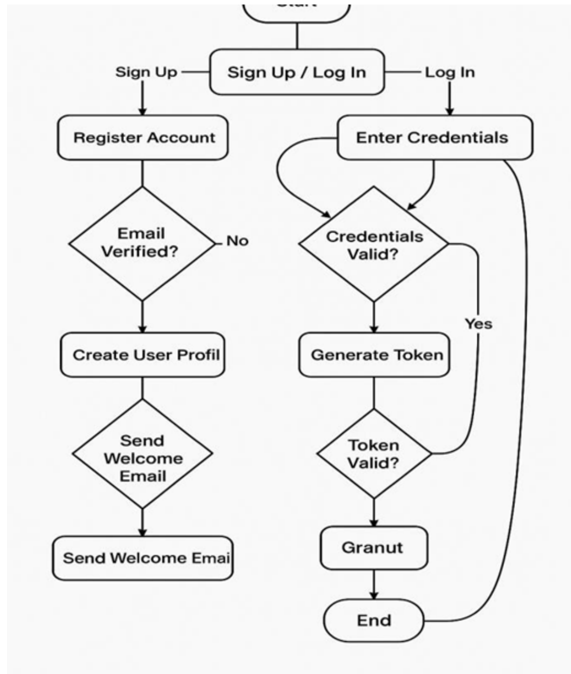
LITERATURE REVIEW

QR codes (Quick Response codes) at the moment are a common device for digital conversation throughout marketing, e-trade, and charge structures. Developed initially in 1994 via Denso Wave, QR codes enabled faster information garage and retrieval than the conventional barcode. As time passed, their packages have accelerated typically over their first industrial use, being a way of connecting bodily entities to virtual materials. Yet, the possibility of QR codes as a customized hyperlink to the proprietor-facilitating secure, personalised interaction—stays a fairly new idea that has no longer been substantially advanced in modern literature.

Numerous studies identify the increasing utility of QR codes in patron interplay and authentication mechanisms. For example, Xu et al. (2018) talk how QR codes enable green, real-time interactions between clients and products, imparting an immediate gateway to product, provider, and advertising records. QR codes were integrated into virtual wallets, telephone apps, and social media structures to maximize person revel in (Kim et al., 2019). These implementations are broadly speaking geared toward permitting people to get data however do not pass the quantity of offering a customised connection among the code and someone.

QR codes have developed to be an vital element in virtual authentication and verification of identities, mainly inside cellular banking, e-trade, and secure payments. A quantity of research, which include Yang et al. (2020), look at how QR codes are applied inside steady one-time password (OTP) and multi-issue authentication (MFA) protocols. The QR code is used as a means of authenticating the identification of customers by means of associating them with their money owed or personal data, providing secure get admission to. These packages Are safety-orientated but are more service- or platform-primarily based, rather than establishing an instantaneous, person connection between the QR code and its proprietor. In addition, Zhang et al. (2020) factor to the application of QR codes in contactless authentication within the physical world like in Get admission to manage systems. Although these applications help in authenticating an man or woman using QR codes, they're typically geared towards get right of entry to to services or premises and no longer closer to establishing a lasting connection to an owner's digital identification or holdings. Personalization of the QR codes in order that the code denotes the man or woman's particular possession or identity hasn't been comprehensively performed with those applications yet.

FLOWCHART



PICTURES

Fig.1.Homepage of our Website

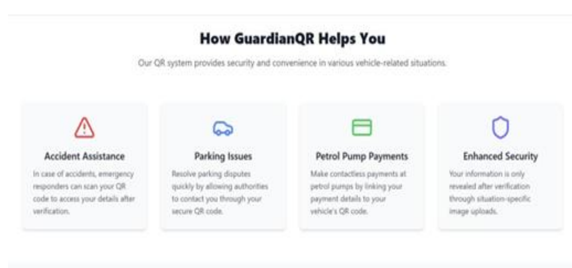


Fig.2.Features included

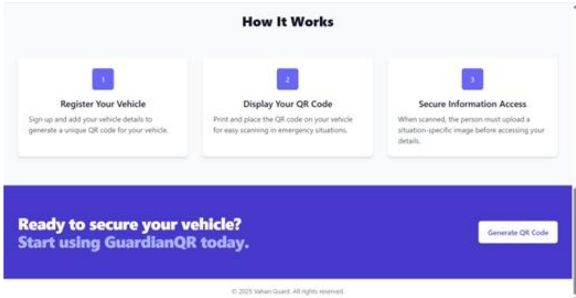


Fig.3.Website Guidance

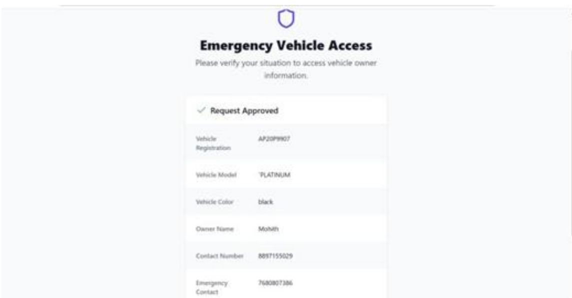


Fig.4.Output of Website

METHODOLOGY

- Advantages of QR Codes:

1. Ease of use – Quick scanning and data retrieval with security.
2. Marketing applications – Used for product promotions and interactive ads related to vehicles.
3. Low cost & high storage capacity – Can store 5000+ alphanumeric characters.

- Dangers of QR Codes:

1. Cybersecurity risks – QR codes can be used for phishing (QRishing).
2. Malware attacks – Some QR codes redirect users to malicious websites.
3. Identity theft – Fraudulent QR codes steal personal data and banking credentials.

Fake QR codes (Attagging) – Hackers place malicious stickers over legitimate QR codes.

- User Authentication & Security: Users can sign up, log in, and access protected content, suggesting role-based access control.
- Service Offerings: The application provides functionalities for booking trips, requesting vehicle towing services, and handling emergency access.
- Payment & Verification: There is a dedicated section for processing payments and verifying user or service details.

GPS-Based Tracking
GPS is the primary era used for real-time place tracking, providing high accuracy in figuring out the placement of vehicles. It is widely carried out in fleet management, navigation structures, and public shipping monitoring to ensure efficient direction control and more suitable consumer experience.

RFID for Monitoring and Ticketing
Radio Frequency Identification (RFID) plays a full-size role in tracking packages, consisting of bus monitoring, ticketing, and passenger counting. However, its effectiveness is limited by means of range constraints, making it greater appropriate for localized implementations as opposed to huge-location tracking.

GSM/GPRS for Communication and Alerts
GSM is preferred over GPRS for alerting due to its reliability in transmitting messages. It is broadly used to send signals thru SMS or server-based totally communication, ensuring well timed updates for users concerning car repute, delays, or emergencies.

Zigbee for Short-Range Data Transmission
Zigbee is an lower priced answer designed for quick-range communique. It is typically used to provide real-time updates at bus stops or within shipping hubs. However, its constrained transmission variety restricts its software to smaller, localized networks.

ARM Processors for Efficient Data Processing
ARM processors are embedded in transportation and tracking structures to facilitate efficient facts processing. Their low electricity intake and excessive performance make them best for actual-time packages, ensuring seamless operation and information dealing with across a couple of tracking and verbal exchange technologies.

The proposed gadget includes:
QR Code-Based Identification
Each purchaser and driving force is assigned a unique QR code, which acts as a virtual identifier for seamless monitoring and authentication. This ensures secure and green journey control at the same time as minimizing fraud and mistakes.

Mobile Application for Ride Requests

A dedicated cellular software allows customers to submit and accept ride requests, making sure clean communique between passengers and drivers. This complements comfort and improves the performance of journey-sharing operations.

Real-Time Data Storage and Retrieval

The system allows actual-time records garage and retrieval the use of QR codes, allowing brief get right of entry to to journey-associated data. This ensures that experience information, journey history, and person hobby are as it should be recorded and easily on hand.

Database Layer for Tracking

A robust database layer is designed to store monitoring statistics, together with QR code IDs, timestamps, and object status. This ensures accurate record-retaining and enhances gadget reliability.

Web API for System Integration

A net API is included to facilitate seamless integration with other systems and services. This enhances machine accessibility and guarantees easy operation across more than one gadgets and applications.

AI-Based Privacy Protection

To ensure the privateness of automobile proprietors, an AI-powered checker is integrated into the gadget. This AI issue mechanically detects and restricts unauthorized get entry to to sensitive owner records, preventing misuse or data breaches. It ensures that best authorized users can access.

RESULTS AND DISCUSSIONS

Integration of Multiple Technologies

For an optimized tracking and monitoring gadget, RFID, GPS, GSM/GPRS, and excessive-pace ARM11 processors have to be mixed. This integration ensures seamless communication, accurate real-time monitoring, and efficient statistics processing, improving the overall performance of the gadget. The use of ARM11 processors complements computational efficiency, enabling faster records managing and minimizing delays in vicinity updates.

Improved Database Management and RFID Range Enhancements in database control are necessary to handle large-scale monitoring statistics correctly. A well-structured database ensures steady storage, quick retrieval, and minimum records redundancy.

Additionally, extending the RFID reader range will improve insurance, allowing more dependable monitoring.

Advanced Arrival Time Prediction

Arrival time prediction algorithms need to be refined to offer more accurate estimations based on actual-time site visitors and environmental conditions. Implementing weather-resistant tracking mechanisms guarantees that elements which includes rain, fog, and severe temperatures do not interfere with vicinity accuracy. AI- driven predictive fashions can further beautify performance by constantly mastering from past information to improve arrival estimations.

AI-Based Privacy Protection

To shield sensitive consumer and automobile information, an AI-powered privacy safety device must be incorporated. This gadget will routinely stumble on and restrict unauthorized get entry to to owner details, making sure that best authenticated customers can view relevant records.

CONCLUSION AND FUTURE SCOPE

The project is a web application designed to offer transportation-related services,showing of owner details, including trip booking, emergency assistance, towing services, and secure payments. With authentication and verification features, it ensures secure access for users. The inclusion of QR code generation suggests an emphasis on seamless digital interactions. The structured development using TypeScript, React, and modern frontend tools highlights its scalability and maintainability.

The Future Scope of this project is:

- Enhanced Security & User Authentication – Implement multi-factor authentication and biometric login for improved security.
- AI-Powered Features – Integrate AI-based recommendations for trip planning, emergency response automation, and predictive maintenance for towing services.
- Mobile App Integration – Develop a companion mobile application to provide a seamless experience

across devices.
- Blockchain-Based Transactions – Implement decentralized payment solutions for added security and transparency.
- Expanded Service Offerings – Introduce additional transportation-related services like carpooling, vehicle rentals, or roadside assistance.
- Performance Optimization – Optimize load times and implement caching strategies to enhance user experience.

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