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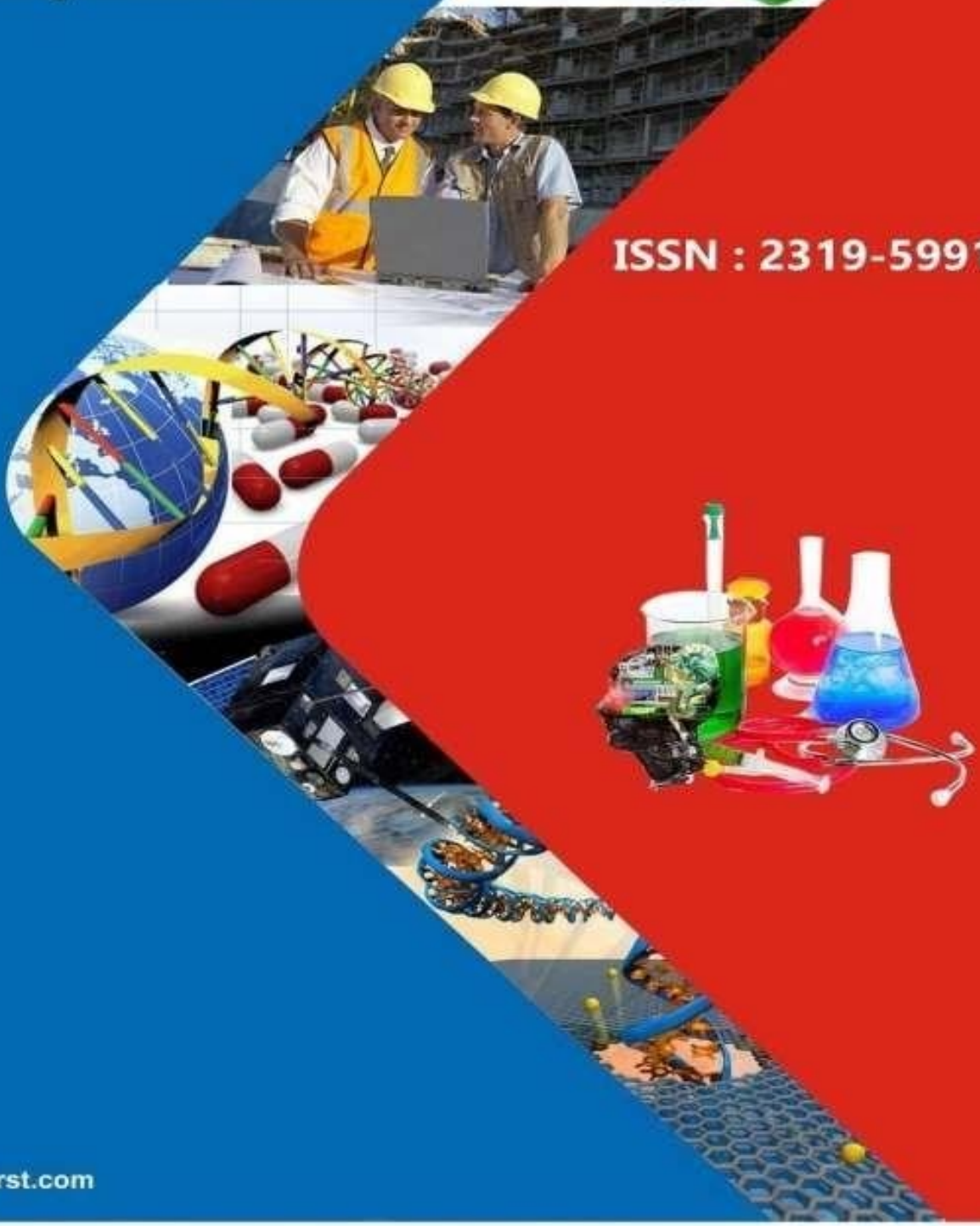

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IOT ENABLED REAL-TIME DIGITAL CAMPUS NOTICE BOARD

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ABSTRACT

The IoT-Enabled Real-Time Digital Campus Notice Board is an innovative solution designed to modernize communication within campuses by leveraging IoT technology and real-time data display. The system is built around the Raspberry Pi zero W microcontroller and integrates multiple components, including an RTC module, DHT11 sensor, and an LED display, to provide a comprehensive and user-friendly experience.The system displays the current time using the RTC module, while the DHT11 sensor monitors and displays real-time temperature and humidity levels on the LED screen. Messages and announcements are transmitted through an IoT-enabled Android application, ensuring that the notice board content is always up-to-date. Each new message sent via the app overrides the previous one, maintaining the relevance of displayed information.This digital notice board offers a dynamic and efficient communication platform for schools, colleges, and other institutions. By integrating IoT connectivity, it eliminates the need for manual updates and provides a centralized way to manage and disseminate information. The combination of real-time environmental data and a user-friendly interface makes this system a versatile and valuable tool for modern campuses.

1. INTRODUCTION

In the contemporary world of overwhelming connection, we are so focused on the ease of accessing information. By the virtue of the internet or newspapers, we love keeping ourselves updated and informed. Notice boards are the primary thing in any institutions or public utility places like bus stations, railway stations, colleges, malls etc. Now a days, papers or wired notice board displays serves for the purpose. A specific person is assigned the task for pasting the notice.

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This not only calls in for extra labour charges as well as consumes a whole lot of time. In the current era where ease of access has always been at the top place in the catalogue of development, need to deliver the message faster is very crucial. This project enables us to communicate without even having someone's contact details or neither needed to have any account with the system hence is better than any online services available till date. The range it provides is its biggest capability. With routers as repeaters, it can service an entire organization located at one place. With furthermore work removing the complexity 'n' no. of classrooms can be delivered with the separate messages to be displayed by having all the tabs representing the classes in only one app. Hence this paper is based on an ingenious rather an exhilarating manner of directing messages to the peers or common folks by employing a wireless electronic display board which is synchronized using an android app. This is a project that displays messages that the user desires, on an LED.

The Display consists of 256 LED lights, sequentially arranged in 8 rows and 32 columns (8*32). Apart from the display, the project consists of a Node MCU controller which helps the system to connect to the Wi-Fi. This system makes use of Google Assistant to accept speech inputs from user, through user's Android smartphone. User needs to login into their Google account. A USB cable acts as the power cable for the system. The speech input is converted into a text display in an alphanumeric format which is predefined.

The remain static, based on the size of display and length of message. This project can widely use in offices, schools, educational institutions as well as government and corporate offices to display important notices and messages. This can prove to help users save a lot of time as against the use of traditional pin and paper notice display.

The Digital Campus Notice Board Android app, empowered by IoT technology, revolutionizes communication within educational institutions. This innovative app seamlessly integrates Internet of Things capabilities to provide real-time updates, event notifications, and important announcements. By leveraging IoT, the app ensures efficient and instant dissemination of information, fostering enhanced connectivity and engagement among students, faculty, and staff. From emergency alerts to academic notices, the app transforms traditional campus communication into a dynamic and interactive experience, contributing to a more connected and informed educational community. In an era defined by technological advancements, educational institutions are embracing innovation to streamline communication and enhance campus life. One such innovation is the Digital Campus Notice Board Android app empowered by IoT (Internet of Things) technology, which revolutionizes the traditional campus bulletin board experience. By leveraging IoT sensors, devices, and connectivity, this app offers a dynamic platform for disseminating information, facilitating engagement, and improving overall campus communication.

The integration of IoT technology into the Digital Campus Notice Board app enables real-time updates and notifications, ensuring that students, faculty, and staff receive timely information about events,

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announcements, schedules, and emergencies. Unlike traditional notice boards that require manual updates, this app automates the process, allowing administrators to remotely manage and distribute content with ease.With IoT-enabled sensors strategically placed across the campus, the app can provide location-specific information and alerts, such as room changes, maintenance updates, or campus security advisories. This granular level of communication enhances situational awareness and promotes a safer environment for everyone on campus.

Multimedia support is another key feature of the Digital Campus Notice Board app, allowing users to access a variety of content formats, including text, images, videos, and audio recordings. This versatility enables administrators to deliver engaging and visually appealing messages, capturing the attention of the campus community and effectively conveying important information.

Personalized user access is another advantage offered by the app, allowing students, faculty, and staff to customize their notification preferences based on their interests and roles within the institution. Whether it's filtering announcements by department, subscribing to specific event categories, or setting notification priorities, users have the flexibility to tailor their experience according to their needs.

The app's user-friendly interface makes it easy for individuals to navigate and interact with the digital notice board, whether they're accessing it from their smartphones, tablets, or desktop computers. Intuitive features such as search functionality, bookmarking, and calendar integration further enhance the user experience, making it effortless to stay informed and engaged with campus life.

Moreover, the Digital Campus Notice Board app fosters a sense of community by providing opportunities for collaboration and participation. Through features like event RSVPs, discussion forums, and feedback mechanisms, users can actively engage with campus events, initiatives, and policies, contributing to a more inclusive and vibrant campus culture.

From an administrative perspective, the app offers valuable insights and analytics, allowing stakeholders to track engagement metrics, measure the effectiveness of communication strategies, and make data-driven decisions to enhance campus operations. This data-driven approach enables institutions to continually optimize their communication channels and improve the overall student experience.

Furthermore, the scalability and flexibility of the Digital Campus Notice Board app make it suitable for institutions of all sizes, from small colleges to large universities. Whether it's a single-campus deployment or a multi-campus network, the app's modular architecture can accommodate diverse needs and infrastructures, ensuring seamless integration and scalability as the institution grows.

The Digital Campus Notice Board Android app empowered by IoT technology represents a significant leap forward in campus communication and engagement. By harnessing the power of IoT sensors, devices, and connectivity, this innovative platform offers a dynamic and interactive solution for sharing information, fostering community, and enriching the campus experience for all stakeholders.

2. LITERATURE SURVEY

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PRASAD P.KULKARNI(2018): The paper authored by Prasad P. Kulkarni titled "Wireless Digital Electronic Notice Board Using WiFi" was published in the International Journal of Innovations in Engineering Research and Technology (IJIERT) in April 2018. The focus of the research is on creating a wireless digital notice board system utilizing WiFi technology. The system likely aims to provide a modern and efficient way of displaying electronic notices. The use of WiFi suggests a wireless connectivity feature, allowing seamless communication and updates. Given the publication in a reputable engineering journal, it implies a scholarly approach to the development of the notice board. The paper may cover aspects such as the design, implementation, and potential applications of the wireless electronic notice board. Readers can expect insights into the technical details, innovations, and contributions of the proposed system within the context of engineering research and technology.[1]

DESHPANDE ARTI PRAKASH(2015): The paper authored by Deshpande Arti Prakash titled "Electronics Notice Board Using Arduino" was published in the International Journal of Advance Research, Ideas, and Innovations in Technology. The publication, with ISSN 2454-132X, is from Volume 04, Issue 03. Notably, the paper highlights an electronics notice board system implemented with Arduino technology. Arduino is a popular open-source electronics platform known for its versatility in creating various electronic projects. The emphasis on an "electronics notice board" implies a digital and dynamic display system. The publication in a journal that values advance research and ideas suggests a focus on innovation and technological advancements. The specified impact factor of 4.295 indicates the perceived significance and influence of the research within the academic community. Readers can anticipate insights into the design, functionality, and potential applications of the Arduino-based electronic notice board as well as its contribution to technological advancements in the field.[2]

DESHMUKH V.R. and KARANDE N.D(2011): The collaborative work of Deshmukh V. R. and Karande N.D. titled "LED Scrolling Display Using Android Phone" is featured in the International Journal for Scientific Research & Development (IJSRD), with ISSN (online) 2321-0613, as part of Volume 04, Issue 01. The paper likely explores the development of a scrolling LED display system controlled by an Android phone. This implies a user-friendly interface for managing the LED display through a mobile device. The integration of LED technology suggests a visually dynamic and attention-catching display. Published in IJSRD, the research emphasizes a scientific and developmental approach, indicating a scholarly contribution to the field. Given the specified volume and issue, the paper may delve into technical details, design considerations, and potential applications of the LED scrolling display. Readers can expect insights into the practical implementation and innovative aspects of using an Android phone as a control interface for the LED scrolling display system.[3]

T.ELIZABETH DARRYL JACOB(2017);Authored by T. Elizabeth Darryl Jacob, the paper titled "Real-Time DigiNotice Board System using IoT" is featured in the International Journal of

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Engineering Research & Technology (IJERT) and is part of the RTICCT - 2017 Conference Proceedings. The focus of this research is likely on developing a digital notice board system with real-time capabilities, incorporating the Internet of Things (IoT) technology. The mention of IoT suggests a networked and connected system, enabling seamless communication and updates. Being part of a conference proceedings indicates a presentation or discussion of the research at a recognized event. Published in IJERT, the paper aligns with engineering research and technology, suggesting a technical and innovative approach to the development of the DigiNotice Board System. Readers can expect insights into the real-time aspects, IoT integration, and potential applications of the system within the context of the conference's themes and discussions.[4]

BHUPESH ANEJA, CHHAVI SRIVASTAV,KARTAVYA FARASHWAL, AJEY ADITYA(2016):
The collaborative work of Bhupesh Aneja, Chhavi Srivastav, Kartavya Farashwal, and Ajey Aditya titled "Wireless Electronic Display Board Using GSM Technology" is published in the International Journal of Advanced Technology in Engineering and Science. This paper, part of Volume 4, Issue 3, dated March 2016, likely explores the development of a wireless electronic display board employing GSM (Global System for Mobile Communications) technology. The
emphasis on "wireless" implies a connectivity solution that doesn't rely on physical cables. The incorporation of GSM technology suggests a mobile communication infrastructure, enabling remote control and updates for the display board. Being published in a journal focused on advanced technology indicates a technologically innovative approach. Readers can anticipate insights into the design, functionality, and potential applications of the wireless electronic display board, with specific attention to the role of GSM technology. The publication date situates the research within the technological landscape of 2016, providing historical context for advancements in wireless display systems.[5]

ANURADHA MUJUMDAR, VAISHALI NIRANJANE & DEEPIKA SAGNE, (2014): The collaborative work of Anuradha Mujumdar, Vaishali Niranjane, and Deepika Sagne, titled "Scrolling LED display using wireless transmission," is published in the International Journal of Engineering Development and Research. The paper, identified by ISSN 23219939, is part of Volume 2, Issue 1, and spans pages 475-478. The research likely focuses on the development of a scrolling LED display system with wireless transmission capabilities. The use of wireless technology implies a cable-free communication approach, enhancing flexibility in display placement. Published in an engineering development and research journal, the work signifies a contribution to the scholarly understanding and advancement of LED display systems. Readers can expect insights into the technical aspects, design considerations, and potential applications of the scrolling LED display with a specific emphasis on wireless transmission. The specified page range provides a reference for those seeking detailed information within the publication.[6]

GOWRISHANKAR KASILINGAM, MRITHA RAMALINGAM AND CHANDRA SEKAR (2014): The

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collaborative work by Gowrishankar Kasilingam, Mritha Ramalingam, and Chandra Sekar, titled "A Survey of Light Emitting Diode (LED) Display Board," is featured in the Indian Journal of Science and Technology. This publication, from February 2014, is part of Volume 7, Issue 2, spanning pages 185-188. The paper is likely a survey, indicating a comprehensive examination and analysis of the existing state of LED display boards. Given the focus on LED technology, the survey may cover various aspects such as design variations, technological advancements, and applications of LED display boards. Published in a
reputable journal, the work signifies a scholarly contribution to the understanding and assessment of LED display technology. Readers can expect insights into trends, challenges, and potential areas of improvement in the field of LED display boards based on the survey conducted by the authors. The publication date provides a historical context for the state of LED display technology in 2014.[7]

R.RANADHEER REDDY, N PRASHANTH, G. INDIRA, M SHARADA(2018): The collaborative work of R. Ranadheer Reddy, N. Prashanth, G. Indira, and M. Sharada, titled "Electronic Scrolling Display Using Arduino Board," is published in the International Journal of Engineering Research in Electrical and Electronic Engineering (IJEREEE). The paper, part of Volume 4, Issue 2, dated February 2018, likely explores the development of an electronic scrolling display system with the utilization of Arduino technology. Arduino is a versatile open-source electronics platform known for its ease of use in various applications. The emphasis on "scrolling display" suggests a dynamic visual output. Published in an engineering research journal, the work signifies a contribution to the understanding and application of electronic scrolling displays. Readers can anticipate insights into the technical details, design considerations, and potential applications of the system based on Arduino technology. The publication date situates the research within the technological landscape of 2018, providing context for advancements in electronic scrolling display systems.[8]

ANURADHA MUJUMDAR, VAISHALI NIRANJANE & DEEPIKA SAGNE, (2014): The collaborative work by Anuradha Mujumdar, Vaishali Niranjane, and Deepika Sagne, titled "Scrolling LED display using wireless transmission," was published in the International Journal of Engineering Development and Research. The paper, with ISSN 23219939, is part of Volume 2, Issue 1, spanning pages 475-478. The research likely focuses on the development of a scrolling LED display system incorporating wireless transmission technology, enhancing flexibility and convenience in deployment. Published in an engineering development and research journal, the work indicates a contribution to the scholarly understanding and advancement of LED display systems. Readers can expect insights into the technical aspects, design considerations, and potential applications of the scrolling LED display, particularly with a focus on wireless transmission. The specified page range
provides a reference for those seeking detailed information within the publication. The work adds to the growing body of knowledge in the field of LED display systems and wireless communication.[9]

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E.FERRO and F.POTORTI(2005): The collaborative work by E. Ferro and F. Potorti, titled "Bluetooth and Wi-Fi wireless protocols: a survey and comparison," was published in the IEEE Wireless Communications journal, Volume 12, Number 1, in February 2005. The paper likely provides a comprehensive survey and comparison of Bluetooth and Wi-Fi wireless protocols, both of which are widely used for short-range and local wireless communication. The publication in IEEE signifies a rigorous and scholarly approach to the exploration of these wireless technologies. Readers can anticipate insights into the technical features, advantages, and limitations of Bluetooth and Wi-Fi, offering a valuable resource for researchers, engineers, and professionals in the wireless communications field. The specified volume, issue, and page numbers provide a clear reference for those interested in accessing detailed information within the publication, which contributes to the understanding of wireless communication protocols in the early 2000s.[10]

3. PROPOSED SYSTEMS

The proposed system aims to develop a smart IoT-based LED notice board using the ESP32 microcontroller, enabling real-time wireless communication for displaying messages remotely. This system integrates Wi-Fi connectivity, allowing users to update notices via an IoT app, eliminating the need for physical intervention. Additionally, environmental parameters such as temperature and humidity are monitored using dedicated sensors, and real-time clock (RTC) functionality ensures accurate time-based scheduling of messages. This approach enhances efficiency, accessibility, and automation in information dissemination, making it ideal for educational institutions, offices.

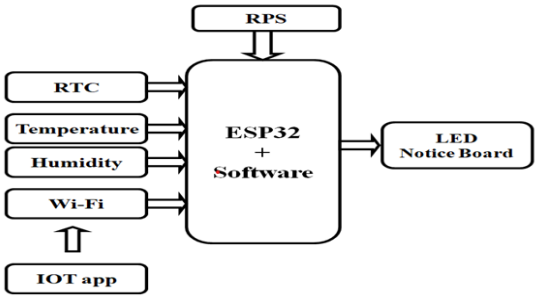

Fig 1:Block Diagram

The block diagram represents the architecture of the proposed system, illustrating how different components interact with the ESP32 controller. The power supply unit (RPS) provides stable voltage to the system. The ESP32 serves as the core processing unit, receiving input from an IoT application via Wi-Fi for remote message updates. Environmental data is collected through temperature and humidity sensors, while RTC ensures time-based operations. The processed information is displayed on an LED notice board, providing real-time updates. This structure design enhances the functionality, automation, and accessibility of the notice board system.

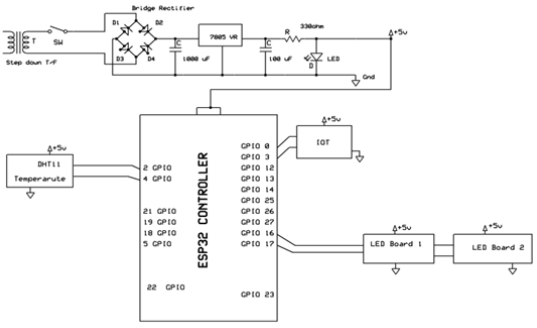

Fig2: Schematic Diagram

The circuit diagram represents an IoT-based LED notice board system using the

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ESP32 microcontroller. The system is powered by a step-down transformer, which converts AC voltage to a lower DC voltage, regulated by a 7805 voltage regulator to provide a stable 5V supply. A bridge rectifier (D1-D4) and capacitor filters are used to smoothen the DC output. The ESP32 microcontroller acts as the central processing unit, interfacing with different components to control and display information on the LED boards.

Pin Configuration:

- **Power Supply (RPS):** Converts AC voltage to regulated 5V DC.
- **DHT11 (Temperature Sensor):** Connected to GPIO 2 and GPIO 4 for temperature data.
- **IoT Module:** Connected to GPIO 16 and GPIO 17 for internet-based communication.
- **LED Board 1:** Connected to GPIO 26 for displaying messages.
- **LED Board 2:** Connected to GPIO 27, receiving data from LED Board 1 for extended display.
- **ESP32 GPIOs:** GPIO 0, GPIO 3, GPIO 12, GPIO 13, GPIO 14, GPIO 25

4. RESULTS

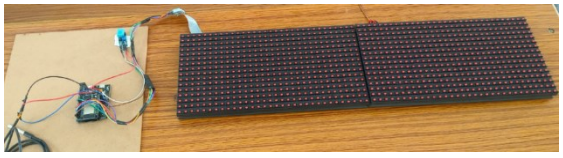

Fig:4.1 Output Result

Real-Time Display: The system shows current date and time for better visibility and relevance.

Fig:4.2 Date is Displayed

Fig: 4.3 Time is Displayed

Environmental Monitoring: The system displays the current temperature and humidity for real-time awareness.

Fig: 4.4 Temperature is Displayed

Fig:4.5 Humidity is Displayed

Remote Message Update: The system displays messages entered through the mobile phone in real time.

Fig: 4.6 Remote Message Updates are displayed

5. CONCLUSION

The project successfully demonstrates an IoT-based LED notice board system using the ESP32 microcontroller. By integrating temperature sensing and remote communication via IoT, the system provides an efficient and real-time solution for displaying messages on LED boards. The ESP32 acts as the central unit,

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interfacing with sensors and display modules, while the IoT connectivity allows seamless updates from remote devices. The power supply circuit ensures stable operation, making the system reliable for various applications, including public announcements, smart classrooms, and industrial notifications. Overall, the project enhances traditional notice board systems by enabling wireless and automated message updates, improving efficiency and accessibility.

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