

Efficient Departmental Coordination: Real-Time Schedule Display using Arduino

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Abstract:- This project tackles the time-consuming task of schedule management for Heads of Departments (HODs) by developing a dynamic, automatic display system. Utilizing an Arduino microcontroller, an RTC module, and a P10 LED display (16x32), the system displays their one-week schedule in real-time, updating automatically each day. Bluetooth connectivity empowers adjustments to the schedule through an external device, offering flexibility and control. Utilizing a P10 LED display for clear visibility, it automatically updates with the real-time clock. Schedule information is embedded within the code for reliability, and the display format is divided for time and detailed schedule. Prioritizing eco-friendliness, it uses low-power components. This project aims to improve departmental communication, transparency, and efficiency by providing a clear and accessible platform for HOD schedule information.

Keywords:- P10 LED Display (16*32), Bluetooth, RTC (Real Time Clock), Schedule, Internet of Everything (IoE), Internet of Things (IoT).

I. INTRODUCTION

The paper presents a smart notice board system that utilizes IoT for updating notices and announcements. It discusses the architecture, components, and working of the system, highlighting its benefits in terms of efficiency and convenience. Traditional noticeboards use fancy displays like smart boards, TVs, or LED screens. These systems often require complex programming and expensive software running in the background to manage how information is shown. Our new system ditches the expensive backend and uses affordable internet-of-things devices instead. These devices are easy to program and portable, allowing them to connect to any display and receive messages from websites, phones, or other modern devices. [1]

Traditional notice boards require manual updates, and home automation systems often lack remote control capabilities. This system aims to address these limitations. The core component is a GSM module that

connects to a cellular network using a SIM card. This allows for remote communication via SMS. Newer technologies like WiFi or Bluetooth Low Energy (BLE) might offer advantages in terms of cost, power consumption, and data transfer speed compared to GSM.[2][10]

As technology advances, more and more things in our lives become digital and new ideas emerge. The Internet of Things (IoT) is a concept that determines the location of various objects in the environment, influenced by radio or telephone communication, each with the concept of communicating, creating new applications and achieving common goals. It also brings people, processes and information together. The concept of the Internet of Everything (IoE) is one of the key concepts of this revolutionary era [3].

This article presents a real-time control framework design centred on the RF24E1 remote transmission module. Using the nRF24E1 transmission module as its foundation, the AT89S52 chip manages the remote Driven show in this framework. Heightened security, low toll, and ease of use are some of this administration's benefits [4]

Public spaces frequently use LED displays because of their huge screens, excellent brightness, low power consumption, and other features. This article primarily presents a straightforward chip-based LED display control system with strong wireless transmission control capabilities. By using this control, the controller and the LED display are no longer electrically connected.[5]

There's a lot more colour available for light signals than for radio signals. LEDs, however, usually emit a wide range of colours at once. This is done on purpose to make them efficient and give good quality light. The downside is that these LEDs can't be switched on and off very quickly. Researchers are working on ways to improve this by studying how LEDs work and making adjustments to the system. This is important because LED technology is getting better at turning electricity into light, but the way they respond to signals is different from older LEDs. [9]

Android-based application programs are used for communication between Android devices and the display board. The Arduino Uno, a low-cost microcontroller board, may be configured to receive and display messages via Bluetooth or WiFi. The proposed system aims to reduce human effort, paper usage, and printing costs associated with manual notice board changes [6].

The paper reviews existing VLC systems using intensity modulation of LEDs for data transmission. Challenges identified include limitations in duplex communication (two-way data exchange), dimming control complexities, and the need for separate frames for transmitter identification and data transmission. An Optical Wireless Communication (IS-OWC) system based on image sensors is proposed by the authors. In this system, an optical communication image sensor (OCI) chip is used as the receiver in a camera, while LEDs are used as transmitters [7][8].

II. HARDWARE IMPLEMENTATION

A. System Architecture

The below block diagram shows we have used p10 led display, RTC (DS1307 real time clock), Arduino and Bluetooth module. The work of RTC is to show the date and time. Arduino is controller which is control the whole system and where we upload the code with help of USB cable for operates the Arduino 5V power supply is used. P10 led display used to show time, day, date, and schedule of HOD.

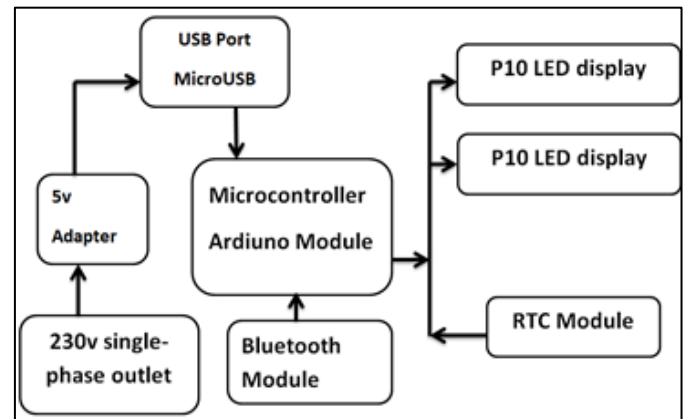


Fig 1 System's Design Block

B. The Working Model

Following a thorough demonstration of the selected component, the system initial working model was first tested on a breadboard testing platform.

➤ Arduino Uno

With its ATmega328P chip, which boasts 14 advanced Pins for input and output, 6 analog I/P pins, and a clock speed rate of 16 MHz, the Arduino Uno is a potentially versatile open-source microcontroller board. With its USB connection for programming and power, reset button, and compatibility with a plethora of shields, it serves as an ideal platform for prototyping interactive electronic projects.



Fig 2 Arduino UNO Development Board.

➤ RTC Module

Real-Time Clock Modules, or RTC modules for short, are tiny computer chips that maintain timekeeping even when the primary power supply is unplugged. The DS3107 is a popular RTC module, tiny but powerful. It keeps time & date precise using minimal power, even in power outages thanks to a backup battery. It communicates with microcontrollers via I2C, offering seconds, minutes, hours, date, month, year info – even leap year adjustments. Some modules include alarms and temperature sensors (DS3231). Great for projects needing accurate timekeeping across power cycles.

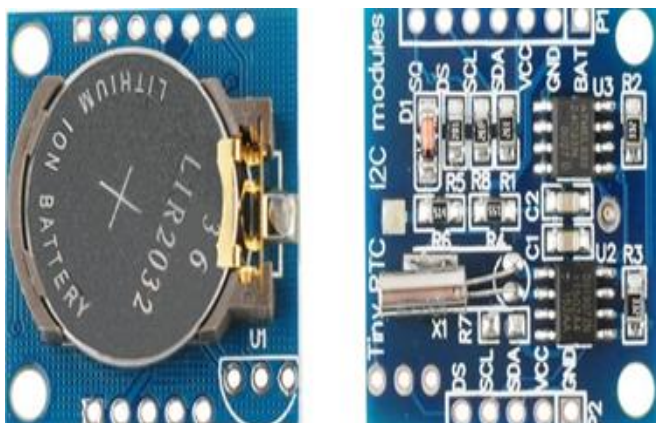


Fig 3 DS3107 RTC Module.

➤ Bluetooth

The HC-05 is a Bluetooth "serial port" chip, enabling wireless communication between microcontrollers and other Bluetooth devices. It's like a tiny translator, converting data for wireless transmission. Think of it as a Bluetooth walkie-talkie for your projects! It's known for its small size, low power use, and ease of use, making it popular for beginners and hobbyists. Send and receive data between your project and other Bluetooth devices. Typically ranges from a few meters to tens of meters.

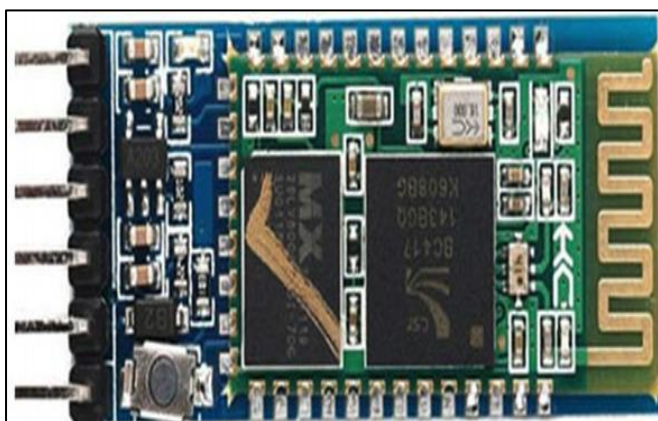


Fig 4 HC-05 Bluetooth Module

➤ P10 LED Matrix

P10 LED displays are large, outdoor displays made up of individual LEDs spaced 10 millimeters apart. They are bright, durable, and energy-efficient, making them popular for advertising, stadiums, and other large-scale applications.

The pixel pitch refers to the distance between the centers of two LEDs. In a P10 display, this distance is 10 millimeters. This means that a P10 display will have larger pixels compared to displays with a smaller pixel pitch, resulting in a lower resolution image. P10 displays are typically used for outdoor applications due to their larger pixel pitch. They are bright and easily readable from long distances, making them suitable for billboards, public signage, scoreboards, and other outdoor displays.

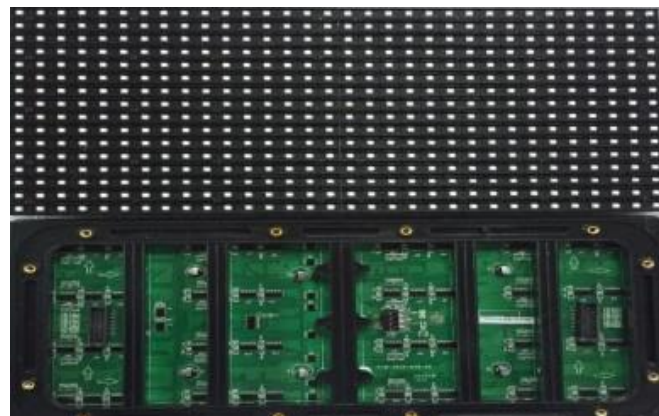


Fig 5 16*32 LED Display

III. SOFTWARE IMPLEMENTATION

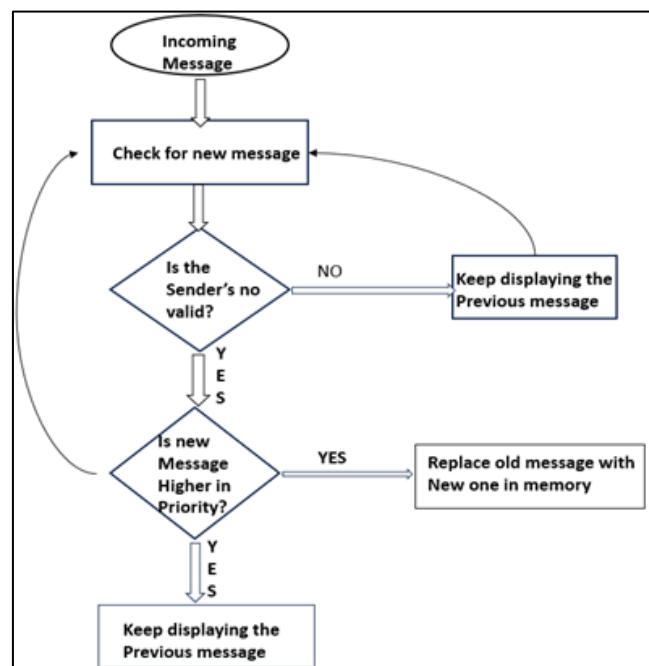


Fig 6 Functioning Diagram of the Arduino Code.

User can give the incoming message then condition will be checked for the message, is sender send new message or not. If sender send new message, then 2nd condition will get checked. We have to give higher priority for that message or not. If sender doesn't send the new message, then it will keep displaying previous message, and if the 1st condition gets true, it will check for 2nd condition. If 2nd condition is true, then it will replace older message with new message, and if condition gets false, it will keep displaying the previous message.

➤ *Connect the LED Matrix to Arduino:*

Identify the pin out of your LED matrix. Usually, there are pins for power, ground, data, and clock. Connect power and ground to the corresponding pins on the Arduino. Attach the clock and data pins to the Arduino's digital pins.

➤ *Install Required Libraries:*

Depending on the type of LED matrix, you may need to install specific libraries. Install the necessary libraries using the Arduino IDE.

➤ *Write the Arduino Code:*

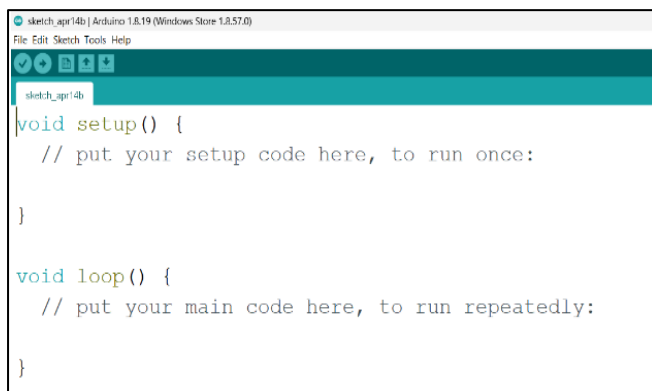


Fig 7 Main Window of the Program.

- Open the Arduino IDE and create a new sketch.
- Write code to initialize the LED matrix and control the scrolling display.
- Adjust the code according to your LED matrix and specific requirements.

➤ *Upload the Code to Arduino:*

- Use USB to connect your computer to the Arduino board.
- In the Arduino IDE, choose the appropriate board and port.
- Upload the code to the Arduino.

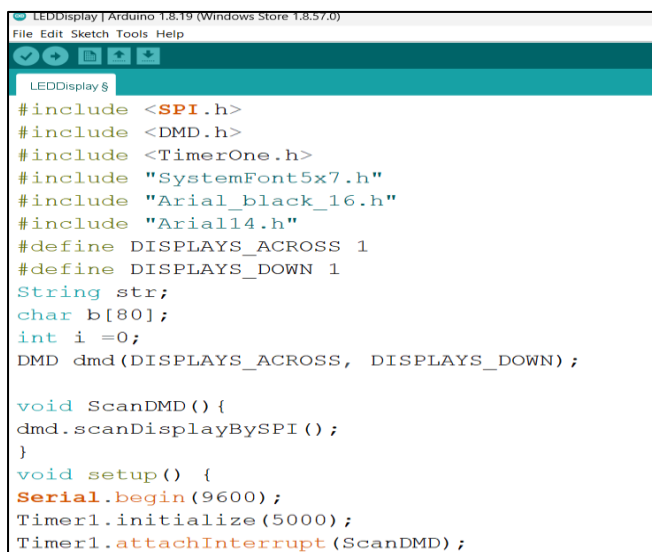


Fig 8 Code Compilation

➤ *Test the Scrolling Display:*

Once uploaded, your LED matrix should display scrolling text. Additionally, consider factors like power requirements, refresh rate, and display size when working with LED matrices.

IV. FINAL RESULT



Fig 9 Displaying Time, Date & Day

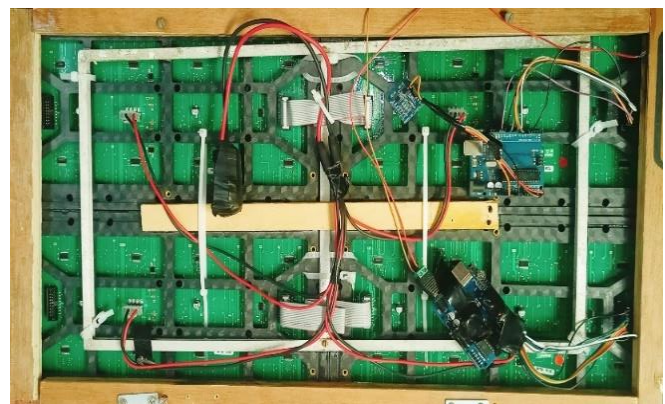


Fig 10 Connection Diagram

V. ADVANTAGES

- **Dynamic communication:** allows the hod to display dynamic messages, announcements, and updates relevant to the department or team.
- **Instant updates:** messages can be updated in real-time, ensuring that the latest information is always communicated effectively.
- **Enhanced visibility:** the scrolling led display grabs attention, ensuring that important messages are noticed promptly.
- **Customization:** messages can be customized to suit specific needs, whether it's departmental <https://plagiarismdetector.net/updates>, reminders, or motivational quotes.
- **Remote management:** the display can be controlled wirelessly, allowing the hod to update messages conveniently from their desk or even remotely.
- **Professional image:** enhances the professional image of the department by displaying information in a modern and eye-catching manner.
- **Efficient communication:** provides a centralized platform for communication, reducing the need for printed memos or emails.
- **Time-saving:** saves time compared to traditional methods of communication, such as printing and distributing paper notices.

- Environmental friendly: reduces paper wastage and promotes eco-friendly practices within the department.
- Versatility: can be used to display various types of content, including text, graphics, and animations, maximizing its utility.

VI. CONCLUSION

In conclusion, an electronic LED display board displaying Time, Date, Day and Events by wireless transmission through Bluetooth has been successful developed and has meet its objectives. The storage and retrieval of information is done by the Arduino mega microcontroller. This display board incorporates features such as user interaction, allowing users to select which view of the display to view .This strategy can be utilized exceptionally successfully in places such as chain eateries, where orders and uncommon rebates can be appeared at all branches at the same time, and at universities, where staff and understudies might be overhauled simultaneously and in genuine time. It is a reasonable and simple-to-use gadget that can be introduced at open transportation centers like transport and prepare stations, airplane terminals, and railroads. It may moreover be utilized on the side of the street for activity administration and crisis circumstances. Authorized people can upgrade the fabric and anticipate the delay that comes with utilizing paper for take note shows.

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