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SMART NOTICE BOARD

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ABSTRACT

A notice board is an essential component of every public space, including parks, train stations, and bus stops. However, it takes a lot of work to send out different alerts every day. The advanced notice board is the subject of this project. It offers an SMS-based notice board that uses the widely utilized GSM to enable message display on the noticeboard via a user's mobile phone. Its functioning is based on an assembly language-programmed microcontroller, the AT89c52. AT instructions are used to connect a SIM300 GSM modem with a SIM card to the microcontroller's ports. When an SMS is sent from a mobile phone using a registered number, the SIM300 GSM modem at the recipient's end receives it. The SIM300 and microcontroller are properly interfaced. So, the microcontroller receives the message. It is furthermore shown on an electronic notice board that has an LCD display connected to a microprocessor that is supplied by a controlled mains power source. Our real-time noticing experiment is this project.

Keywords: GSM MODEM SIM 300A, SMS Notice Board, LCD 16x4, Microcontroller At89c52, Cell Phone.

I. INTRODUCTION

The Smart Notice Board, which combines an OLED display, NODEMCU, and a wire-based networking system to provide a flexible and interactive solution, marks a major leap in digital communication and information display technologies. With the addition of remote administration features, customized content, and real-time updates, this creative concept completely reimagines the typical notice board.

The NODEMCU, which acts as the central processing unit and enables smooth connection between the information source and the OLED display, is the brains behind the Smart Notice Board. The board can accept and show current data from many digital inputs thanks to the NODEMCU's strong microcontroller and Wi-Fi capabilities. Because of this connectedness, users may remotely change material, guaranteeing that announcements, alerts, and other information are always up to date and relevant.

With its bright, clear images for messages, timetables, and other crucial information, the OLED display improves the notice board's use. Its high-resolution screen makes it easy to read even at a distance, which makes it perfect for busy places where prompt and effective communication is crucial. To meet a range of informative demands, the user-friendly display interface also supports a number of forms, including text, photos, and graphics.

By combining these technologies, a Smart Notice Board is created that is interactive and user-friendly in addition to increasing the effectiveness of information distribution. The OLED display's excellent visual output in conjunction with the capability to control and update material remotely turns the conventional notice board into a dynamic instrument for communication. This development is a flexible and useful addition to any information-sharing system as it enables a broad variety of applications, from public areas and community centers to corporate offices and educational institutions.

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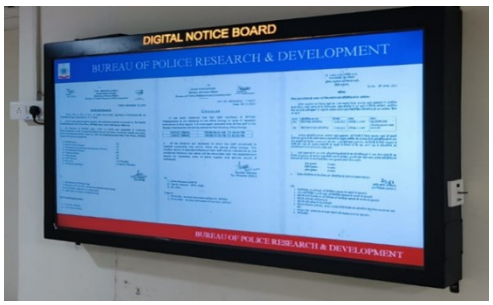

Figure.1: Smart Notice Board

1.1: Problem Statement:

In the realm of digital communication and information dissemination, traditional notice boards have proven inadequate in meeting the dynamic needs of modern environments. These conventional boards often rely on static, manually updated content, which fails to address the demand for real-time information updates and remote management. The limitations of existing notice boards become increasingly apparent in settings such as educational institutions, corporate offices, and public spaces, where timely and accurate information dissemination is crucial. Users face challenges with outdated information, inefficiencies in manual updating processes, and a lack of interactive features.

To bridge this gap, there is a need for a Smart Notice Board that integrates advanced technology to enhance the effectiveness and versatility of information display. The problem at hand is the absence of an interactive, digital solution capable of providing real-time updates, remote content management, and high-quality visual output. The Smart Notice Board is envisioned to address these issues by incorporating an OLED display, NODEMCU, and a robust connectivity system to create a modern, dynamic, and user-friendly information dissemination tool. This innovation aims to deliver a solution that meets the demands for efficient communication, ease of use, and adaptability in diverse environments, transforming the traditional notice board into a sophisticated digital communication platform.

Figure.2 : Problem faced before Smart Travel Card

1.2: Problem Scope:

The problem scope of the Smart Notice Board project encompasses the inadequacies of traditional notice boards in modern communication and information management. In contemporary settings such as educational institutions, corporate offices, and public spaces, conventional notice boards often rely on static and manually updated content, which fails to address the need for real-time information dissemination and remote management. The core issue lies in the inability of these traditional boards to provide dynamic updates, interactive features, and efficient content management.

The scope of the problem includes several key dimensions:

1. **Real-Time Information Updates**: Traditional notice boards lack the capability to provide real-time updates, leading to outdated information and reduced relevance.
2. **Manual Content Management**: The process of updating content manually on conventional boards is labor-intensive and prone to delays, affecting the efficiency of information distribution.
3. **Lack of Interactivity**: Conventional boards do not offer interactive features, limiting user engagement and the ability to access information in a user-friendly manner.

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4. **Visual and Functional Limitations**: The static nature of traditional notice boards restricts their functionality, failing to deliver high-quality, visually appealing information.
5. **Remote Access and Control**: The absence of remote management capabilities in traditional boards makes it challenging to update content from different locations, impacting the agility of information dissemination.

The Smart Notice Board project aims to address these limitations by integrating advanced technologies such as OLED displays, NODEMCU, and a connectivity system to create a digital, interactive, and user-friendly information dissemination tool. The scope includes developing a solution that enhances communication efficiency, allows for real-time updates, and provides a more engaging and accessible platform for information sharing. This innovative approach seeks to transform traditional notice boards into dynamic and technologically advanced tools that meet the evolving needs of modern environments.

1.3: Advantages of using Smart travel card

The Smart Notice Board offers several advantages over traditional notice boards, addressing key limitations and enhancing information management and communication:

1. **Real-Time Updates**: Enables immediate dissemination of information, ensuring that all displayed content is current and relevant.
2. **Remote Management**: Allows content to be updated and managed from a remote location, providing flexibility and convenience.
3. **Interactive Features**: Enhances user engagement by offering interactive elements such as touch or remote control options, allowing users to access and navigate information more effectively.
4. **Visual Appeal**: Utilizes OLED displays for clear, high-resolution visuals, improving readability and aesthetic appeal compared to traditional paper-based boards.
5. **Efficiency**: Reduces the time and effort required for content updates, streamlining information management and reducing manual labor.
6. **Environmental Benefits**: Minimizes paper usage and waste, contributing to a more sustainable and eco-friendly approach to information dissemination.
7. **Versatility**: Can be used in various settings, including educational institutions, corporate offices, and public spaces, adapting to different communication needs.

1.4 Proposed Solution:

The proposed solution for the Smart Notice Board involves the integration of advanced technologies to create a modern and efficient information display system. At the core of the solution is the NODEMCU, which acts as the central control unit, managing the communication between the OLED display and the content management system. This setup enables remote updates and real-time content management, allowing information to be swiftly and accurately conveyed.

The OLED display provides high-resolution visuals, enhancing readability and offering a visually appealing interface for dynamic content such as text, images, and multimedia. Wireless communication protocols facilitate seamless updates and remote control, while the content management system supports various content types and scheduling, making it easy to create and distribute information. Interactive features, such as touch capabilities or remote control options, further engage users, making information retrieval intuitive and user-friendly. Designed to be scalable and adaptable, the Smart Notice Board can be deployed across different environments, from

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educational institutions to corporate offices, addressing the limitations of traditional notice boards and significantly improving information dissemination and management.

1.5 Aim and Objectives

Aim:

The aim of the Smart Notice Board project is to revolutionise traditional information display systems by integrating advanced technologies to provide a modern, interactive, and efficient communication solution. By leveraging the NODEMCU for central control and the OLED display for high-resolution visuals, the project seeks to enhance the way information is presented and managed. The goal is to create a dynamic and user-friendly interface that allows for real-time updates, remote content management, and interactive features, addressing the limitations of conventional notice boards. This innovation aims to improve information dissemination across various environments, such as educational institutions, corporate settings, and public spaces, thereby streamlining communication, increasing engagement, and offering a more effective means of delivering and updating information.

Objectives:

The objectives of the Smart Notice Board project are:

1. **Enhance Information Display:** To utilize the OLED display to present clear, high-resolution information that is easily readable and visually engaging for users.
2. **Real-Time Updates:** To enable the NODEMCU to facilitate real-time content updates, allowing for immediate changes and ensuring that the displayed information is always current.
3. **Remote Management:** To develop a system that allows users to manage and update the content of the notice board remotely, using a user-friendly interface, thereby increasing convenience and efficiency.
4. **Interactive Features:** To incorporate interactive functionalities, such as touch or sensor-based inputs, to enhance user engagement and provide a more dynamic interaction with the notice board.
5. **Integration with Existing Systems:** To ensure compatibility and integration with existing information management systems, allowing for seamless data synchronization and content updates.
6. **Energy Efficiency:** To design the system with energy-efficient components and power management features, minimizing energy consumption while maintaining optimal performance.
7. **Scalability:** To create a scalable solution that can be adapted to various sizes and types of notice boards, from small informational displays to large digital signage systems.
8. **User-Friendly Interface:** To develop an intuitive interface for both content management and user interaction, ensuring ease of use for administrators and end-users alike.

II. LITERATURE SURVEY

The literature survey for the Smart Notice Board project presents a comprehensive exploration of existing research, technologies, and methodologies pertinent to digital display systems and IoT applications. The review begins with an examination of the current state of information display technologies, focusing on OLED displays. Studies reveal the advantages of OLED screens, including their high resolution, vibrant colors, and energy efficiency, which make them well-suited for dynamic and visually engaging content presentations. This technology's ability to deliver clear, readable information is pivotal

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for enhancing user engagement and interaction with digital notice boards.

The survey further investigates the integration of IoT platforms like NODEMCU into digital signage solutions. NODEMCU, an open-source IoT platform, is evaluated for its role in enabling remote management and real-time updates of display content. Research highlights the platform's versatility and ease of integration, which are crucial for developing a notice board that can be managed and updated remotely, thus providing a streamlined and efficient user experience.

In addition to hardware considerations, the survey delves into the communication protocols and data management strategies essential for seamless operation of digital notice boards. The efficiency of data transfer protocols, such as MQTT or HTTP, is explored to ensure that updates and content changes are transmitted reliably and swiftly. This aspect is critical for maintaining the relevance and accuracy of the information displayed.

The literature also addresses user interface design, emphasizing the importance of creating intuitive and user-friendly interactions. Studies on interface design principles offer insights into how users interact with digital signage systems, informing the development of a notice board that is both functional and accessible.

Finally, the survey reviews case studies and existing implementations of smart display systems in various contexts, such as public information systems and corporate environments. These examples provide practical insights into the challenges and successes of deploying similar technologies, offering valuable lessons for the Smart Notice Board project.

Overall, the literature survey provides a detailed understanding of the technologies and design principles relevant to the Smart Notice Board project, equipping the initiative with the knowledge needed to develop an innovative and effective solution for modern information display needs.

III. BLOCK DIAGRAM

The methodology for the Smart Notice Board project is meticulously designed to leverage insights from the literature survey into a practical and effective solution. This structured approach encompasses technology integration, user experience design, and a comprehensive testing and implementation strategy.

The first component of the methodology involves the integration of core technologies. The project employs an OLED display for its superior visual quality and energy efficiency, ensuring that information is presented clearly and attractively. This requires the development and calibration of the OLED screen to handle various types of content, from text to graphics, with high readability and contrast.

Simultaneously, the NODEMCU platform is utilized for its versatile IoT capabilities. The methodology includes configuring the NODEMCU to manage and control the OLED display, enabling real-time updates and remote management of content. This involves programming the NODEMCU to communicate effectively with the display, ensuring that data is accurately and swiftly transmitted.

The design phase emphasizes creating an intuitive and user-friendly interface. This involves developing software that allows for easy updating and management of the notice board's content. The interface should facilitate straightforward interactions for users, enabling them to update information or schedule content changes without requiring extensive technical knowledge.

Testing is a critical phase of the methodology. The Smart Notice Board system undergoes rigorous testing to ensure reliability and functionality. This includes validating the performance of the OLED display under various conditions, assessing the NODEMCU's communication capabilities, and

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evaluating the overall user experience. Feedback from initial tests is used to refine the system, addressing any issues related to display clarity, data transmission, or ease of use.

Finally, the implementation strategy involves deploying the Smart Notice Board in selected environments, such as educational institutions or corporate settings. This phase includes monitoring the system's performance, gathering user feedback, and making necessary adjustments to optimize functionality and user satisfaction. The goal is to ensure that the notice board meets the needs of its users effectively and adapts to real-world conditions.

Overall, the methodology for the Smart Notice Board project integrates cutting-edge technologies with user-centric design principles, resulting in a robust and innovative solution for dynamic information display.

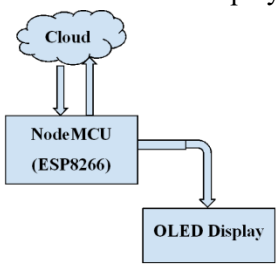

Figure .3: Block Diagram

IV. HARDWARE COMPONENTS

4.1 NodeMCU (ESP8266)

The NodeMCU ESP8266 is a powerful and versatile platform designed for Internet of Things (IoT) development. The ESP8266 is a cost-effective Wi-Fi microchip known for its capability to enable wireless communication in IoT applications. NodeMCU, on the other hand, is an open-source firmware and development kit that simplifies the process of prototyping and programming the ESP8266. With built-in Wi-Fi connectivity, the NodeMCU ESP8266 allows devices to connect to the internet wirelessly, making it suitable for a wide range of IoT projects. One notable feature is its support for the Lua scripting language, providing a high-level programming environment for developers. Additionally, it is compatible with the Arduino IDE, allowing those familiar with Arduino to use the NodeMCU platform. Equipped with General Purpose Input/Output (GPIO) pins, the ESP8266 facilitates interfacing with various electronic components, making it ideal for applications such as home automation and sensor networks. The NodeMCU ESP8266 has garnered significant community support, resulting in an extensive collection of libraries and documentation, making it a popular choice for rapid IoT prototyping and development.

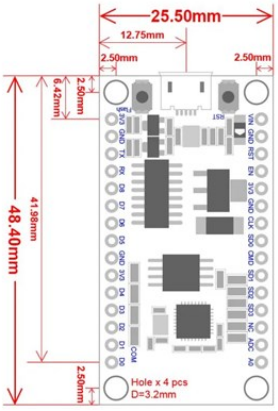

Figure .4: NodeMCU 2D View

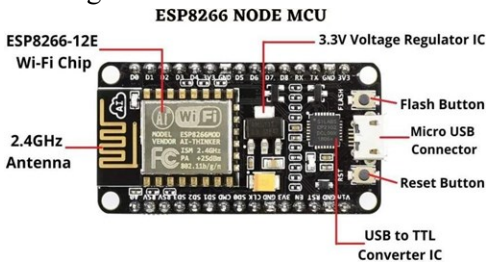

Figure 5: NodeMCU Parts

The NodeMCU ESP8266 development board typically has GPIO (General Purpose Input/Output) pins that can be used for various purposes, including interfacing with sensors, actuators, and other electronic components. Below is a common pinout configuration for the NodeMCU development board

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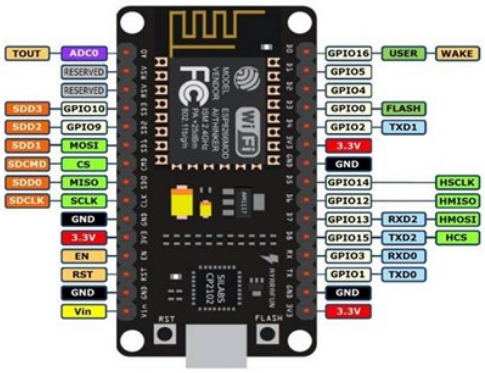

Figure 6: NodeMCU ESP8266 Pinout

4.2 OLED Display:

OLED displays are available in a range of sizes (such as 128×64, 128×32) and colors (such as white, blue, and dual-colour OLEDs). Some OLED displays have an I2C interface, while others have an SPI interface.

One thing they all have in common, however, is that at their core is a powerful single-chip CMOS OLED driver controller – SSD1306, which handles all RAM buffering, requiring very little work from your Arduino.

In this tutorial, we'll be using both I2C and SPI 0.96-inch 128x64 OLED displays. Don't worry if your module is a different size or color; the information on this page is still useful.

Figure .7: OLED Display

An OLED display, unlike a character LCD display, does not require a backlight because it generates its own light. This explains the display's high contrast, extremely wide viewing angle, and ability to display deep black levels. The absence of a backlight reduces power consumption significantly. The display uses about 20mA on average, though this varies depending on how much of the display is lit.

The SSD1306 controller operates at 1.65V to 3.3V, while the OLED panel requires a 7V to 15V supply voltage. All of these various power requirements are fulfilled by internal charge pump circuitry. This makes it possible to connect the display to an Arduino or any other 5V logic microcontroller without requiring a logic level converter.

OLED Display Module Pinout

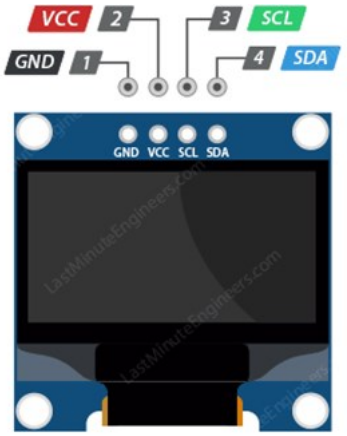

Figure .8: OLED Pinout

GND is the ground pin.

VCC is the power supply for the display, which we connect to the 5V pin on the Arduino.

SCL is a serial clock pin for the I2C interface.

SDA is a serial data pin for the I2C interface.

V. CONCLUSION

To the best of our knowledge, the "Smart Notice Board" project has been successfully finished and tested, including troubleshooting. It has well-reasoned and justified blocks for each.The project is very marketable and cost-effective, and the readily accessible and straightforward components are simply sourced from the market. We think that our concept has the potential to be commercially successful and used in locations like universities, banks, train stations, etc.Ultimately, we draw the conclusion that, as this project is built on the extensively utilized GSM technology, there is still room for growth and study in the future and that it may be adjusted depending on its intended purpose.

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