



## A Review on Identification and Information Using QR Code in Ace College Campus Plants

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DOI : <https://doi.org/10.55248/gengpi.5.1124.3229>

### ABSTRACT

Trees serve as the primary source of oxygen production in the environment, contributing to a healthy, productive, and sustainable ecosystem. Our campus is home to a variety of tree species. However, accurately identifying and managing a significant number of trees can present challenges. To address this, we have created QR codes for each distinct tree and mapped them with relevant information, including tree ID, botanical name, English name, Tamil name, family, and medicinal uses. Students and visitors can access details about each tree by scanning the QR code with their smartphone camera, provided they have a QR code reader application installed.

**Keywords** – Plant Identification, QR code, Environmental Education and Biodiversity

### Introduction

The ACE College campus features a rich assortment of plant species, many of which possess significant ecological and educational importance. Nevertheless, the awareness of these plants is frequently underutilized by students, faculty, and visitors. To address this issue, the initiative titled "Identification and Information Using QR Code in ACE College Campus Plant" seeks to establish an interactive platform that enables users to effortlessly identify plants and obtain comprehensive information about them. This project merges disciplines such as botany, technology, and environmental science, thereby creating an innovative educational tool for the ACE College community. Students and visitors can acquire information about the trees by scanning the QR codes with their smartphone cameras equipped with QR code reader applications.

Despite this initiative, there remains a considerable lack of awareness among students and visitors regarding the variety of plant species present on campus. This research intends to close this knowledge gap by providing a swift and accessible method for plant identification through a groundbreaking system.

Data on trees were gathered from two higher education institutions in Akure, Nigeria: the Federal University of Technology and the Federal College of Agriculture. The system's design is based on a three-tier architectural framework. PostgreSQL serves as the database system at the foundational tier, while the middle tier consists of the Apache HTTP Server as the web server. PHP 8.1 is utilized as the scripting language to facilitate communication with the database.

This integration of artificial intelligence algorithms effectively addresses the challenge of fitting distorted QR images into geometric deformation patterns, thereby enabling successful QR code recognition. The issue of two-dimensional code distortion, which has been a significant concern in existing software systems, is tackled in this study. Furthermore, Natural Language Processing (NLP) is employed alongside Digital Signal Processing (DSP) technology to transform the processed text into a synthesized speech representation. In this context, we have developed a practical text-to-speech synthesizer in the form of a straightforward application that converts inputted text into spoken words.

### Problem Definition

- The ACE College campus hosts a wide variety of plant species, many of which hold educational, ecological, and aesthetic value.
- However, there is currently no effective system in place to identify these plants or provide detailed information about them to students, faculty, and visitors.

- Furthermore, traditional methods of plant identification, such as signs or plaques with limited information, are often insufficient and prone to weathering over time.

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## Objectives

- **Enhance Environmental Awareness:**

To promote environmental education and awareness among students, faculty, and visitors by providing easy access to information about the diverse tree species on campus.

- **Facilitate Tree Identification:**

To create an efficient system for identifying trees on campus by linking QR codes to detailed descriptions, including scientific names, common names, characteristics, and ecological significance.

- **Promote Technological Integration:**

To integrate technology into campus infrastructure by using QR codes as a tool for education, making the process of learning about local flora more interactive and engaging.

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## Literature survey

[1] **Paper Name :-** Identification Of Trees Using Qr Code In College Campus

**Author:-** R.Nagajyothi<sup>1</sup> , Dr. R. MurugalakshmiKumari<sup>2</sup>, V.G.Jyothimani<sup>3</sup>

**Publication:-** International Journal of Engineering Technology and Management Sciences October -2023

**Explanation:-** Trees are the foremost source for producing the oxygen in environment and ensure a healthy productive and sustainable environment. In our campus, we have number of trees with different species. Accurately identifying and managing a large number of trees can be a challenging task.

[2] **Paper Name:-** QR Code System for Plant Identification at Raden Intan Lampung State Islamic University

**Author:-** Mala Pratiwi<sup>1</sup>, Ardian Asyhari<sup>2</sup>, Happy Komikesari<sup>3</sup>

**Publication:-** E3S Web of Conferences 482, 05009 (2024)

**Explanation :-** The Raden Intan Lampung State Islamic University, recognized as the 8th Most Sustainable University in Indonesia, is notable for its verdant campus characterized by lush and well-preserved vegetation.

[3] **Paper Name:-** Development of A Qr Code System for Tree Species Identification

**Author:-** Bukola A. Onyekwelu<sup>a</sup>, Grace O. Alo<sup>b</sup> , Flourish K. Echefu<sup>c</sup> , Meshach Aderele<sup>d</sup> , Israel O. Adetula<sup>e</sup> , Jonathan C. Onyekwelu<sup>f</sup>

**Publication:-** International Journal of Web Research, Vol. 6, No. 1, Winter- Spring, 2023

**Explanation:-** Trees provide a wide range of benefits to humans and other living organisms. An accurate method tree species identification will improve their management and conservation. Also, tree identification and description are crucial for genetic study, biodiversity conservation, management and regeneration strategies.

[4] **Paper Name:-** Research on QR image code recognition system based on artificial intelligence algorithm

**Author:-** Lina Huo, Jianxing Zhu<sup>1</sup> Pradeep Kumar Singh<sup>2</sup> Pljonkin Anton Pavlovic<sup>4</sup>

**Publication:-** Journal of Intelligent Systems 2021; 30: 855–867

**Explanation:-** The QR code recognition often faces the challenges of uneven background fluctuations, inadequate illuminations, and distortions due to the improper image acquisition method. This makes the identification of QR codes difficult, and therefore, to deal with this problem, artificial intelligence-based systems came into existence.

[5] **Paper Name:-** Design and Implementation of Text To Speech Conversion for Visually Impaired People

**Author:-** Itunuoluwa Isewon<sup>1</sup> Jelili Oyelade<sup>2</sup> Olufunke Oladipupo<sup>3</sup>

**Publication:-** International Journal of Applied Information Systems (IJ AIS) – ISSN : 2249-0868 Foundation of Computer Science FCS, New York, USA Volume 7– No. 2, April 2014 –

**Explanation:-** A Text-to-speech synthesizer is an application that converts text into spoken word, by analyzing and processing the text using Natural Language Processing (NLP) and then using Digital Signal Processing (DSP) technology to convert this processed text into synthesized speech representation of the text. Here, we developed a useful text-to-speech synthesizer in the form of a simple application that converts inputted text

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## Methodology

### 1. Plant Identification and Data Collection

- **Survey the Campus:** Conduct a thorough survey of the ACE College campus to identify and catalog various plant species. This will involve mapping out the locations of plants and noting their physical characteristics.
- **Consult Experts:** Collaborate with botanists or use plant identification apps to accurately identify each plant species.
- **Gather Data:** Collect detailed information for each identified plant, including its scientific name, common name, botanical description, native region, ecological role, and care instructions. Take high-quality photographs of each plant for visual reference.

### 2. Database Creation

- **Design the Database Structure:** Create a relational database (using MySQL, PostgreSQL, or another suitable DBMS) to store all the collected data. The database should include fields for plant identification information, descriptions, images, and QR code links.
- **Populate the Database:** Input all the collected plant data into the database, ensuring that each plant is uniquely identified and categorized.

### 3. QR Code Generation

- **Generate QR Codes:** Use a Python library like `qrcode` or an online QR code generator to create unique QR codes for each plant. Each QR code should encode a URL or data that links to the corresponding plant's information page.
- **Link QR Codes to Plant Data:** Ensure that each QR code is linked to the correct plant in the database, allowing users to access detailed information upon scanning.

### 4. Website or Mobile App Development

- **Develop a Backend:** Set up a backend server using a web framework such as Flask (Python), Jingo (Python), or Node.js. This server will handle requests from users who scan the QR codes and retrieve the corresponding plant data from the database.
- **Design the Frontend:** Create a responsive and user-friendly interface (using HTML, CSS, JavaScript, or a mobile app framework like React Native) that displays the plant information in an appealing and accessible manner. The interface should be intuitive, with features such as plant images, descriptions, and additional resources.
- **Implement QR Code Scanning Functionality:** Integrate QR code scanning capabilities into the website or mobile app, allowing users to easily scan codes and access plant data.

### 5. Testing and Validation

- **Test the System:** Conduct extensive testing of the entire system, from scanning QR codes to retrieving and displaying plant information. This includes testing different devices (smartphones, tablets) and browsers to ensure compatibility.
- **Validate Plant Data:** Ensure the accuracy of the plant information by cross-checking it with reliable sources. Correct any discrepancies before launching the system.

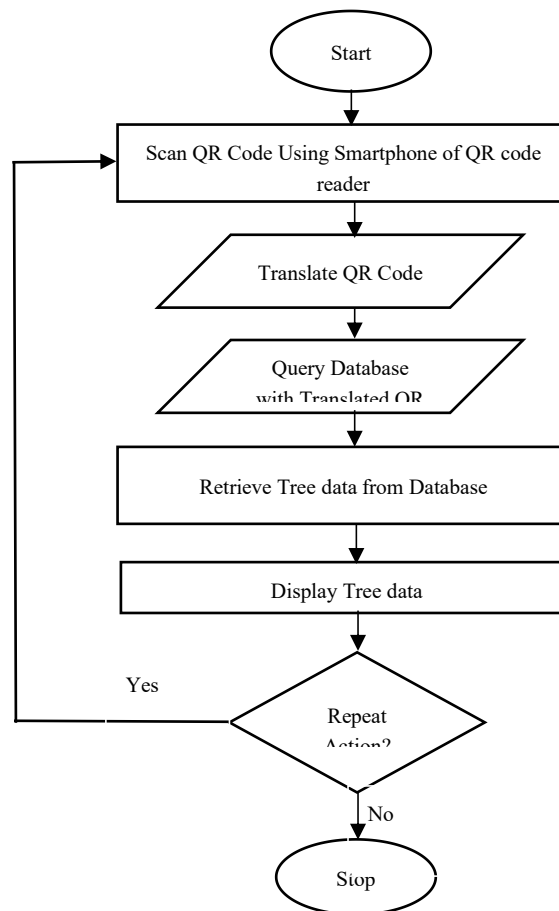
### 6. QR Code Installation

- **Design QR Code Placards:** Create durable, weather-resistant placards or stands that will display the QR codes near the respective plants. Ensure that the design is aesthetically pleasing and fits well within the campus environment.
- **Install QR Codes on Campus:** Place the QR code placards near each identified plant across the campus. Ensure that they are positioned in a way that makes them easily accessible to users without damaging the plants.

### 7. Launch and Deployment

- **Launch the System:** Deploy the website or mobile application and ensure it is publicly accessible. Announce the launch of the project to the campus community through events, social media, and other communication channels.
- **User Education:** Educate students, faculty, and visitors on how to use the QR code system. This could include informational posters, instructional videos, and live demonstrations.

## Data flow Diagram



Fir. Data flow Diagram

## Advantages & Disadvantages

### Advantages

#### 1. Enhanced Educational Value

**Increased Awareness:** Provides detailed information about campus flora, enhancing educational experiences for students, faculty, and visitors.

**Interactive Learning:** Engages users through interactive QR codes and a digital platform, making learning about plants more engaging and accessible.

#### 2. Technological Integration

**Modern Solution:** Utilizes QR codes and digital platforms to modernize plant identification and information dissemination, aligning with current technological trends.

**Ease of Access:** Allows users to quickly access plant information using smartphones or tablets, without the need for extensive physical signage.

#### 3. Improved Campus Aesthetics

**Aesthetic Displays:** QR code plaques can be designed to blend with the campus environment, contributing to its visual appeal while providing useful information.

**Reduced Clutter:** Minimizes the need for large, weather-prone physical signs by using compact QR code displays.

#### 4. Support for Conservation and Sustainability

**Environmental Awareness:** Promotes understanding of plant species and their ecological roles, encouraging conservation efforts and sustainable practices.

**Educational Tool:** Serves as a resource for teaching about biodiversity, plant care, and ecological relationships.

### 5. Scalability and Adaptability

**Expandable System:** Can be scaled to include more plant species or expanded to other campuses or locations.

**Adaptable Technology:** The digital platform can be updated with new features or additional plant data as needed.

### 6. User Engagement

**Interactive Features:** Allows users to leave feedback or additional information, fostering a sense of community and involvement.

**Mobile Accessibility:** Facilitates on-the-go learning and exploration of campus flora.

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## Disadvantages

### 1. Initial Costs

**Development Costs:** Requires investment in software development, QR code generation, database management, and website or app development.

**Hardware Costs:** Costs for printing QR code plaques, purchasing durable materials, and potentially creating custom stands or mounts.

### 2. Maintenance and Updates

**Ongoing Maintenance:** Requires regular updates to the database and digital platform to ensure accuracy and relevance of plant information.

**Physical Maintenance:** QR code plaques and stands need to be maintained to prevent damage from weather or vandalism.

### 3. Technical Limitations

**Device Dependency:** Users need a smartphone or tablet with a camera and internet access to scan QR codes and access information.

**Technical Issues:** Potential for technical problems such as broken links, QR code scanning issues, or website/app malfunctions.

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## Conclusion

The "Identification and Information Using QR Code in Ace College Campus Plant" project exemplifies an innovative blend of technology and education, providing a scalable solution for environmental awareness and plant identification. By employing QR codes as informational tools, the campus not only encourages interactive learning but also fosters a sense of stewardship for local flora among students, staff, and visitors. The approach can bridge the gap between digital tools and environmental science education, making it accessible and engaging.

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