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TABLE OF CONTENT

ABSTRACT

In this busy world, the traditional way of printing the message on the paper and passing in on the notice board is a time-consuming process. We face these type of challenges mostly in colleges, public places, etc.

To overcome this type problem, we came up with our project SCROLL BOARD. This System is Bluetooth based Wireless Digital Notice Board. This proposed technology can be used in colleges, public places, to enhance security system and also make awareness of emergency situations. This system is developed by using two different applications, one is for displaying messages on digital notice board and wireless person calling has been implemented. It saves the time and cost for printing Hardware. If there is any important and emergency message the buzzer will on.

The main aim of SCROLL BOARD is to provide a specific content or message and displaying it on the digital notice board for students in the colleges, and to the people in the public places. The study delves into the hardware and software components required to construct a robust and efficient display system, including microcontrollers, communication interfaces, and programmable display protocols.

Furthermore, it addresses the challenges of visibility, readability, and energy efficiency. Through case studies and performance analysis, this paper demonstrates how scrolling message display boards enhance communication, improve operational efficiency, and offer scalable solutions adaptable to different contexts and user needs. The findings underscore the significance of integrating modern technological advancements to optimize the functionality and versatility of scrolling message display boards in an increasingly information-driven world.

CHAPTER – 1

INTRODUCTION

1.1 Introduction

A SCROLL BOARD is an electronic signage system designed to convey information dynamically in a continuous, scrolling format. This technology addresses the need for effective communication in various environments, such as schools, businesses, public transportation, and events, where real-time updates and clear visibility are crucial. The core problem involves developing a system that can handle diverse content inputs, ensure smooth scrolling of messages, and maintain high readability across different lighting conditions and distances. Key challenges include designing robust software capable of managing text formatting, timing, and synchronization, as well as hardware that supports reliable performance, durability, and energy efficiency. The system must also be user- friendly, allowing non-technical users to easily update and manage the displayed messages. The main aim of SCROLL BOARD is to provide a specific content or scrolling message and displaying it on the digital notice board for students in the colleges, and to the people in the public places. Features may include: Wireless Connectivity: Supports Wi-Fi, Bluetooth, or cellular connectivity for easy and remote content updates without physical connections. Real-time Updates: Instant updates of messages and notices, ensuring timely communication of important information.

User-friendly Interface: Intuitive software or apps for creating, scheduling, and managing content, often with drag-and-drop functionality. Voice Recognition: Integration with advanced voice recognition technology to convert spoken words into text. Security Features: Secure access and user authentication to prevent unauthorized content changes. High Resolution Display LCD Screen with High pixel density for clear and sharp text display and support for different text sizes and fonts to enhance readability.

1.2 Problem Statement

Real-Time Updates: To enable real-time updating of notices, ensuring that information is always current. To allow for the immediate broadcasting of urgent messages

Operational Efficiency: To reduce the time and resources required for updating traditional notice board. To streamline the process of managing and scheduling announcements.

Security and Control: To ensure that only authorized personnel can update the notice board, maintaining the integrity of the information displayed. To implement robust authentication mechanisms, including voice recognition and user logins.

Cost-Effectiveness: To reduce the costs associated with printing and manually updating traditional notice boards. To leverage energy-efficient technologies to minimize operational costs.

Environmental Sustainability: To reduce paper waste and the environmental impact associated with traditional notice boards. To promote the use of digital solutions as part of a broader sustainability initiative.

1.3 Objective of Project

Remote Message Display: Enable users to send and display messages remotely via Bluetooth or IoT, allowing real-time updates to the display without physical interaction.
Dynamic Scrolling Effect: Implement a scrolling effect on the message board to display long messages within a limited screen space, improving readability and visual appeal.
Cost-Effective Communication Tool: Develop a low-cost, efficient digital notice board system using easily accessible components like Arduino, LCD, and Bluetooth modules.
User-Friendly Interface: Provide a simple and intuitive interface for users to send messages, using a mobile app or Bluetooth terminal, without the need for specialized training.
Energy Efficiency: Design the system to operate with minimal power consumption, making it suitable for continuous use in public or private spaces.
Versatility and Scalability: Create a design that can be expanded with additional features (e.g., internet connectivity, cloud-based messaging) to adapt to various environments like schools, offices, and public spaces.

1.4 Goal of Project

The scope of a SCROLL BOARD project Would typically include features such as wireless Connectivity, Real-time Updates, User-friendly Interface, Voice Recognition, Security Features, Emergency Alerts. The notice board may display textual information such as announcements, alerts, or instructions.

Functionality: Displays text messages in a scrolling format.

User Interface (UI) and User Experience (UX): Design a user-friendly interface for easy navigation and message management. Ensure efficient and enjoyable interaction,

Voice Commands: Implement voice command functionality for hands-free operation.

Accessibility Features: Ensure the board is accessible to users with disabilities.

CHAPTER – 2

PROBLEM IDENTIFICATION

2.1 Existing System

Display Panel: The core component, often an LCD screen, that visually presents the scrolling messages. LCD panels are popular due to their brightness, energy efficiency, and visibility from a distance.

Controller Unit: This includes microcontrollers (such as Arduino, Raspberry Pi, or specialized display drivers) that manage the display functions, including message scrolling, speed, and other effects.

Power Supply: Provides the necessary power for the display and controller. This could be a simple DC adapter or a more complex power system for larger installations.

Software: Custom or off-the-shelf software that provides the user interface for managing the messages.

Input Interface: Allows users to input and manage the messages displayed. This may include keyboards, wireless interfaces.

2.2. Proposed System

E-Paper displays are ideal for applications where low power consumption and excellent visibility in direct sunlight are essential. To enhance sustainability and reduce operational costs, especially for outdoor installations, integrating solar panels with battery storage is crucial. Utilizing low-power microcontrollers and efficient power regulation circuits further optimizes energy usage. For robust control and processing, advanced microcontrollers or single-board computers can provide superior processing capabilities, while FPGAs cater to high-speed data processing and display update requirements. Enhanced communication interfaces such as Wi-Fi, Bluetooth, and cellular connectivity offer flexibility across diverse environments, with IoT integration enabling real-time data updates and remote management. Secure and intuitive software is vital, featuring user-friendly web-based or mobile applications for seamless message management, alongside robust encryption and authentication protocols to ensure data protection against unauthorized access.

CHAPTER 3

REQUIREMENTS

3.1 Software Requirements

Microcontroller Firmware: You'll need firmware to control the display hardware. This might involve programming a microcontroller like Arduino or Raspberry Pi to control LEDs or other display elements.
Control Interface: A user interface or control mechanism to input messages or commands for the display board.
Power Management: Depending on the display hardware, you may need software to manage power consumption and prevent overheating or other issues.
Optional Features: Depending on your requirements, you may also need additional features like scheduling messages, displaying images or animations, or integrating with external data sources.
Content Management System (CMS): A web-based or desktop application to manage the content displayed on the notice board. This CMS should allow users to create, edit, and schedule notices remotely.
Database Management System: A database to store notices and relevant metadata, such as scheduling information, priority levels, and display settings.
Wireless Communication Protocol: Software to handle wireless communication between the notice board and the central server or CMS. This may involve protocols like Wi-Fi, Bluetooth, or cellular connectivity, depending on the setup.
Security Measures: Software to encrypt communication between the notice board and the server, protect user data, and prevent unauthorized access or tampering with the system.

3.2 Hardware requirements

LED Matrix or Display Panel: The primary hardware component is the display panel itself. This could be an LED matrix, a segmented display, or any other type of display capable of showing scrolling text.

Microcontroller or Single Board Computer: A device to control the display screen and manage the wireless communication. This could be a Raspberry Pi, Arduino, ESP32, or similar microcontroller or single board computer.

Wireless Connectivity Module: A module to enable wireless communication. This could be Wi-Fi, Bluetooth, Zigbee, or cellular connectivity depending on the range and requirements of the notice board.

Power Supply: An appropriate power supply to provide electricity to the display screen, microcontroller, and wireless module.

Microphone: A microphone or microphone array to capture voice input from users.

Voice Recognition Module: A voice recognition module or software library to process and interpret voice commands.

Enclosure: An enclosure to protect the electronics and provide a mounting surface for the display screen and the microphone.

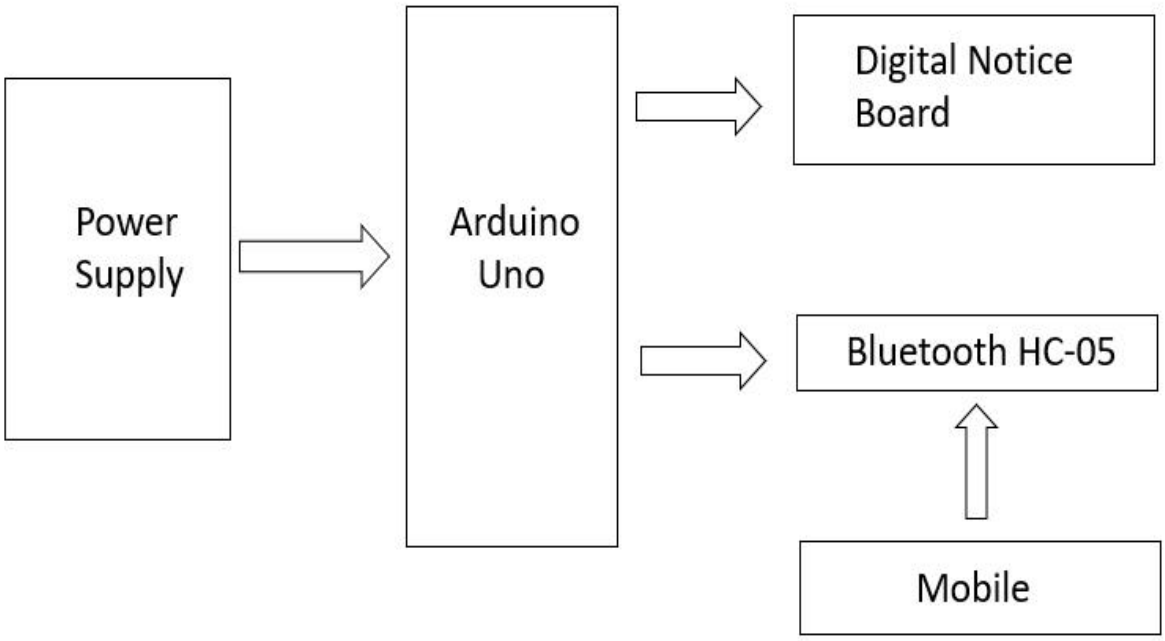
Sensors: sensors such as ambient light sensor, motion sensor is to provide additional functionality based on the environmental conditions.

Power Management System: A power management system to conserve energy by turning off the display screen or reducing power consumption during periods of inactivity.

CHAPTER 4

DESIGN AND IMPLEMENTATION

4.1 Design



4.1.1 Architectural Diagram

Power Supply: Provides power to the Arduino Uno, enabling it to operate and control other components.

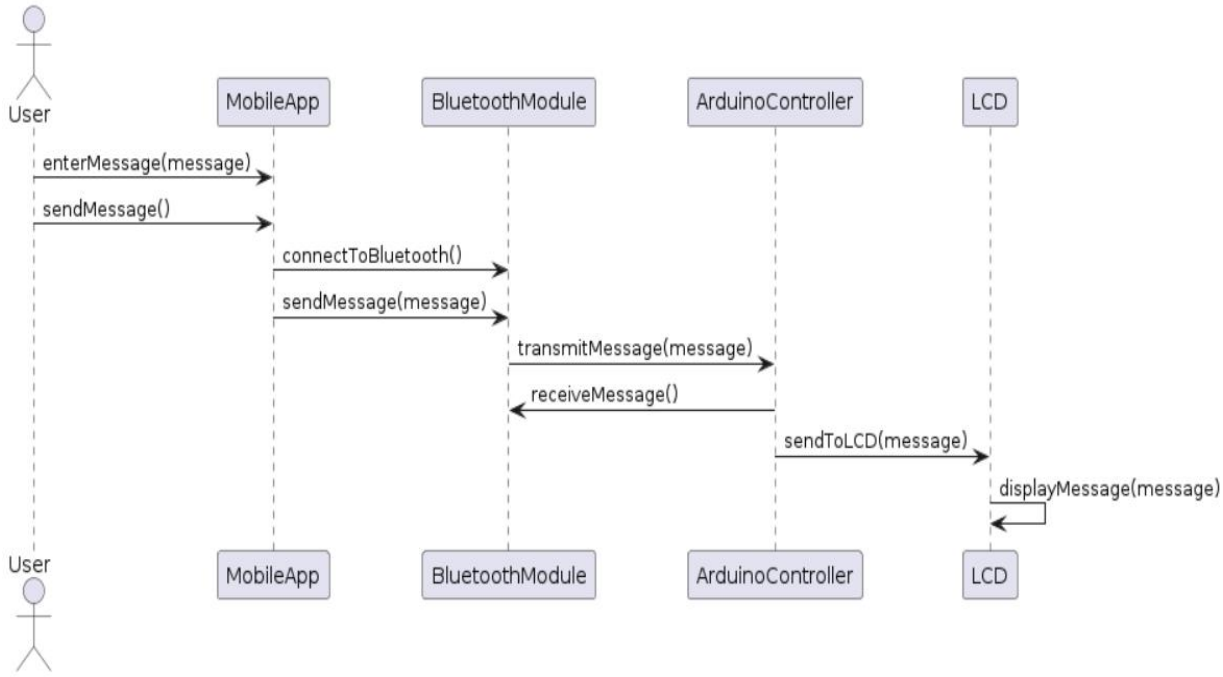
Arduino Uno: Acts as the central controller in this setup. It receives power from the power supply and manages the communication between the components.

Digital Notice Board: This is the display device where the messages will be shown. It is connected to the Arduino Uno, which controls what is displayed based on received instructions.

Bluetooth HC-05 Module: This module enables wireless communication between the Arduino Uno and a mobile device. The Arduino communicates with the Bluetooth HC-05 module to receive data from the mobile device.

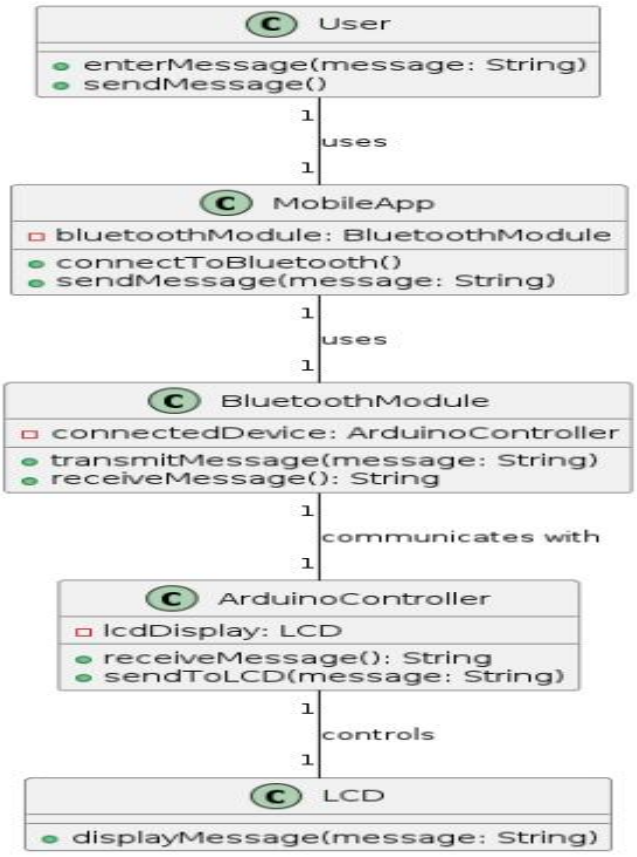
Mobile Device: Acts as the user interface for sending messages to the Arduino Uno through Bluetooth. When the user inputs a message on the mobile device, it is transmitted via the Bluetooth module to the Arduino Uno, which then displays it on the digital notice board.

4.1.2. Sequence Diagram:



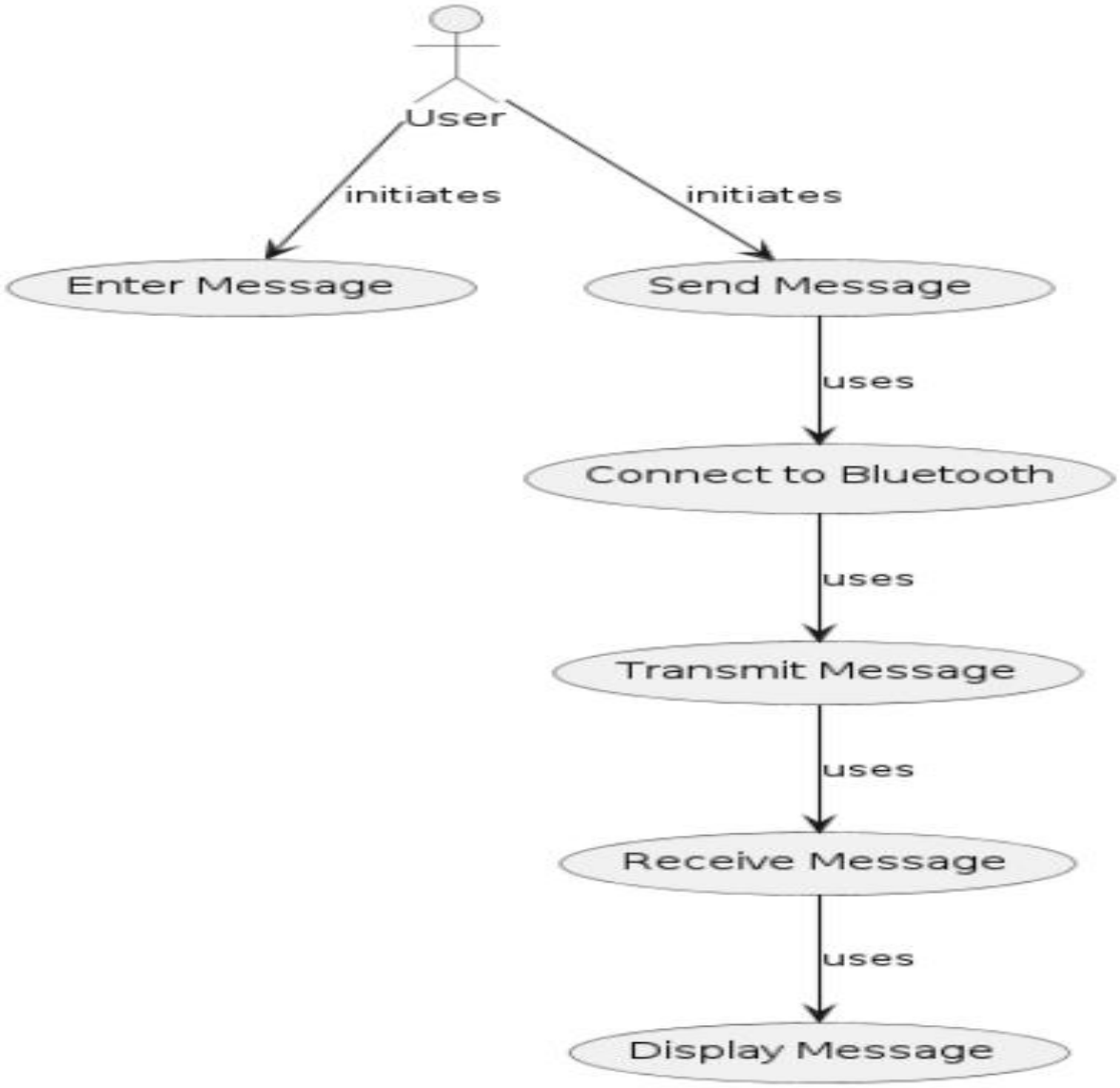
The sequence diagram show cases the interactions between various components in the system during the message dissemination process. It outlines the flow of messages from the user's initiation to their display on the notice board. Initially, the user sends a message through the Android application, triggering the transmission of the message to the Arduino controller. The Arduino controller processes the message and forwards it to the Bluetooth notice board for display. This diagram succinctly illustrates the communication and coordination between different elements of the smart digital notice board system, offering insight into its operational flow and functionalities.

4.1.3. Class Diagram

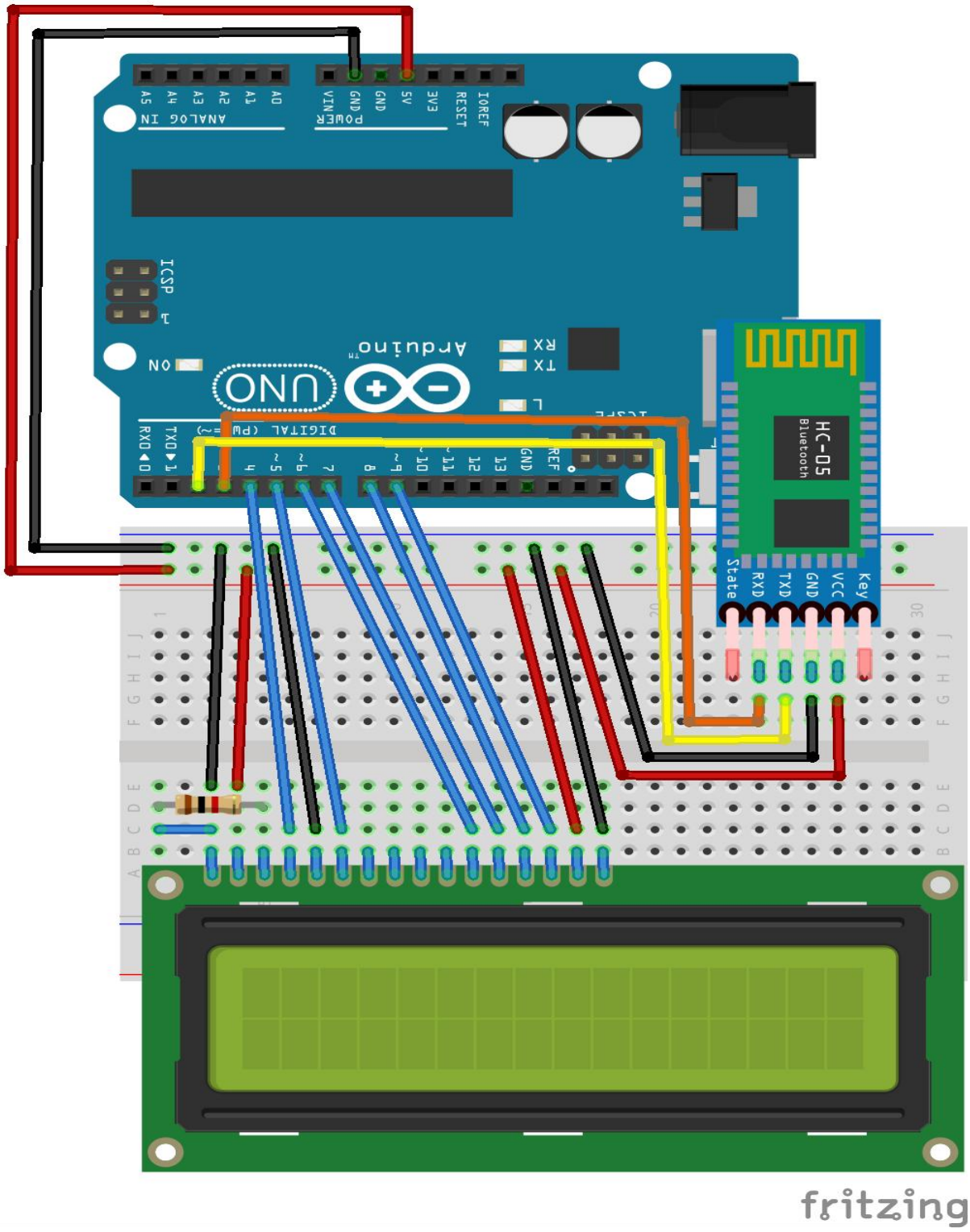


- ❖ It includes classes such as Message, Notice Board, Arduino Controller, Android Device, and Communication Interface.
- ❖ The Message class represents the messages received, with attributes for content and type.
- ❖ Notice Board represents the display unit, while Arduino Controller manages communication between the Arduino microcontroller and the Notice Board.
- ❖ The Class Diagram for the Bluetooth-based wireless notice board system encapsulates the system's key classes and their relationships.
- ❖ Android Device class handles interactions with the Android-based application, while Communication Interface defines methods for communication between components.

4.1.4. Use Case Diagram



4.1.5 Circuit Diagram



4.2.Implemenation

1.Initialization :

1. Power on the Notice Board System.

2.Initialize the microcontroller and Bluetooth.

2. Bluetooth connection& amp; pairing :

1. Activate the Bluetooth module in discoverable mode.

2.Use a Bluetooth-enabled device (e.g. smartphone , tablet, computer) to search for and pair with the noticeboard's Bluetooth module.

3.Establish a secure connection between the Bluetooth module and the paired device.

3. Message Transmission:

1.Once the user inputs the message and configuration settings, the paired device sends the data to the notice board via Bluetooth.

2.The Bluetooth module receives the incoming data and forwards it to the microcontroller.

4. Data Processing :

1.The microcontroller processes the received data, extracting the message text and configuration settings.

2.Perform any necessary data validation and formatting to ensure compatibility with the display hardware.

5.Diaplay Output :

1. The microcontroller sends the formatted message and display settings to the LED/LCD display driver.

2. Update the display to show the new message on the notice board.

6. Continuous Operation:

1.Continuously monitor the Bluetooth connection for new incoming messages.

2.Update the display in real-time as new messages are received.

3.Maintain an active connection with the paired device for seamless message updates.

7. Error Handling:

1.Implement error detection for issues such as connection loss, data corruption, or display hardware malfunctions.

2. Display error messages or indicators if any issues are detected.

3.Attempt to reconnect or prompt the user to re-establish the Bluetooth connection if necessary.

CHAPTER 5

CODE

5.1 Source Code

```
 #include <SoftwareSerial.h>
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27,20,3);
SoftwareSerial mySerial (0,1);   //(RX, TX);
String val = "No Data";
String oldval;
String newval = "No Data";
int i = 0;
void setup()
{
  // put your setup code here, to run once:
 lcd.init();                    // initialize the lcd
  //lcd.init();
  // Print a message to the LCD.
  lcd.backlight();
  // put your setup
  lcd.begin(16,2);
  mySerial.begin(9600);
  Serial.begin(9600);
  lcd.setCursor(0, 0);
  lcd.print("Wireless Notice");
```

```
  lcd.setCursor(0, 1);
  lcd.print("     Board     ");
  delay(3000);
  lcd.clear();
  lcd.print("Welcome!");
}
void loop()
{
  val = mySerial.readString();
  val.trim();
  Serial.println(val);
  if(val != oldval)
  {
    newval = val;
  }
  lcd.clear();
  lcd.setCursor(i, 0);
  lcd.print(newval);
  i++;
  if(i >= 15)
  {
    i = 0;
  }
  val = oldval; }
```

5.2 Screenshot of Application

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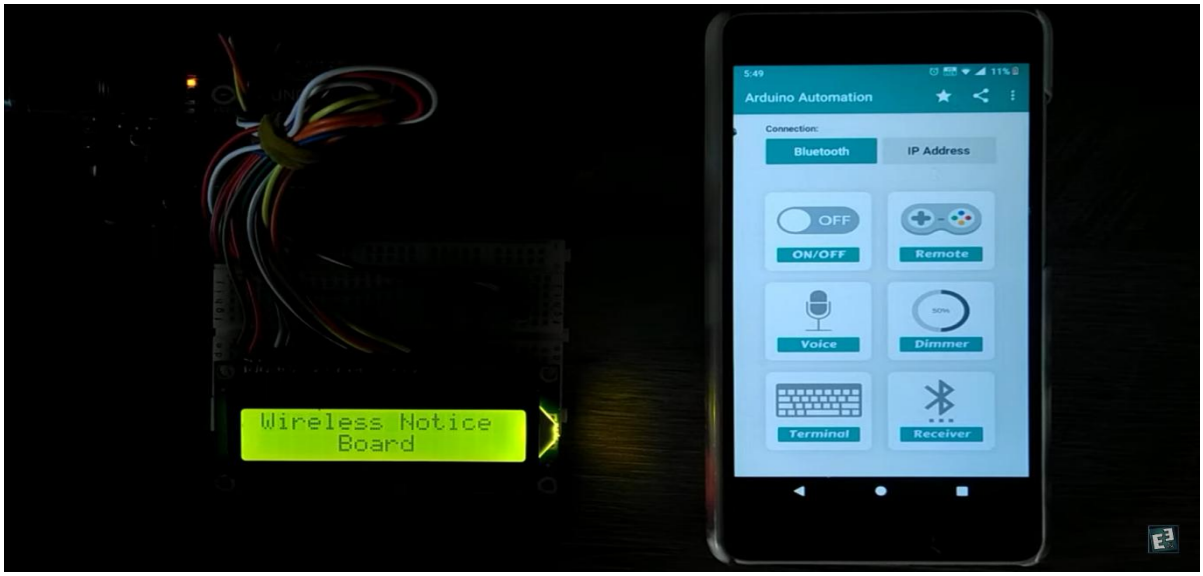

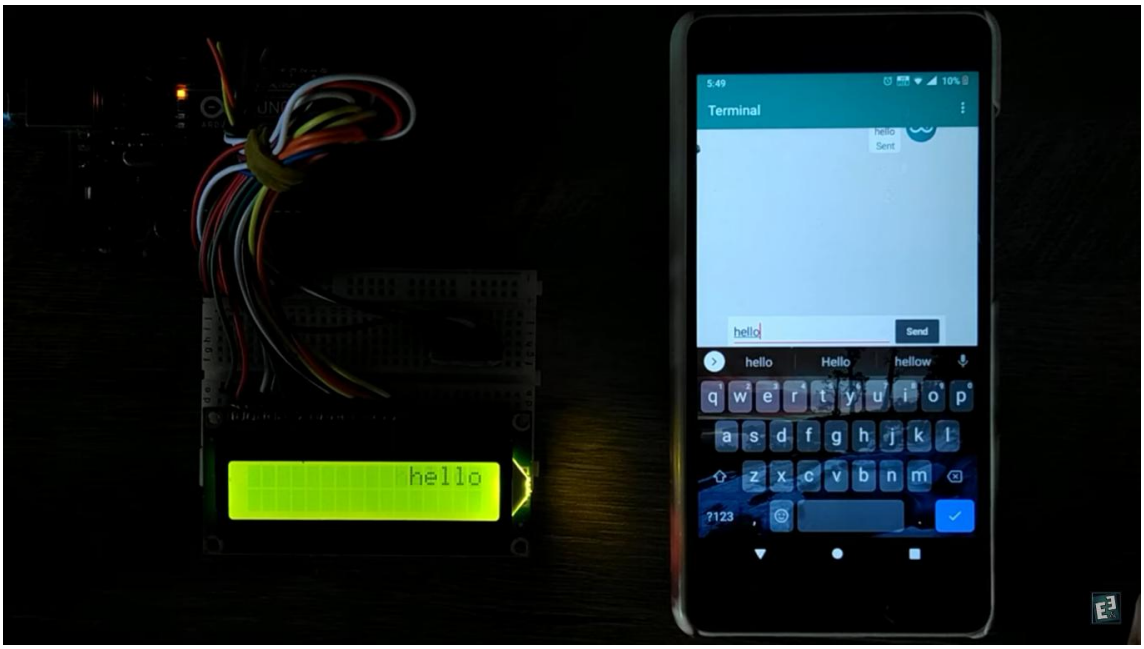

CHAPTER 6

RESULTS AND CONCLUSION

6.1 Results

This project explains how to control the display of characters on a LCD (I2C) moving message display using Arduino Microcontroller. This project is a worldwide access of LCD using IOT. It provides implementation of displaying characters on an LCD matrix without any time and place boundary. In which the scroll and blink display modes are supported. It is easily accessible and more user friendly. It overcomes the disadvantages of GSM and has various advantages over it. If Wi-Fi module is interfaced with the microcontroller of this project and one application is written for Wi-Fi enabled PC/laptop, then any such PC having that app installed will be able to change the message on the display.

6.2 Conclusion

As the technology is advancing every day the display board systems are moving from Normal handwriting display to digital display. Further to Wireless display units. This project develops a wireless notice board system with Bluetooth connected to it, which displays the desired message of the user through an SMS in a most populated or crowded places. Here by introducing the concept of wireless technology in the Field of the communication. We can make our communication more efficient and faster, with greater efficiency. We can display the messages and with less errors and maintenance. This proposed system has many upcoming applications in educational institutions and organizations, crime prevention, traffic management, railways, advertisements etc. By Using this proposed methodology, we can enhance the security system and also make awareness of the emergency situations and avoid. Latency involved in using of papers in displaying of notices is avoided and the information can be updated by the authorized persons. Features such as customizable text effects, multi-language support, and versatile mounting options enhance the board's functionality and make it a versatile tool for diverse communication needs.

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