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Web Controlled Wireess IoT Notice Board Using Led Display

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Abstract

With the introduction of smart wireless electronic notice boards, the conventional notice board has undergone a substantial evolution. In order to increase the effectiveness and adaptability of information distribution, this study presents the design and development of a sophisticated system that seamlessly incorporates contemporary communication technology. The suggested smart notice board connects seamlessly to a central control system using wireless communication protocols like Bluetooth and Wi-Fi. This removes the requirement for in-person interaction by enabling administrators to remotely update and manage presented content. Through a specialized software application, authorized workers may effortlessly upload, edit, and schedule announcements thanks to the system's user-friendly interface. It also has a high-resolution display, which guarantees that texts are seen in a variety of lighting settings with clarity and vibrancy. The notice board offers a flexible platform for conveying a variety of information by supporting dynamic content changes that include text, photos, and multimedia components. To stop unwanted access and content manipulation, security measures are integrated. Additionally, power management systems and energy-efficient parts are combined to improve sustainability and lessen the impact on the environment. There are many advantages to using this smart wireless electronic notice board, such as enhanced interactivity, lower maintenance costs, and real-time information distribution.

Introduction

Information sharing is the main goal of any messaging system, and communication technologies have advanced significantly in recent years. Due to its effectiveness and capacity to provide smooth communication with others in a short amount of time, wireless networking is preferred by people nowadays. One significant technological advancement that makes it possible to create a variety of practical online applications is the Internet of Things (IoT). IoT is essentially a network where physical items are linked to the internet through routers or network devices, enabling data sharing. IoT is a strong and clever solution that reduces human labor while streamlining access to physical equipment by enabling remote control of devices over current network infrastructures. Autonomous control is another feature of this technology that allows gadgets to function without human assistance.

The Internet of Things makes use of intelligently connected machines and devices that gather data by integrating sensors and actuators into a

variety of tangible items. It is anticipated that as IoT use grows quickly in the upcoming years, new services that raise consumer quality of life and boost business efficiency will be introduced—what the GSM industry calls the "connected lifestyle."
This project creates a smart communication interface by combining a Raspberry Pi, a local area network (LAN), and Internet of Things technology. If a user wishes to show a message, they can email it to the Raspberry Pi, which will process it using a Python script and display it on an LCD screen.
This system's main objective is to show significant announcements in an educational context, including information on international conferences, workshops, and other institutional events.
This digital project intends to create a computer-controlled scrolling message display board with a space-efficient design. Keeping up with current events has become more crucial as technology continues to influence our daily lives. Because wireless communication enables instantaneous engagement without the need for physical connections, people like it. Wireless technology is perfect for modern applications since it allows devices to communicate with each other without any problems.
This project's main goal is to use the Internet of Things to show alerts, allowing information to be shared via a digital display unit controlled by a mobile application for an administrator. To give real-time updates, this device can be installed in public spaces like rail and bus stations as well as college campuses. To ensure effective and timely information sharing, modern wireless alternatives are replacing traditional paper-based notice boards.
A LAN module is incorporated into an IoT-based board to allow for real-time message updates. The system is intended to be very dependable, autonomous, and automatic.
When authorized users send messages, a display linked to a central server continuously scans for them, processes them, and changes the LCD screen appropriately. The presented content can only be altered by authenticated users, guaranteeing accurate and safe information distribution.

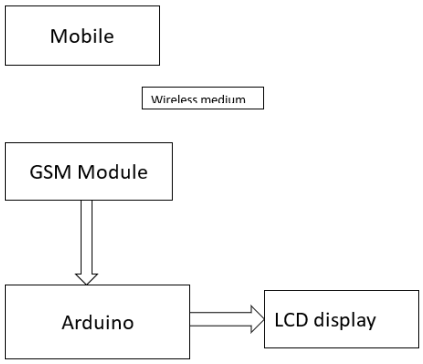

Fig. 1 Module

Methodology

Hardware design, software development, and wireless communication integration are some of the crucial processes involved in creating a wireless LED notice board. Reliability and affordability were our top priorities when choosing P10 LED display modules and Wi-Fi controllers for this investigation. To guarantee optimum connectivity and performance, these hardware components must be seamlessly integrated.
At the same time, software development was started with the goal of creating an Arduino-based control system for controlling display behavior and an intuitive Content Management System (CMS) for remote content management. Wi-Fi was carefully set up to provide reliable connectivity between the CMS and the message board system. To improve system efficiency and dependability, a thorough testing and optimization process was carried out.
An intelligent wireless messaging system with dynamically enhanced media capabilities emerged as a result of the communication equipment being upgraded after successful implementation. The wireless LED display offers contemporary communication options by integrating smartphone technologies. Users can easily compose messages and send them to the display board for editing and real-time changes via a specialized mobile application.
In order to facilitate smooth connection between smartphones and LED displays and guarantee successful and efficient message broadcasting, the system makes use of Bluetooth or Wi-Fi connectivity. Its features can be customized to meet a variety of needs, such as

giving updates about school events or showing job openings.

Block Diagram

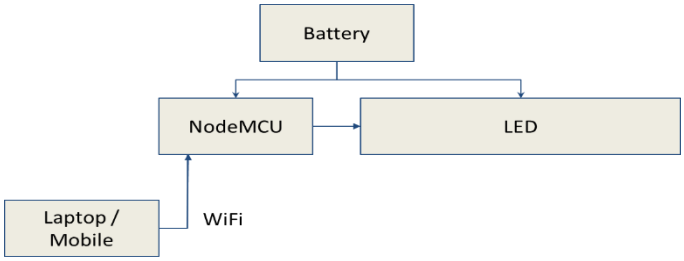

Fig. 2 :- Block Diagram

Working Principle

1. Power Supply:
   - The battery supplies power to the NodeMCU and the LED display.
   - Once powered on, the NodeMCU initializes and connects to the configured Wi-Fi network.
   - It sets up a Web Server or MQTT Client to listen for incoming messages.
2. Wireless Communication:
   - A laptop or mobile device sends messages wirelessly to the NodeMCU via Wi-Fi.
   - The NodeMCU acts as a receiver and processes the received message.
3. Message Processing:
   - A user sends a message from a laptop or mobile using:
   - A web-based interface hosted by the NodeMCU.
   - A mobile app designed for this system.
   - A third-party service like MQTT or Firebase to send messages remotely.
   - The message is transmitted to the NodeMCU over Wi-Fi.

Key Features

- Wireless Control: No need for physical interaction; messages are sent via Wi-Fi.
- Portable Power: The system runs on a battery, making it mobile.
- User-Friendly: Messages can be updated easily using a mobile or laptop.

Conversation

In order to remotely operate and show messages on a digital notice board, the LED advertising board concept makes use of Internet of Things (IoT) platforms such as Blynk. With their dynamic content display and real-time updates, these Wi-Fi-based LED advertising boards are transforming the advertising sector by providing a novel take on e-circular notifications.

Important Features of LED Advertising Boards Powered by IoT Connectivity & Display in Real Time: Due to their internet connectivity, these billboards can instantaneously receive and show messages.

Compatibility Issues: The disparate communication protocols and standards used by IoT devices could cause incompatibilities. It may be challenging to integrate smart notice boards with current systems or devices due to limited interoperability.

Needs for Reliable Connectivity: For IoT devices to operate efficiently, a steady internet connection is necessary. Operations can be disrupted by poor connectivity, which can cause important information to be shown inaccurately or with delays.
Important Things to Think About When Implementing:
Location: The best positioning guarantees the most exposure and interaction.
LED Display Quality: Readability is enhanced in a range of lighting settings by robust, high-resolution panels.
Wi-Fi Security: Robust authentication and encryption procedures guard against unwanted access.
Content Management System (CMS): Easy scheduling and remote updates are made possible by an intuitive platform.

EXECUTION

The deployment of a **smart notice board system** involves a systematic approach, from circuit design to final installation. Below are the key steps involved in the process:

1. Design of Circuits Designing the circuit that manages the P10 LED display and interprets commands from the Wi-Fi module is the first stage. This comprises: choosing necessary parts such the power supply, Wi-Fi module, and Atmega32p microprocessor.

integrating and connecting the parts correctly to guarantee smooth functioning.

2. Creating the "C" Program for Embedding An embedded "C" program is created and uploaded to the Atmega32p microcontroller after the circuit has been designed. This program is in charge of: obtaining and deciphering instructions from the Wi-Fi module. Real-time transmission of messages is shown on the P10 LED display.

3. Wi-Fi Module Configuration To connect to the internet and receive commands from users, the Wi-Fi module needs to be configured. This stage entails: entering the required network login information.
setting up the module to send data to the microcontroller and listen for incoming commands.

4. Configuring the SSH Client for Android On a smartphone or tablet, an Android SSH client (like JuiceSSH) must be installed in order to enable remote control. The configuration consists of:
getting the notice board system to connect via SSH.
setting up the client to transmit messages that will be shown on the LED board.

SYSTEM TESTING
After assembling the hardware, programming the microcontroller, and configuring both the Wi-Fi module and SSH client, the system undergoes a **testing phase** to verify functionality. This includes:

- Sending **commands and messages remotely**.
- Ensuring that messages are correctly displayed on the **P10 LED display**.

DEPLOYMENT OF THE SYSTEM
Once testing is successful, the system is deployed at the chosen location. This step involves:

- **Mounting** the **P10 LED display** securely.
- Connecting the display to the **circuit and power source**.
- Ensuring the **Wi-Fi module** is properly linked to the local network.
- Conducting a **final verification** to confirm stable operation and reliability.

Conclusion
An IoT-based wireless notice board offers a cutting-edge, effective, and user-friendly way to disseminate information in real time. This method eliminates the need for manual interventions by utilizing internet access to enable remote message updates through a web browser or mobile application. This project provides a portable, affordable, and scalable substitute for conventional notice boards, improving communication in workplaces, public areas, schools, and institutions. High visibility, real-time updates, and user-friendliness are guaranteed by the use of LED screens and wireless technology. Further enhancing the system's adaptability and accessibility is its text extraction feature, which enables media messages to be transformed into readable formats. This smart notice board is a very useful solution for a variety of real-world applications since it can be operated by a single user without the need for a centralized system. In summary, the IoT-enabled wireless notice board offers a smooth, automated, and efficient way to broadcast information in real-time, marking a substantial advancement in smart communication systems.

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