

Exploring Plant Intelligence Based On QR Code

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Abstract—In the era of technological advancement, bridging the gap between humans and nature is paramount. This paper presents a novel idea aimed at learning techniques to enhance our understanding of plant life through the innovative use of QR code technology. Using this technology, we can understand much more about that plant and make a proper use of it by which it will be beneficial to human beings. The paper work revolves around the concept of scanning QR codes associated with various plant species to get comprehensive information about them. With the help of QR codes and a user-friendly interface, users can delve into the intricate details of plants, including their uses of components, growth habits, environmental requirements, and medicinal uses. In conclusion, this project serves as a testament to the power of interdisciplinary collaboration and technological innovation in fostering a deeper appreciation for the natural world. By seamlessly merging education with technology, we aim to inspire future generations to explore the wonders of plant life and cultivate a sustainable relationship with our environment.

Also we have introduced vacation water system supply which enables trees to get water automatically at certain interval of time. Water treatment plays an important role in maintaining water quality standards, particularly in regions where natural water sources may be susceptible to contamination. This type of treatment is useful for those situations when we can't keep continuous watch on our plants or trees. As it becomes difficult for us to keep time to time watch on the watering status of our plants, we can use such techniques for maintaining the humidity among trees and save it from getting dry. In summary, a well-designed vacation water supply system is essential for ensuring a safe, reliable, and sustainable water supply to meet the diverse needs of travelers and residents alike. By incorporating sound engineering principles, innovative technologies, and environmentally conscious practices, such systems play a vital role in enhancing the overall quality of the vacation experience while safeguarding precious water resources for future generations.

Keywords—QR codes, plants, environment, sustainable, contamination

I. INTRODUCTION

In the realm of environmental education, fostering curiosity and connection with the natural world is paramount. With the rapid advancement of technology, integrating innovative tools like Quick Response (QR) codes has emerged as a promising method to enrich learning experiences, particularly in exploring the

diverse realm of trees. This introduction delves into the potential of using QR codes to access comprehensive information about trees, including iconic species like the Mango, Gulmohar, Kadamba, Akash Shevaga, and Nilgiri trees, thereby fostering a deeper understanding and appreciation for the botanical wonders that surround us. Each species of tree bears a unique tale, from the luscious fruit-bearing Mango tree, symbolizing abundance, and cultural significance to the pleasant blooms of the Gulmohar tree, evoking awe, and admiration with its vibrant hues. The Kadamba tree, steeped in mythological lore, whispers tales of divine beauty and transcendence, while the Akash Shevaga tree, with its delicate blossoms, serves as a testament to the ephemeral beauty of nature. Amidst mist-laden hills, the Nilgiri trees stand tall, cloaked in verdant foliage, harboring a wealth of biodiversity within their embrace. Everyone may doesn't know this much about the trees mentioned above and that's the reason of making this project to bring in used by which people can get to know much more things about those trees and make beneficial use of that tree. This introduction sets the stage for an exploration of how QR codes can serve as catalysts for interactive learning experiences, fostering a deeper connection with trees and the ecosystems they inhabit. By seamlessly blending technology with nature, this innovative approach cultivates a sense of reverence for the invaluable gifts that trees bestow upon our planet. In water vacation system efficient distribution networks are used for delivering water to various points of use throughout a vacation property or destination in plants. This may involve pipelines, pumps, valves, and fittings configured to transport water safely and efficiently, minimizing losses and ensuring equitable access. while addressing the associated concerns and ambiguities.

II. PROBLEM STATEMENT

Inspite of availability of lot of information about tress on internet, many of us face problem to get exact and compressive required information. which becomes very time-consuming task and sometimes doesn't get what we needed. For solving this problem, we can attach well programmed QR codes which will contain proper

information about that plant including its medicinal uses, history of plants.

III. OBJECTIVES

The objective of our project is to develop a QR code which gives information about trees and supply essential amount of water to the plants on certain interval of time. Few more objectives are as follows:

- To people know more about the plant/tree which is present in their surroundings.
- To provide information about that tree.
- To make proper use of plants/trees and their components by increasing knowledge about them.
- To study more about the technology which can improve the use of availability of natural resources
- To save plants/trees from getting dry.
- To supply them time to time water by using vacation water supply system.

IV. SCOPE

The scope of using QR code scanning to obtain information about plants is vast and holds significant potential in various fields including agriculture, botany, horticulture, conservation, and education. Here's an overview of the scope:

- **Plant Identification:** QR codes can be linked to databases containing information about different plant species. By scanning the QR code associated with a specific plant, users can quickly access details such as common and scientific names, habitat preferences, growth habits, and even images for visual identification.
- **Educational Tools:** QR codes can enhance educational experiences by providing students and enthusiasts with instant access to comprehensive plant information. Schools, botanical gardens, and nature reserves can incorporate QR codes into signage or educational materials, allowing visitors to learn more about the plants they encounter.
- **Agricultural Applications:** In agriculture, QR codes can be used to provide farmers with detailed information about crops, including optimal growing conditions, pest management strategies, and harvesting techniques. This can aid in increasing crop yields, optimizing resource usage, and promoting sustainable farming practices.
- **Gardening and Landscaping:** QR codes can be integrated into plant labels or seed packets, allowing gardeners and landscapers to access cultivation tips, planting instructions, and design ideas tailored to specific plants. This facilitates the creation of beautiful and thriving gardens while promoting biodiversity and ecological balance.
- **Conservation Efforts:** QR codes can play a crucial role in conservation initiatives by providing information about endangered or threatened plant species. Conservation organizations can utilize QR codes to raise awareness, gather data on plant populations, and engage the public in conservation efforts such as habitat restoration and seed banking.
- **Market Transparency:** Consumers increasingly value transparency and traceability in the products they purchase, including plants and plant-based products.

QR codes can be used to provide consumers with information about the origin, cultivation methods, and sustainability practices associated with plants, promoting informed purchasing decisions.

- **Citizen Science:** QR code-enabled plant identification apps can empower citizen scientists to contribute valuable data to research projects and biodiversity monitoring efforts. By engaging the public in plant identification and data collection, scientists can gather large-scale data sets useful for studying plant distribution, phenology, and ecological trends.
- **Customization and Integration:** The versatility of QR codes allows for customization and integration into existing systems and platforms. Whether used in printed materials, mobile apps, or interactive displays, QR codes can be tailored to meet the specific needs and preferences of users across various contexts.

V. TREE INFORMATION SYSTEM

Tree Information System involves the installation of QR codes on select trees within urban areas or parks. Each QR code is linked to a database containing comprehensive information about the respective tree species, including its common and scientific name, characteristics, ecological significance, and maintenance requirements. Users can scan the QR codes using their smartphones to access this information instantly, fostering a deeper appreciation for urban biodiversity and environmental stewardship. Key features of the Tree Information System:

- QR codes linked to a centralized database with detailed tree information.
- User-friendly interface accessible via smartphone scanning.
- Educational content transferred to various age groups and interests.
- Integration with community engagement initiatives, such as tree planting events and guided nature walks.
- Data analytics capabilities for monitoring user engagement and tree health trends over time.

VI. METHODOLOGY

This setup consists of QR code technology for plant information. QR code generation is with computer by using QR code generator and Water supply system for plants/trees with containers.

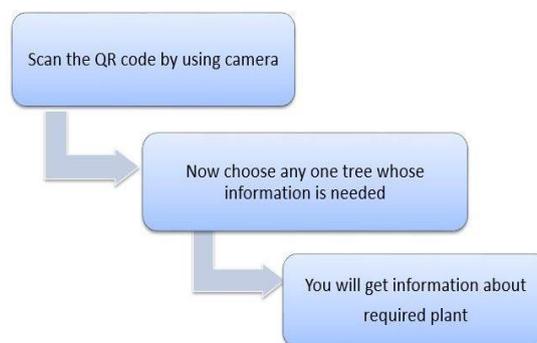


Figure 1: QR Code Methodology



Figure 2: QR Code and Scanning Output

VII. CONCLUSION

Scanning QR codes to retrieve information about specific trees offers a promising solution for engaging the public, facilitating tree management, and fostering environmental awareness. Through the reviewed literature, it becomes evident that QR code-based systems serve as effective tools in various contexts, including urban green spaces, campuses, and smart city environments.

In conclusion, scanning QR codes to access information about trees represents a valuable strategy for promoting environmental education, enhancing urban green infrastructure, and fostering sustainable development. As technology continues to evolve, further innovations in QR code applications, coupled with advancements in data analytic and mobile interfaces, hold the potential to revolutionize how we interact with and manage our urban forest ecosystems.

VIII. FUTURE SCOPE

The future scope of generating QR codes and retrieving information about trees after scanning them holds significant potential for further advancements and innovations in several key areas:

1. **Integration with Emerging Technologies:** As technology continues to evolve, QR code-based tree

information systems can benefit from integration with emerging technologies such as augmented reality (AR) and Internet of Things (IoT). AR overlays can provide immersive experiences by superimposing additional information, such as historical facts or real-time environmental data, onto the user's smartphone screen after scanning the QR code. IoT sensors embedded in trees can provide continuous monitoring of environmental parameters like soil moisture, air quality, and temperature, enhancing the depth and accuracy of the information provided to users.

2. **Personalized User Experiences:** Future QR code systems could leverage machine learning algorithms and user behaviour analytics to deliver personalized experiences tailored to individual preferences and interests. By analysing scanning patterns and user feedback, the system can dynamically adjust the content and presentation of tree information to better engage and educate users.

3. **Enhanced Data Visualization and Interactivity:** Advanced data visualization techniques, such as interactive maps and 3D models, can enrich the user experience by providing visually compelling representations of tree distributions, ecological networks, and urban green spaces. Users can explore virtual environments, interact with digital replicas of trees, and visualize the impact of urban forestry initiatives in real-time.

4. **Crowdsourced Data Collection and Citizen Science:** QR code systems can serve as platforms for crowdsourced data collection and citizen science initiatives aimed at monitoring tree health, biodiversity, and ecosystem dynamics. By encouraging users to contribute observations, photographs, and ecological data through QR code scanning, these systems can harness the collective intelligence of communities to support scientific research and inform evidence-based conservation efforts.

5. **Seamless Integration with Smart City Infrastructure:** In the context of smart cities, QR code-based tree information systems can be seamlessly integrated with existing urban infrastructure, including smart streetlights, public transit stops, and digital signage. By embedding QR codes in strategic locations throughout the city, authorities can provide residents and visitors with instant access to tree-related information as part of their everyday urban experience.

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REFERENCES

- [1] S. Tiwari, "An introduction to QR code technology," Proc. - 2016 15th Int. Conf. Inf. Technol. ICIT 2016, vol. 1, pp. 39–44, 2017
- [2] O. Lopez-Rincon, O. Starostenko, V. Alarcon-Aquino, and J. C. Galan-Hernandez, "Binary Large Object-Based Approach for QR Code Detection in Uncontrolled Environments," J. Electr. Comput. Eng., vol. 2017, pp. 15, 2017.
- [3] K. Czuszyński and J. Rumiński, "Interaction with medical data using QR-codes," in 2014 7th International Conference on Human System Interactions (HSI), pp. 182–187, 2014. K. Elissa, "Title of paper if known," unpublished.
- [4] P. K. Jithin, M. Vishnuram, P. Prasath, and J. T. Thirukrishna, "Tourism Guide for Tamilnadu (Android Application)," Int. J. Innov. Res. Sci. Technol., vol. 4, no. 11, pp. 112–116, 2018.
- [5] F. Masalha, "A Students Attendance System Using QR Code," Int. J. Adv. Comput. Sci. Appl., vol. 5, no. 3, pp. 75–79, 2014.
- [6] N. FatimahSahidan, A. K. Juha, N. Mohammad, and Z. Ibrahim, "Flower and leaf recognition for plant identification using convolutional neural network," Indones. J. Electr. Eng. Comput. Sci., vol. 16, no. 2, pp. 737–743, 2019.
- [7] B. M. Silva, I. M. Lopes, M. B. Marques, J. J. P. C. Rodrigues, and M. L. P. Jr, "A Mobile Health Application for Outpatients Medication Management," in IEEE International Conference on Communications (ICC), pp. 4389–4393, 2013.
- [8] D. Jagodi, D. Vuji, and S. Ran, "Android system for identification of objects based on QR code," Telecommun. Forum Telfor, vol. 7, pp. 922–925, 2015.
- [9] M. V Dahigonde and V. J. Kadam, "QR Code Based Digitized Marksheet System," Int. J. Res. Comput. Sci. Inf. Technol., vol. 2, no. 2, pp. 120–123, 2014.
- [10] B. Ahmed and S. Al-qaraawi, "Design and Implementation of e-Shopping System Using QR Code and Smart Mobile Phone," Iraqi J. Comput. Commun. Control Syst. Eng., vol. 19, no. 3, pp. 56–64, 2019.
- [11] B. Ahmed and S. Al-Qaraawi, "Design and Implementation Guidance Mobile Application 1 1,2," Int. J. ofAdvanced Res. Comput. Eng. Technol., vol. 8, no. 7, pp. 283–290, 2019.
- [12] S. Haque and R. Dybowski, "Advanced QR Code Based Identity Card : A New Era for Generating Student ID Card in Developing Countries," in International Conference on Systems Informatics, Modelling and Simulation, pp. 76–82, 2014.
- [13] S. L. Fong, F. Y. H. Ahmed, and A. Jamal, "Smart City Bus Application with Quick Response (QR) Code Payment," in International Conference on Software and Computer Applications, vol. 2, pp. 248–252, 2019.
- [14] A. Cornelia and A. Repanovici, "Legal Information Management Using QR Codes," Qual. Quant. Methods Libr., vol. 4, pp. 381–397, 2015.
- [15] K. L. Tan and K. C. Lim, "Fast surveillance video indexing & retrieval with WiFi MAC address tagging," Indones. J. Electr. Eng. Comput. Sci., vol. 16, no. 1, pp. 473–481, 2019.
- [16] "QR Code Generator WiFi Access." [Online]. Available: <https://blog.qr4.nl/QR-Code-WiFi.aspx>. [Accessed: 30- Aug-2019].
- [17] S. A. Case, D. Bosco, C. Central, A. Pradesh, S. C. Singha, and M. K. Verma, "Integration of AIDC Technology in Mobile via QR Code for Enhancing the Library Integration of AIDC Technology in Mobile via QR Code for Enhancing the Library Services : A Case Study of Don Bosco College Central Library , Arunachal Pradesh," Indian J. Inf. Sources Serv., vol. 9, no. 2, pp. 44–48, 2019.
- [18] C. Hema, S. Sankar, and M. Sandhya, "Tag count based priority scheduling algorithm for mitigating the RFID collisions," Indones. J. Electr. Eng. Comput. Sci., vol. 18, no. 1, pp. 434–442, 2019.
- [19] "Gerador de código QR - Crie aqui códigos QR gratuitos." [Online]. Available: <https://br.qr-code-generator.com/>. [Accessed: 30-Aug-2019].
- [20] R. Ramly, A. A. B. Sajak, and M. Rashid, "IoT recycle management system to support green city initiatives," Indones. J. Electr. Eng. Comput. Sci., vol. 15, no. 2, pp. 1037–1045, 2019.
- [21] Chen, N.S., Teng, D. Ichia-En., Lee, C.H. (2011) . Augmenting paper-based reading activity with direct access to digital material and scaffolded questioning. Computer and Education. 57(2), 1705-1715.
- [22] Law, C., & So, S. (2010). QR codes in education. Journal of Educational Technology Development and Exchange, 3(1), 85-100.
- [23] Masalha F. (2014). A Students Attendance System Using QR Code. Inter. J. of Adv. Comp. Sci. and Appl.,5(3), 75-79.
- [24] Susono, H., & Shimomura, T, Using Mobile Phones and QR Codes for Formative Class Assessment, In A. Méndez-Vilas, A. Solano, 2006

