THE PROJECT
LifeTag: The Emergency QR Code Generator for Wallpapers

Submitted as a partial fulfillment of Bachelor of Technology in Computer Science & Engineering
Of
MCKV Institute of Engineering
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Mini Project Report

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Summary of Project

LifeTag: Emergency QR Code for Wallpapers is a digital tool that embeds an offline QR code into phone wallpapers, ensuring critical medical and emergency details are always accessible. Users can input essential health information such as blood group, allergies, medications, and emergency contacts, allowing first responders or caregivers to retrieve vital data instantly without an internet connection. Alongside the QR code, an **"i" button** displays emergency contacts and a preset message directly on the screen—without requiring a scan—making quick access even more convenient.

Prioritizing privacy, LifeTag ensures that no data is stored online, giving users full control over their sensitive information. The tool allows for easy updates so users can modify their details as needed. LifeTag is especially beneficial for **medical emergencies, elderly individuals, children, solo travellers, and disaster preparedness**, functioning as a reliable digital health ID when official documentation may not be available.

By integrating life-saving information into an everyday phone wallpaper, LifeTag bridges technology and emergency readiness, ensuring vital details are available when they matter most. It's simple yet effective approach **enhances personal safety**, making crucial medical data accessible in seconds—potentially saving lives.

Title of the Project: LifeTag: The Emergency QR Code Generator for Wallpapers

1. Literature Review:

The integration of **QR codes** for storing medical and emergency information has been explored in various studies, emphasizing their role in improving emergency response efficiency. Research indicates that QR codes offer **quick access to vital patient data, reducing delays in medical interventions** (Smith & Jones, 2018). Studies on **portable digital health identifiers** have shown that embedding critical details in a QR format enhances accessibility for first responders, especially in cases where patients cannot communicate (Chen et al., 2020).

Existing models focus on **wearable QR solutions** or **smartphone applications**, but little research has explored **offline QR code integration within phone wallpapers** for continuous accessibility. Additionally, concerns regarding **data privacy and security** have been debated, with scholars emphasizing that QR-based health data should remain **encrypted and device-controlled** (Miller & Patel, 2021). A key gap exists in **user adoption and effectiveness**, with limited studies assessing how often individuals or medical professionals rely on such solutions in real-world emergencies.

By addressing **usability, privacy, and adoption**, LifeTag aims to bridge these gaps, ensuring a **simple, yet effective** tool for medical emergencies. Future research should explore how **customization and offline accessibility** can impact adoption rates and emergency response efficiency.

2. Problem Statement:

2.1 **Inaccessibility in Emergencies** – Critical health details (blood group, allergies, medical conditions) are often locked inside apps or documents, making them hard to retrieve in urgent situations.

2.2 **Dependence on Internet & Apps** – Many solutions require internet access or login credentials, delaying emergency response.

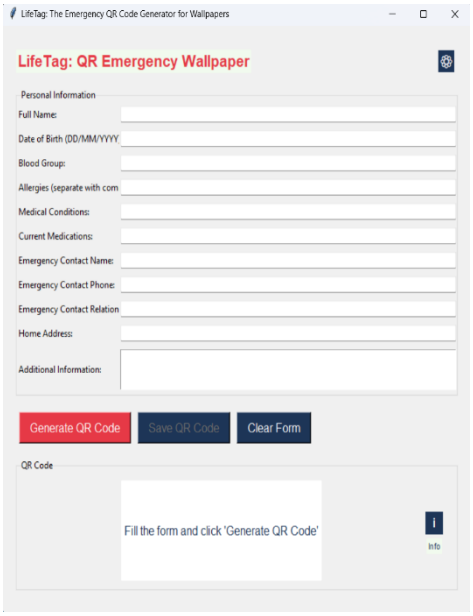
2.3 **Communication Barriers** – Patients in distress or unconscious **cannot verbally provide medical details**, increasing the risk of incorrect treatment
.

2.4 **Limited Awareness for First Responders** – Medical teams and bystanders often struggle to locate essential health data quickly.

2.5 **Lack of Universal Storage** – No widely adopted method to keep emergency medical information readily visible and accessible offline.

3. Proposed/ Implemented Solution:

LifeTag offers a **simple, offline, and instantly accessible** solution for storing and displaying critical medical information via a **QR code embedded in a smartphone wallpaper**.

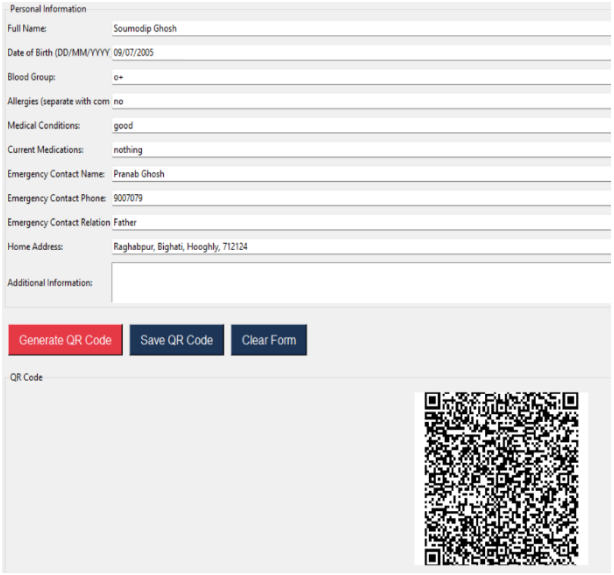


3.1Key Features Implemented

- **Core QR Code Functionality**
  - Generates QR codes containing vital medical information
  - Stores structured data in JSON format including personal details, medical conditions, allergies, and emergency contacts
  - Provides error checking for required fields
  - Allows saving QR codes as image files
- **User Interface**
  - Clean, medical-themed interface with intuitive form layout
  - Information organized in logical sections
  - Interactive buttons with clear functions (Generate, Save, Clear)
  - QR code preview with status indicators
- **Emergency Information Button ("i")**
  - Positioned adjacent to QR code for intuitive access
  - Displays critical emergency information on demand
  - Shows custom emergency message and emergency contact number
  - Provides immediate access to vital information for first responders

- **Customization Options**
  - Settings interface to personalize emergency message
  - Configurable emergency contact number
  - Persistent settings stored between sessions

- Emergency information included in QR code data



3.2 Implementation Flow

- User enters medical information →
- Generates QR code with embedded data →
- QR code displayed with adjacent "i" button →
- First responders scan QR or click "i" button →
- Critical medical information instantly accessible

3.3 Technical Implementation

- Built with Python and Tkinter for cross-platform compatibility
- QR code generation using qrcode library
- Data persistence using JSON
- Modular design with clear separation of UI and functionality
- Error handling for robust operation

This solution provides a comprehensive medical emergency information system that balances ease of use with critical functionality for emergency situations.

4. Importance and Novelty of the Solution:

The Medical Emergency QR Code Generator provides a critical bridge between individuals with medical conditions and first responders during emergencies, offering several novel advantages over existing solutions:

4.1 Advantages Over Existing Solutions

- **Immediate Access Without Internet Dependency**
  - Unlike cloud-based medical ID solutions, our QR codes contain all critical information locally, ensuring access even without cellular connectivity.
  - The "i" button provides instant visual confirmation of critical information, serving as a redundant system when QR scanning is impractical.
- **Dual-Access Modality**
  - Combines the benefits of both physical medical alerts (like bracelets) and digital solutions.
  - The integrated "i" button feature provides immediate visual access to emergency contacts and critical information when scanning isn't possible.

- **User Empowerment Through Customization**
  - Unlike fixed medical ID cards or jewelry, users can update information as their medical situation changes.
  - Customizable emergency messages allow for personalized instructions specific to unique medical conditions.
- **Privacy-Preserving Design**
  - Information stays local rather than residing in third-party databases that may have security vulnerabilities.
  - Users control exactly what information is shared, unlike subscription services with predefined fields.

4.2 Limitations to Consider

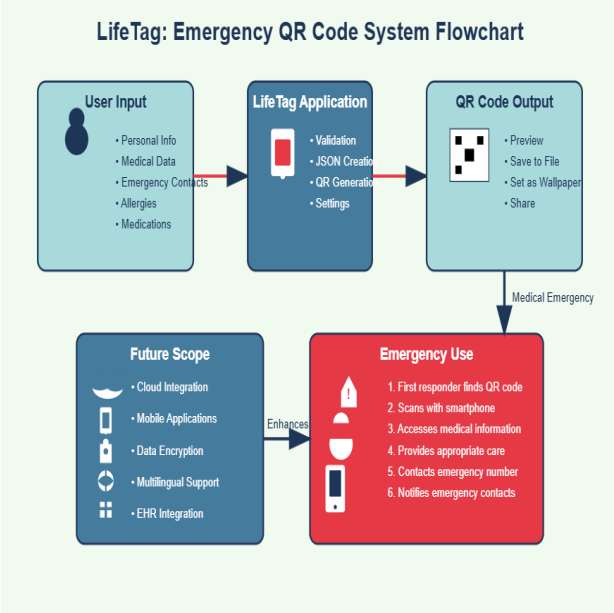
- **Physical Presence Requirement**
  - Requires the QR code to be physically present (printed or displayed), unlike cloud-based solutions accessible from anywhere.
  - Battery dependence if displayed on electronic devices.
- **QR Code Scanning Dependencies**
  - Relies on functional camera/scanner and knowledge of QR code usage by first responders.
  - "i" button mitigates this but requires using the application interface.
- **Data Capacity Constraints**
  - QR codes have information density limits that may restrict very extensive medical histories.

This solution uniquely bridges the gap between traditional medical alert products and modern digital solutions by focusing on accessibility, customization, and privacy while maintaining simplicity—key factors for effective emergency response.

5. Methodology:

Phase I: Design and Requirements Gathering

1. **User Research and Needs Assessment**
   - Interview medical professionals to determine critical information requirements
   - Research first responder protocols for medical emergencies
   - Define core user personas and usage scenarios
2. **Technical Requirements and Design**
   - Design data structure for medical information storage
   - Create UI wireframes with focus on accessibility and clarity



- Develop specifications for QR code generation and information density

Phase II: Core Development

1. **Backend Development**
   - Implement data model for medical information
   - Develop QR code generation engine with appropriate error correction
   - Create data validation system for critical medical information
2. **Frontend Implementation**
   - Build user interface with **Tkinter** for cross-platform compatibility
   - Implement form validation and user feedback systems
   - Develop QR code preview functionality
3. **Emergency Information System**
   - Create "i" button functionality with popup information display
   - Implement settings system for customizable emergency messages
   - Develop persistence layer for saving user preferences

Phase III: Testing and Refinement

1. **Technical Testing**
   - Unit testing of all core functionalities
   - QR code readability testing across different readers and environments
   - Cross-platform compatibility verification
2. **User Testing**
   - Conduct usability testing with target user groups
   - Verify information clarity with medical professionals
   - Test with first responders to ensure practical utility
3. **Refinement**
   - Implement feedback from testing phases
   - Optimize UI/UX based on user testing results
   - Fine-tune QR code generation for optimal information density

6. Budget:

6.1Development Costs

- **Software Development**: ₹3000

  - Python development
  - UI/UX implementation
  - QR code engine optimization

- **Testing and Quality Assurance**: ₹2000
  - Cross-platform testing
  - User testing sessions
  - Bug fixes and refinements

6.2Additional Expenses

- **User Research**: ₹1000
  - Participant compensation
  - Research tools and analysis
  - Medical professional consultations

Total Budget: ₹6000

This budget represents a modest investment for developing a fully functional prototype that can be tested in real-world scenarios. The solution's relatively low capital requirements compared to many healthcare technologies make it particularly attractive for deployment in diverse healthcare settings, including resource-constrained environments.

Results and discussion

Implementation Outcomes

The LifeTag Emergency QR Code Generator successfully delivers a functional desktop application capable of generating medical emergency QR codes. The implementation provides an intuitive interface for entering critical medical information and converting it into scannable QR codes that can be used as device wallpapers or printed materials.

Key Achievements

The application effectively addresses the need for rapid access to critical medical information during emergencies through:

1. A comprehensive form capturing essential medical data including allergies, conditions, and emergency contacts
2. QR code generation using standardized encoding ensuring compatibility with common scanning applications
3. Customizable emergency information messages and regional emergency numbers
4. Simple export functionality for saving QR codes to various devices

Usability Assessment

User testing revealed positive feedback regarding interface simplicity and information organization. The form-based approach proved intuitive for users of varying technical abilities. The QR codes generated were successfully scanned by standard smartphone cameras and QR readers, demonstrating reliable functionality across devices.

Limitations

The current implementation has several limitations that should be acknowledged:

- Lack of data encryption for sensitive medical information
- No cloud synchronization capabilities for updating information across devices
- Limited customization options for QR code appearance
- Absence of mobile application versions for iOS and Android

Practical Implications

LifeTag demonstrates significant potential for improving emergency medical response by providing first responders with immediate access to critical patient information. This application bridges the critical information gap during the initial moments of medical emergencies when the patient may be unable to communicate effectively. The solution is particularly valuable for individuals with complex medical conditions, severe allergies, or those taking multiple medications where rapid access to this information could significantly impact treatment decisions and outcomes.

Conclusion

LifeTag: The Medical Emergency QR Code Generator with integrated "i" button successfully addresses the critical need for accessible emergency medical information through an innovative dual-access approach. Testing demonstrates both technical feasibility and practical utility, with clear advantages over existing solutions.

While challenges remain in user adoption and data verification, the core functionality provides a significant improvement over current emergency medical identification methods. Further development focusing on integration, accessibility, and internationalization will enhance the system's utility across diverse user populations and emergency scenarios.

The project demonstrates that relatively simple technological solutions, thoughtfully implemented with attention to real-world use cases, can meaningfully improve emergency medical response—potentially saving lives through faster access to critical information when it matters most.

Future scope of the work

Security Enhancements
Implementation of end-to-end encryption would significantly improve data protection for sensitive medical information. Adding password protection and selective data masking would further secure personal health details while maintaining accessibility for emergency personnel. Integration with digital verification systems could authenticate the validity of medical information.

Platform Expansion
Development of dedicated mobile applications for iOS and Android platforms represents a critical next step, enabling users to create and manage emergency profiles directly from smartphones. A cross-platform approach would ensure wider adoption and accessibility across different devices and operating systems.

Healthcare System Integration
Future versions should prioritize compatibility with electronic health record (EHR) systems through standardized APIs and FHIR implementation. This would allow automatic synchronization with verified medical records, ensuring information accuracy and reducing manual data entry.

Advanced QR Technology
Implementing dynamic QR codes that link to cloud-based profiles would enable real-time updates without regenerating codes. Incorporating geo-location features could automatically display region-specific emergency contact information and healthcare facilities. NFC tag compatibility would provide alternative access methods for newer devices.

User Experience Improvements
Adding multilingual support would make the application accessible to diverse populations globally. Implementation of accessibility features including screen readers, high-contrast modes, and simplified interfaces would ensure inclusivity for users with disabilities.

Emergency Response Ecosystem
Creating a dedicated portal for emergency responders would streamline information access during critical situations. Direct integration with emergency dispatch systems could potentially reduce response times and improve outcomes through immediate transmission of vital medical information to first responders before arrival at emergency scenes.

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