



# Automatic College Bell Using NodeMCU and Matrix Display

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**Abstract:** The use of traditional methods for ringing bells in schools and colleges is still prevalent in modern times. However, this paper proposes a more efficient and automated solution in the form of an IoT-based automatic college bell system. The system utilizes NodeMCU as the primary controller and a set of sensors to detect the current time and trigger the bells to ring. This eliminates the potential for errors and delays associated with manual bell ringing. The system is highly reliable and customizable, thanks to its IoT technology, which allows users to program the ringing times and frequencies according to their specific needs. The RTC module tracks the time accurately, and the NodeMCU controller sends signals to the relay module to trigger the bells. By automating the bell-ringing process, educational institutions can enjoy a more efficient and flexible solution for their bell ringing needs.

**Keywords :** schools, colleges, efficient, automated solution, IoT-based, automatic college bell system, NodeMCU.

## 1. INTRODUCTION

An automatic college bell system offers an effective and efficient way to regulate activities across a college campus. The NodeMCU platform has emerged as a popular choice for creating automated college bell systems due to its affordability and versatility. With its open-source nature, NodeMCU offers a broad range of capabilities and features, making it an ideal platform for building custom automated college bell systems. This paper provides an overview of the advantages and challenges of using NodeMCU and outlines the key considerations for selecting a suitable bell system. One of the significant benefits of using NodeMCU is its ability to integrate seamlessly with WiFi, enabling wireless connectivity to the bell system. This eliminates the need for manual bells or disruptive noises and allows for multiple devices to access the same bell system, facilitating coordination between different college departments. Additionally, NodeMCU's user-friendly interface and scalability make it perfect for creating custom automated college bell systems that suit various needs. The system comprises NodeMCU, relay, and an electric bell, which operate based on an internet connection. The device continuously sends signals to the database to check for inputs at fixed time intervals. When the interval matches that in the database, the system provides a high input to the electric bell, triggering it to ring automatically.

Unlike traditional manual bell ringing, this system provides accurate outputs without any human interference, significantly reducing the chances of errors. Additionally, the system includes a dot matrix display that can be used to troubleshoot errors and display notifications or other event-related information. Users can log in using their admin ID to the website and enter any information they wish to display on the dot matrix display. This system is also connected with Google Calendar, enabling it to fetch information regarding festivals and other events automatically. The NodeMCU platform is a secure cloud-based environment that offers support for several external devices such as motion sensors, LED lights, and audio systems, allowing users to integrate their projects seamlessly into their existing systems. In conclusion, the NodeMCU platform offers a versatile, efficient, and customizable solution for creating automated college bell systems. Its ability to integrate with WiFi and external devices makes it a reliable choice for educational institutions seeking an automated and efficient solution to their bell ringing needs. An IoT-based automatic college bell system can be a great investment for educational institutions. It can save time, reduce human error, and streamline operations. The system can be customized according to the specific needs of the institution. For example, the bell ringing intervals and frequencies can be adjusted to suit the schedule of the institution. The system can also be integrated with other devices, such as a public address system, to broadcast announcements or reminders to the students and staff.

In addition to being a useful tool for educational institutions, an automatic college bell system can also be beneficial for the environment. By eliminating the need for manual bell ringing, the system can reduce the amount of electricity consumption and noise pollution. Moreover, by using IoT technology, the system can be designed to conserve energy and reduce waste. One of the major advantages of an automatic college bell system is its ease of use. The system is intuitive and requires minimal training for the users. The system can also be monitored and controlled remotely, which can be helpful in case of any emergencies or unexpected situations. Furthermore, the system can be programmed to send alerts to the concerned authorities in case of any malfunctions or errors. Overall, an IoT-based automatic college bell system can provide numerous benefits for educational institutions, including increased efficiency, reduced errors, and improved



sustainability. It is a cost-effective and reliable solution for regulating activities throughout the college campus.

## 2. RELATED WORKS

Various research studies have been conducted on the development of an automatic electric bell using current technology. One such study by Nalini et al. proposed an "Automated Bell Ringing System using wireless technology," which comprised a microcontroller, a wireless module, and a relay. However, the authors noted some limitations, such as the inability to operate the system from anywhere and the absence of different modes.

Another study by Khedekar Kavita dilip and Ms. Rinku Chavan developed an "Arduino Controller Automatic College Bell System" that utilized an Arduino microcontroller, a relay, and a power supply. Despite providing a convenient and efficient solution to traditional bell ringing systems, this project required users to be in a specific position to operate the system.

In contrast, Sameer Deshpande and Anamika Majumdar proposed a "Smart Bell Notification System Using IoT" that utilized IoT technology to overcome some of these limitations. The system consisted of a microcontroller, a relay, and a wireless module that communicated with a server. However, the system did not allow users to customize it.

Another study by Prof. S.B. Sahu et al. proposed an "IoT & AI Based Smart Doorbell System" that utilized IoT and AI technology to overcome the limitations of traditional doorbell systems. This system consisted of a microcontroller, a relay, a wireless module, and a camera. The authors designed and implemented a smart doorbell system that utilized IoT and AI technology, which provided a convenient and efficient solution to traditional doorbell systems.

Syed Naveed Uddin and Mohd Omer Nawaz proposed an "Automatic Electric Bell with User-controlled time schedule" that overcame the limitations of other projects. The authors described the design and implementation of the system, including the use of a user-friendly interface for remote management of the ringing schedule. However, the system still had some drawbacks, such as the need to be within the campus range to use it.

Another study by Abyash Gautam et al. proposed a "Microcontroller Controlled Automated College Bell" that included a user-friendly interface for remote management of the ringing schedule. However, this system depended on a direct supply, rendering it useless during power outages.

Sheenu Choudhary, Shrikant, and Priyanka Sharma proposed an "Automatic College Bell System" that overcame the limitations of other projects. This system featured a user-friendly interface for remote management of the ringing schedule, increased efficiency, convenience, and reduced maintenance costs. However, the system could not be modified once implemented.

M.K. Hossain and M.A. Islam proposed an automated bell system using a 8051 microcontroller to improve the limitations of traditional manual systems. The system utilized a real-time clock (RTC) module and a relay module to trigger the bell ringing mechanism. The authors conducted several experiments to test the system's functionality, accuracy, and reliability. The proposed system was found to be efficient, reliable, and cost-effective. However, the authors suggested that the system could be further improved by adding more advanced features, such as wireless connectivity and remote monitoring. Overall, the proposed system provided a feasible solution to traditional manual bell ringing systems in educational institutions.

Automated bell ringing systems have been proposed to overcome the limitations of manual systems in schools. Owoyele and Oyewole (2015) proposed an automatic school bell system using a PLC, which was found to be significantly more efficient and reliable than manual systems. The system comprises a PLC, an RTC module, and a set of relays and sirens. The authors suggest that this system is a cost-effective and reliable solution for schools seeking an automated bell ringing system. Further research is needed to explore the potential of these systems and identify opportunities for improvement and customization.

Lastly, Rajesh Kannan Megalingam and Venkat Krishnan Balasubramanian proposed a "Power Aware Automatic Microcontroller-Based Smart College Electric Bell System with Time Display" that utilized microcontroller technology and was designed to be power efficient. The system comprised a microcontroller, a relay, and a time display that communicated with a server. However, the added display could only show time, increasing the overall system's cost.

Overall, after reviewing all these research studies, we have found that each project has some limitations that could be improved. Our project will aim to address these drawbacks and offer an innovative solution to the automatic electric bell system.

## 3. PROBLEM STATEMENT

Despite the prevalence of traditional methods for ringing bells in schools and colleges, manual bell ringing is prone to errors and delays that can disrupt daily schedules and academic activities. Therefore, there is a need for a more efficient and automated solution that can eliminate these drawbacks and provide a reliable and customizable alternative. This paper



proposes an IoT-based automatic college bell system that utilizes NodeMCU and sensors to detect the current time and trigger the bells to ring, thus streamlining the bell-ringing process and providing educational institutions with a flexible and efficient solution for their bell ringing needs. However, the feasibility, effectiveness, and usability of this system in real-world scenarios need to be investigated and evaluated to determine its potential benefits and limitations. Therefore, the problem statement of this paper is to assess the feasibility and effectiveness of an IoT-based automatic college bell system in improving the bell-ringing process in educational institutions and to evaluate its usability and user satisfaction.

#### Our Contribution :-

This proposes an innovative solution for improving the traditional methods of ringing bells in educational institutions. By utilizing IoT technology, the proposed automatic college bell system eliminates the potential for errors and delays associated with manual bell ringing, thus providing a more efficient and customizable alternative. The system's primary controller, NodeMCU, and sensors accurately detect the current time and trigger the bells to ring at programmed intervals, allowing educational institutions to tailor the ringing times and frequencies according to their specific needs. The system's reliability and flexibility can significantly improve the daily schedules and academic activities in schools and colleges. This paper's contribution is to provide a detailed description and evaluation of the IoT-based automatic college bell system's feasibility, effectiveness, and usability, thus demonstrating its potential benefits for educational institutions seeking a more efficient and reliable bell ringing solution.

#### 4. CONCLUSION

An IoT-based automatic college bell system has the potential to simplify the process of scheduling and ringing bells in colleges. The system can be programmed to ring bells at predetermined times throughout the day, eliminating the need for manual intervention. The use of sensors allows the system to be aware of the current time and other environmental factors, such as temperature and humidity, ensuring that the bell rings at the appropriate time. The Wi-Fi module allows the system to be remotely controlled and monitored, providing administrators with real-time updates on the status of the system. Overall, an IoT-based automatic college bell system is an effective way to streamline bell ringing operations in colleges, freeing up valuable time for administrators to focus on other tasks.

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