



International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Rolling LED Display

¹ Atharv Sutar, ² Atharva Talekar, ³ Shrivardhan Patil, ⁴ Sarthak Shete, ⁵ Dr. A.L. Renke

^{1 2 3 4 5} Department Of Electronics and Telecommunication Kolhapur Institute Of Technology College Of Engineering(Empowered autonomous), Kolhapur

ABSTRACT :

The Rolling LED Display is a low-cost, wireless, and user-friendly solution for displaying scrolling messages using WS2812B individually addressable LEDs. Traditional notice boards require manual updates and fail to attract attention effectively. Our project solves this by creating a digital notice board that can be updated in real-time using a Bluetooth connection, offering both flexibility and visual appeal.

The system is powered by an Arduino microcontroller, which receives message data from the HC-05 Bluetooth module. Once the message is received, the Arduino processes the text and controls the WS2812B LED strip to scroll the message across the display. These RGB LEDs allow for colorful and eye-catching visuals while being energy-efficient. Unlike traditional LED matrices, WS2812B does not require shift registers, as the data is passed serially from one LED to the next using a single data wire, simplifying both hardware and code.

This display can be used in schools, colleges, offices, malls, bus stops, and other public places where announcements and updates need to be made frequently. The system is compact, customizable, and supports wireless updates, making it suitable for a wide range of applications. The project also introduces students to important concepts in electronics, embedded systems, and wireless communication.

In conclusion, the Rolling LED Display offers a modern, affordable, and scalable alternative to traditional display boards. It provides an engaging way to share information, enhances visibility, and reduces manual work, all while offering a great hands-on learning experience in microcontroller-based system design.

INTRODUCTION

In our daily life, we often see notice boards in places like schools, colleges, offices, malls, bus stops, and railway stations. These boards are used to display important information such as event updates, exam timetables, advertisements, or public announcements. But most of the time, these notice boards are manual, meaning someone has to go and change the paper or update it physically, which takes time and effort.

To solve this problem, we decided to make a Rolling LED Display. This is a digital notice board that shows scrolling text using an LED matrix. It grabs attention easily and makes the information more visible and attractive. The best part is that we can change the message remotely using Bluetooth or other wireless methods, without touching the display board. This makes it faster and more convenient to update messages anytime we want.

We are using a microcontroller like Arduino to control the LED matrix, and shift registers to manage the display with fewer wires. The display shows messages by scrolling them from one side to the other, which makes it more eye-catching. This project is low-cost, energy-efficient, and easy to build, making it perfect for use in public places.

By doing this project, we are also learning how to work with electronics, coding, and real-world communication systems. It gives us practical knowledge about microcontrollers, LED displays, and wireless data transfer, which can be helpful for future projects and careers.

LITREATURE REVIEW:

The use of embedded systems in communication has led to advancements like the Public Addressing System (PAS). Traditional audio, video, and programmable signboards rely on wired connections, making them complex and difficult to expand. Integrating wireless communication, such as GSM, enhances flexibility and ease of use. LED scrolling message displays are increasingly popular in various applications, including shopping malls, public transport, and highways. This paper discusses the working of a GSM-based LED display system.

An LED scrolling display is a versatile system for sharing information, advertisements, and announcements. It enables real-time message updates and remote control via the internet. This project aims to develop a display system for college event updates, including exam schedules, interviews, seminars, and webinars. Additionally, it can be used in shopping malls, theaters, public transport, traffic signs, and other locations requiring frequent updates.

This project involves creating a low-cost LED scrolling display controlled via an Android phone using Bluetooth. It uses an advanced Arduino development board and an AVR microcontroller to enable wireless message display. In this component include the P10 LED module, Bluetooth module,

and an Android application for seamless communication and message updates.

Notice boards are one of the best ways to organize and display information. They are commonly used in schools, colleges, railway stations, and other public places. In this project, we propose a modern wireless notice board that allows The main goals of this project are to reduce costs, save energy, and improve service quality. Compared to traditional pin-up boards, a wireless electronic notice board is a faster and more efficient solution.

This project uses an Arduino uno to display scrolling text on a 32x16 LED dot matrix display module (P10 LED display). The system is built using LEDs arranged in a dot matrix pattern to show messages. It can be useful for different departments and faculties in institutions to share important information.

The LED display system is designed for colleges and universities to display important announcements throughout the day. Since it is GSM-based, it allows messages to be displayed quickly and flexibly.

This system can also be used in schools, hospitals, railway stations, parks, and other public places without causing any disturbance. It mainly consists of a receiver and a display unit, which can be programmed using Arduino IDE. The system receives messages through a serial port, converts them into the required format, and then displays them on the LED screen.

The LED display works as an electronic notice board, showing important information instantly, reducing delays. Its modular design makes it easy to expand, allowing more display units to be added at different locations within the campus as needed.

With advancements in technology, the way information is marketed and advertised has also improved. LED matrix display boards are now widely used to show advertisements and important notices. These display boards are commonly seen in educational institutes, workplaces, and public places to provide information such as public transport schedules.

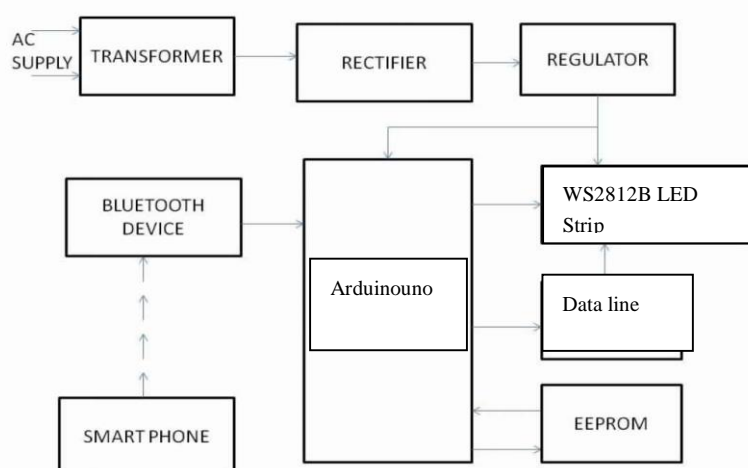
Today, people are used to getting information instantly. Older display boards relied on wired communication, but in this project, we use wireless technology (Wi-Fi) for better and more efficient communication.

RESEARCH QUESTIONS:

1. How can we design a low-cost and energy-efficient LED scrolling display system?
2. What components (microcontroller, LED matrix, communication modules) are best suited for building a simple scrolling display?
3. How can we make the message update process easier and faster using wireless communication like Bluetooth?
4. What is the best method to achieve smooth and clear scrolling of text on an LED matrix?
5. How does the use of shift registers improve the efficiency of LED control in the display system?
6. In what ways can the Rolling LED Display be more effective than traditional notice boards?
7. What are the limitations of using LED displays in outdoor environments, and how can we overcome them (e.g., brightness issues, power usage)?
8. How can we expand the system to display messages from multiple sources or users at the same time?
9. Can we integrate this system with mobile apps or websites for easier control and real-time updates?

METHODOLOGY

Block Diagram:



1. WS2812B

WS2812B is an RGB LED with a in-built microcontroller. Each LED can be controlled individually using just one data wire. The microcontroller (like Arduino or ESP32) sends a serial data signal that includes the color and brightness for each LED.

Each WS2812B receives 24 bits of data (8 bits for Red, Green, and Blue), uses the first 24 bits for itself, and passes the rest of the signal to the next LED in the chain.

The timing of the signal is very important — that's why special libraries like FastLED or Adafruit NeoPixel are used to control it. Power and ground are also connected to all LEDs, and a separate 5V supply is usually used if you have many LED.

2. Bluetooth module(HC-05)

The HC-05 is a Bluetooth module that allows wireless communication between your project (like Arduino or ESP32) and a smartphone or other Bluetooth-enabled device.

It works using serial communication (UART). That means it sends and receives data through TX (Transmit) and RX (Receive) pins, just like normal serial ports. You can send messages from your phone using an app (like a Bluetooth terminal), and the HC-05 will send that data to The microcontroller

3. Arduino UNO

Arduino is a small, low-cost microcontroller board that can be programmed to control electronics like LEDs, motors, sensors, and displays. It acts like the **brain of your project**.

You write code in the **Arduino IDE** (using C/C++), upload it to the board via USB, and it runs the code automatically. Arduino reads inputs (like buttons, sensors, or Bluetooth commands) and gives outputs (like turning on LEDs, displaying messages, or moving motors).

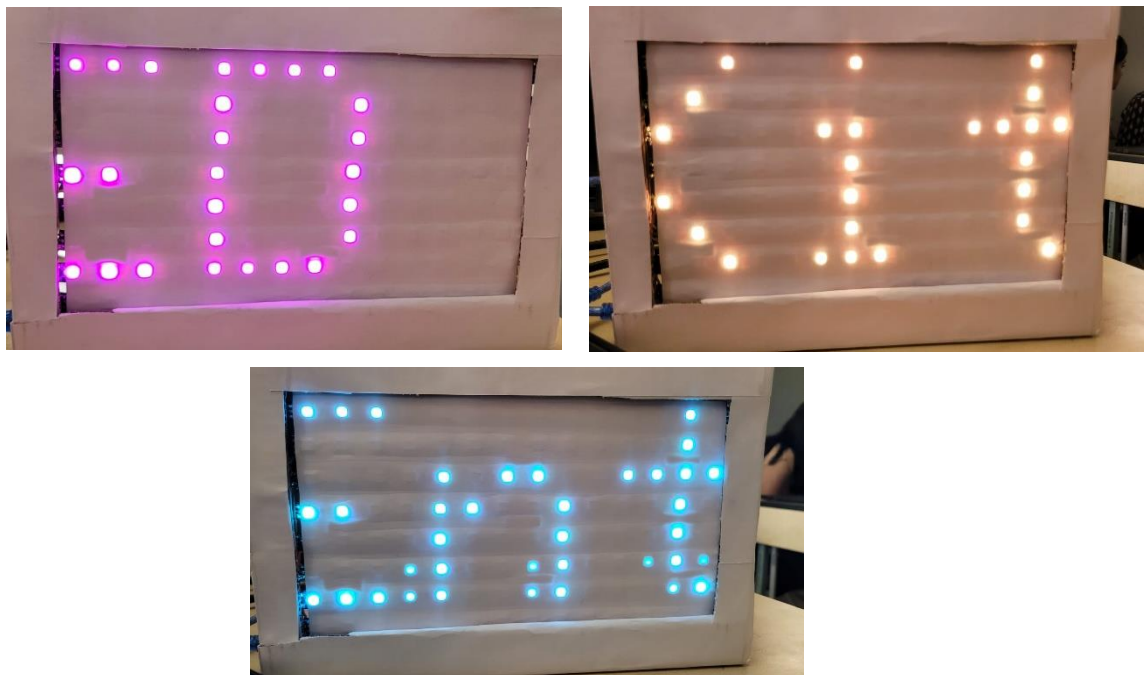
In the case of your **Rolling LED Display**, the Arduino receives message data from the **HC-05 Bluetooth module**, processes it, and then sends the scrolling text to the **WS2812B LED strip**.

4. 5V Power supply

A 5V power supply provides a constant output of 5 volts, commonly used for powering electronic devices such as microcontrollers (e.g., Arduino, ESP32), sensors, and small gadgets. It can be powered from various sources, including AC adapters, batteries, or USB ports. A typical 5V power supply will have:

- **Input Voltage:** U 100-240V AC
- **Output Voltage:** 5V DC
- **Current Rating:** 1A

RESULT and DISCUSSION



CONCLUSION

The Rolling LED Display project helped us create a smart and modern way to show important messages using WS2812B LEDs and wireless control. By using an Arduino as the main controller, and connecting it with the HC-05 Bluetooth module, we made it easy to update messages in real time without any wires.

This project is low-cost, easy to build, and energy-efficient, making it perfect for schools, colleges, malls, bus stops, and other public places. It also helped us learn how to work with microcontrollers, LED communication protocols, and Bluetooth modules.

Even though we faced some challenges like timing issues and power supply handling, we successfully managed to solve them. In the future, we can improve this project by adding features like Wi-Fi, mobile app control, or even voice input.

Overall, this project was a great learning experience and showed how electronics and coding can solve real-world problems.

REFERENCE

1. Technical datasheets and application notes for HC-05 Bluetooth module and P10 LED module.
2. Research papers and project reports related to wireless scrolling LED displays.
3. Online tutorials and guides for Arduino-based LED display programming.
4. Manufacturer manuals and specifications for power supply units, LED modules, and microcontroller boards.
5. Open-source forums and community discussions related to LED scrolling display projects