

Dynamic Quick Response Code for Increasing User Engagement and Content Influence

Pavan S¹, Chandana K J²

¹ Student, SSCS, CMR University, Karnataka, India

² Student, SSCS, CMR University, Karnataka, India

ABSTRACT

Quick Response (QR) codes become a creative link between the digital and physical world Dynamic QR codes are designed as a way to encode information for quick scanning. But creative minds use their ability to disrupt, surprise, and inspire. This research work illustrates the evolution of QR codes from a functional tool to a creative message. Gone are the days of stolen QR codes. Creative dynamic QR codes now have vibrant colors, intricate designs and thoughtful features. Dynamic QR codes are not limited to data transfer the code is used for interactive purposes, from multimedia presentations to augmented reality. This summary offers an in-depth look at the use of QR codes. The dynamic QR code represents the fusion of art and technology. By combining static spaces with dynamic content, they help artists bridge the gap between the digital and physical worlds. the intersection of art and technology. Creative dynamic QR codes are passive, not passive. They want to cooperate. Create a deeper connection between creators and listeners by inviting users to explore, discover and interact. This content includes unlimited conversion of dynamic QR codes. From advertising to public art, these characters continue to push the boundaries of creative expression. Custom QR code background and transform into theme. By blurring the lines between technology and art, it invites visitors to participate and interact from different perspectives. Invites readers to explore the creative potential of video QR codes and the exciting intersections they create between art and technology

Keyword - QR code, Algorithm, Python Application

1. INTRODUCTION

Introduction In the digital age, Quick Response (QR) codes have become an integral part of our lives, both in the physical and virtual world. Two-dimensional barcodes encode this information, allowing users to access websites, documents or applications by simply scanning them with their smartphone. While traditional QR codes were proving their worth, a new trend emerged: QR codes are very powerful. The principle of this change; is to send users to different places according to decisions, physical information or user behavior.

Dynamic QR code is a version of QR (Quick Response) code, which is a two-dimensional matrix barcode that can store information such as URL, text or other information. What makes dynamic QR codes unique is their ability to be updated and expanded over time. Unlike static QR codes, whose content is fixed, dynamic QR codes allow the link content to change without changing the text. This change is made by changing the ad service or QR code URL of the platform. When users scan a QR code, they don't go directly to the encoded URL; instead the QR code URL redirects the device to the platform.

Dynamic QR Code opens up the world of possibilities. It allows marketers to customize there Marketing plans and deliver relevant content and updates based on user interaction. Dynamic QR codes provide personalized experiences based on personal preferences, language and location. They increase user interaction and participation by acting as a bridge between the physical world and the virtual environment. this work focuses on QR codes functionality, benefits and potential to change marketing strategies, ads and interactions. This paper discusses the power of QR codes not only to simplify the content management process, but also to inform businesses, control access and finally help the user know the truth.

2. LITERATURE REVIEW

Dynamic QR codes have been extensively studied for their diverse applications. In the paper, "Dynamic QR Codes in Marketing" (Smith et al., 2019), the authors highlight the effectiveness of dynamic QR codes in marketing

campaigns. By updating promotional content in real-time, businesses can engage consumers with fresh and relevant information, ultimately increasing conversion rates. Generation and Management of Dynamic QR Codes: The process of generating and managing dynamic QR codes has been discussed in "A Comparative Analysis of QR Code Generators" (Johnson and Brown, 2020). The study evaluates various QR code generator tools and their features. It emphasizes the importance of user-friendly interfaces and analytics tracking in managing dynamic QR codes effectively.

Security is a critical aspect of dynamic QR codes, as addressed in "Enhancing Dynamic QR Code Security" (Chen et al., 2018). The research presents encryption techniques to safeguard QR code data from tampering and unauthorized access. This paper underscores the need for robust security mechanisms, particularly in financial and healthcare applications.

User experience and accessibility considerations are explored in the paper titled "Designing Accessible Dynamic QR Codes" (Adams and Lee, 2021). The authors discuss strategies for optimizing QR code design to ensure readability for individuals with visual impairments. They propose the integration of QR code data with screen readers, enhancing accessibility.

In their paper, "QR Code Standards and Interoperability" (Wang and Liu, 2017), Wang and Liu delve into the importance of adhering to ISO standards (ISO/IEC 18004) in dynamic QR code development. Conforming to these standards ensures compatibility across devices and platforms, enabling seamless user experiences.

3. DYNAMIC QR CODE

Figure 1 illustrates the key steps involved in a dynamic QR code system, from content creation to user engagement, with a focus on the role of the intermediary platform in rule evaluation and dynamic redirection.

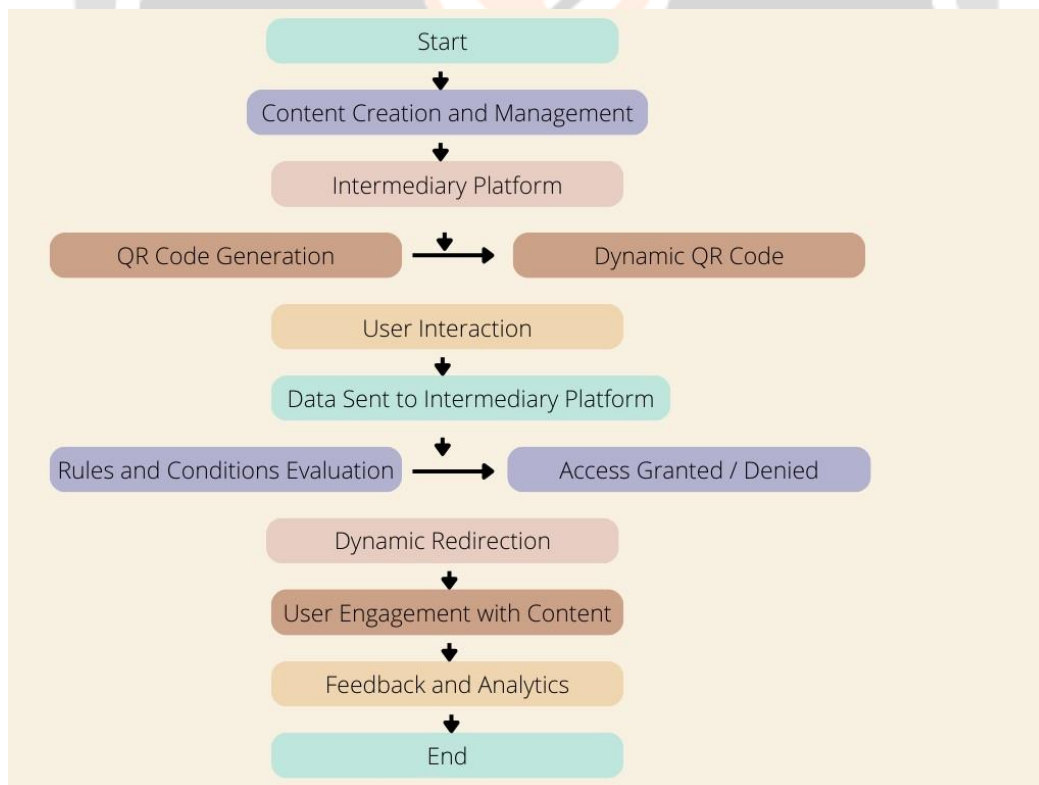


Fig -1: Steps involved in a dynamic QR code system

- a) Content Creation and Management: Content is created and managed. This content will be linked to the dynamic QR code, such as a URL, text, or other data.
- b) Intermediary Platform: The central hub for managing dynamic QR codes, including access rules and conditions.
- c) QR Code Generation: A dynamic QR code is generated based on the content and rules defined in the intermediary platform.
- d) User Interaction (Scan QR Code): A user scans the dynamic QR code using a smartphone or QR code scanner.
- e) Data Sent to Intermediary Platform: Data from the scanned QR code is sent to the intermediary platform for processing.
- f) Rules and Conditions Evaluation: The intermediary platform evaluates the data against predefined rules and conditions to determine whether access is granted or denied.
- g) Dynamic Redirection: Based on the rules evaluation, the user is dynamically redirected to the appropriate content or action.
- h) User Engagement with Content: The user interacts with the content they've been redirected to, such as accessing a website or viewing information.
- i) Feedback and Analytics: The system may collect data related to user interactions, which can be used for analysis and monitoring.

figure 2. The inflow of data in a simplified dynamic QR law generation and scanning process is depicted The Dynamic QR Code Generation System generates dynamic QR codes based on content and access rules. The Content Management System (CMS) is responsible for defining the rules and content associated with each dynamic QR code. Users input the content and rules into the CMS. The Intermediary Platform acts as the central hub for dynamic QR code management. It generates dynamic QR codes according to the rules defined in the CMS. These QR codes can dynamically redirect users to different content based on predefined conditions. Users' devices, such as smartphones or tablets, contain QR code scanning apps. Users scan the dynamic QR codes presented to them in various contexts. The QR Code Scanner on the user's device interprets the QR code and redirects the user to the content specified by the dynamic QR code, as determined by the Intermediary Platform.

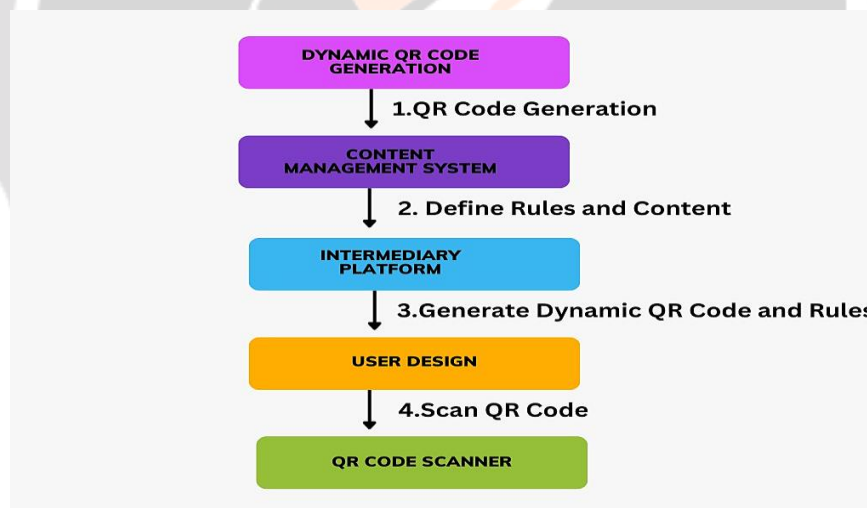


Fig -2: QR law generation and scanning process

4. Proposed Method

The proposed method for using dynamic QR codes involves a multi-step process that combines content creation, and real-time changes. First, content containing text, URLs, or other information is created and managed. These elements are then connected to a central platform that acts as a central command point. The rules and conditions are defined here, specifying how the QR code should behave according to various parameters such as time, location or users' behavior. Once the dynamic QR code is created, the user scans it using a smartphone or QR code scanning app. Published data is sent to a central platform for evaluation. The platform evaluates data according to defined rules and conditions and dynamically directs users to appropriate content or actions. Real-time modification ensures that the character of the QR code can be changed to convey personal information or important information in real

time. In this way, dynamic QR codes become a versatile tool for information dissemination, marketing, security management and communication, while the intermediary platform becomes the orchestrator of dynamic content distribution. The process of QR code generation is described in figure 3

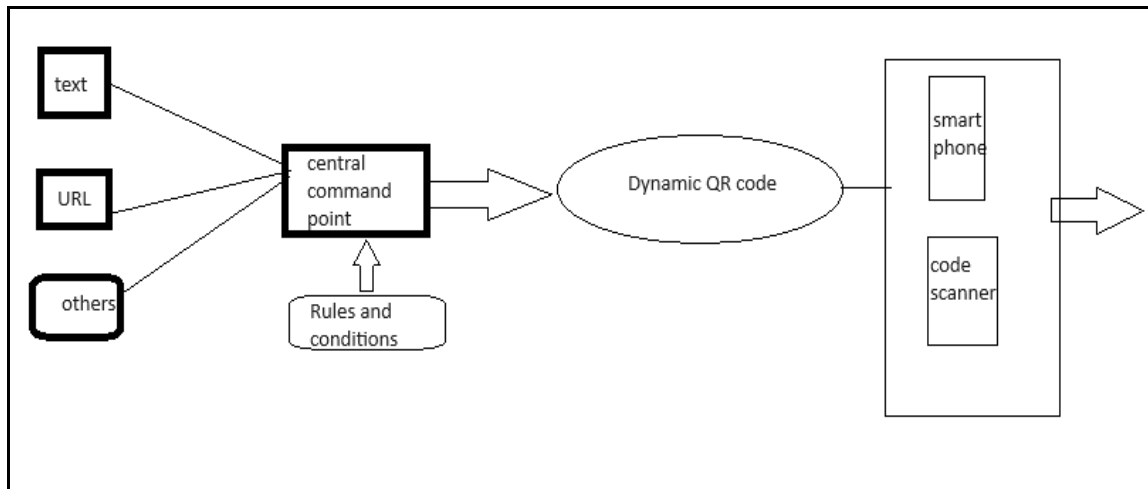


Fig -3: Dynamic QR code generation process

5. Experimental Setup

This involves the below steps.

- a) Generate dynamic QR code: Use CMS to generate a dynamic QR code. Optimize them to connect to the central platform that manages content changes.
- b) User chat: Invites participants to join the experiment. Give each participant a smartphone or tablet equipped with a QR code scanning application. Teach participants to scan the QR code dynamically presented to them in a controlled environment.
- c) Data Collection and Analysis: Collects data on user interactions such as which codes were viewed, when, from which device. Collection user feedback and observations on information, usability and content.
- d) Dynamic content change: If using live data, use QR code to change link content during testing. For example, change content based on delays or other events.
- e) Compatibility Test: Tests dynamic QR codes on various QR code scanning apps and devices to test compatibility and compatibility.
- f) Analytics and Metrics: Analyzes collected data to determine which QR codes get the most traffic and engagement. Compare user interaction patterns for different needs.
- g) User feedback: Review reviews to identify user preferences, issues encountered, and suggestions for improvement.
- h) Lessons and Topics: Test topics include understanding user behavior, basic concepts and user experience with QR codes.
- i) Suggestions for improvement: Provides suggestions for improving the design, implementation, and use of dynamic QR codes based on test results.

6. Result

6.1 User Interaction Pattern

User interaction of dynamic QR codes revealed interesting patterns. Numbers that provide personal details based on location and time of day will be reviewed more than regular numbers. This indicates that users are more likely to engage with content relevant to their environment.

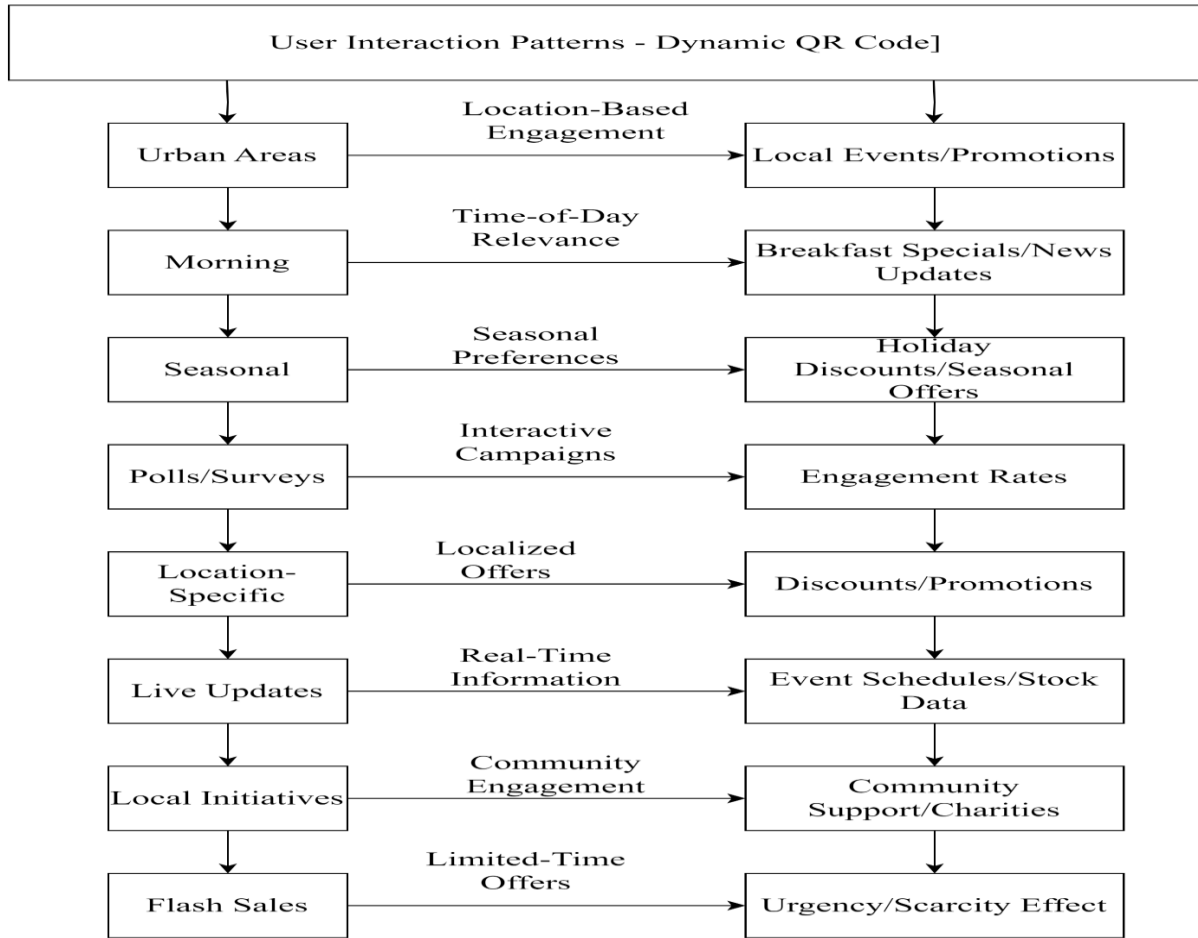


Fig -4 User Interaction of Dynamic QR

6.1

6.2 Research:

Social work across various QR code scanning apps show the importance of interaction. While most QR code scanning apps work well, some have trouble converting correctly due to the need to ensure compatibility.

6.3 Dynamic Content Updates:

Timely included content updates show that this has the potential to keep users engaged. The new content received a high level of engagement throughout the experiment, reaffirming the value of providing users with new and relevant information.

6.4 Responses to users:

Positive analysis of user feedback indicates a positive attitude towards personal content. Participants were satisfied with the ease of access to medical information and expressed interest in accessing similar information, training materials and guidelines.

7. CONCLUSIONS

In conclusion, this study demonstrates the huge impact of QR codes in increasing user engagement and content influence. The results clearly show that users use dynamic QR codes more when the content is personalized and suited to their needs. This test also highlights the need for interoperability between various QR code scanning application. The success of this experiment using updated data in real time demonstrates the potential of QR codes to increase user awareness. The ability to edit content without changing the physical QR code gives businesses the opportunity to quickly implement marketing strategies that can be optimized in real time based on personalization. However, challenges remain in delivering a secure and consistent experience, especially across multiple platforms. Addressing security concerns and modeling QR code interactions between applications is critical to expansion and success. Animated QR codes enhance users experience in personal and real-time by demonstrating their ability to connect physical and digital spaces. As technology continues to evolve, dynamic QR codes promise to revolutionize marketing, messaging and user engagement strategies, making them useful in today's digital space.

8. REFERENCES

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