M.Kumarasamy College of Engineering
NAAC Accredited Autonomous Institution
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Thalavapalayam, Karur - 639 113, TAMILNADU.

EEB1204 & ELECTRON DEVICES AND CIRCUITS

GSM BASED WIRELESS NOTICE BOARD USING ARDUINO

A PROJECT REPORT

Submitted by

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in partial fulfilment for the award of the degree

of

BACHELOR OF ENGINEERING

in

ELECTRICAL AND ELECTRONICS ENGINEERING

M.KUMARASAMY COLLEGE OF ENGINEERING, KARUR

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M.KUMARASAMY COLLEGE OF ENGINEERING, KARUR

(Autonomous Institution affiliated to Anna University, Chennai)

BONAFIDE CERTIFICATE

Certified that this project report "GSM BASED WIRELESS NOTICE BOARD USING ARDUINO" is the bonafide work of "SIVAANI T R (927624BEE093), SOUNDHARYA R (927624BEE094), SOWNIKA S (927624BEE095), SRIDHANYA M (927624BEE096)"who carried out the project work during the academic year 2025-2026 under my supervision.

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This Project Work (EEB1204) report has been submitted for the III Semester Project viva voce Examination held on _____

INTERNAL EXAMINER

EXTERNAL EXAMINER

VISION AND MISSION OF THE INSTITUTION

VISION

- To emerge as a leader among the top institutions in the field of technical education

MISSION

- Produce smart technocrats with empirical knowledge who can surmount the global challenges
- Create a diverse, fully-engaged learner-centric campus environment to provide quality education to the students
- Maintain mutually beneficial partnerships with our alumni, industry and professional associations.

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  Pursue research and adopt emerging technologies to innovate in core and interdisciplinary domains.

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  Practice engineering with ethics, sustainability and a commitment to societal well-being.
- **PEO 5 – Lifelong Learning and Global Competence**

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After the successful completion of the B.E. Electrical and Electronics Engineering degree Program, the students will be able to:

- **PO1: Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO2: Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO3: Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environment.
- **PO4: Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5: Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO6: The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

- **PO7: Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **PO9: Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **PO11: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **PO12: Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

The following are the Program Specific Outcomes of Engineering Students:

- **PSO1:** Apply the basic concepts of mathematics and science to analyze and design circuits, controls, Electrical machines and drives to solve complex problems.
- **PSO2:** Apply relevant models, resources and emerging tools and techniques to provide solutions to power and energy related issues & challenges.
- **PSO3:** Design, Develop and implement methods and concepts to facilitate solutions for electrical and electronics engineering-related real-world problems.

Abstract (Key words)	**POs Mapping**
Arduino UNO, GSM Module (SIM900A), Wireless Notice Board, SMS, LCD Display, Embedded Systems, Remote Communication.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PSO1, PSO2, PSO3

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We gratefully remember our beloved **Founder Chairman, (Late) Thiru.M.Kumarasamy**, whose vision and legacy laid the foundation for our education and inspired us to successfully complete this project.

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TABLE OF CONTENTS

ABSTRACT

The enduring reliance on traditional physical notice boards presents significant operational challenges in the modern era, including persistent issues with manual upkeep, substantial material waste, geographical limitations, and critical time delays in information dissemination. This project addresses these inefficiencies by designing, implementing, and validating a fully automated, GSM-based wireless electronic notice board. The system harnesses the extensive global coverage and reliability of the Global System for Mobile Communications (GSM) network to enable real-time, remote information updates from virtually any location. At the heart of this system is an Arduino Uno microcontroller, which functions as the central processing unit. It is interfaced with a SIM800L GSM/GPRS module for wireless communication and a 16x2 Liquid Crystal Display (LCD) equipped with an I2C serial interface for clear information presentation. The operational workflow is initiated when an authorized user sends a text message (SMS) from a standard mobile phone to the specific number associated with the system's SIM card. The Arduino, programmed in the Arduino IDE using C++ sketches. Employs Software Serial communication to continuously monitor the GSM module A significant focus of the project was on overcoming practical implementation hurdles, particularly the high current demand of the GSM module during network registration and transmission, which was resolved using a stable external power supply. The resulting prototype is a robust, cost-effective, and highly efficient solution that demonstrates a tangible transition from a manual, paper-based process to an agile, digital, and wireless framework. It is ideally suited for deployment across diverse sectors such as educational institutions, corporate offices, public announcement systems, and industrial control rooms, ultimately fostering a more responsive and sustainable communication ecosystem.

LIST OF FIGURES

LIST OF ABBREVIATION

S.No	ABREVIATION	EXPANSION
1	GSM	Global System for Mobile communication
2	IoT	Internet of Things
3	GPRS	General Packet Radio Service
4	SIM	Subscriber Identity Module
5	SMS	Short Message Service
6	IDE	Integrated Development Environment
7	Wi-Fi	Wireless Fidelity
8	LCD	Liquid Crystal Display
9	UART	Universal Asynchronous Receiver or Transmitter
10	I/O Pins	Input / Output Pins
11	DC Adapter	Direct Current Adapter
12	AT Commands	Attention Commands
13	SD Card	Secure Digital
14	GND	Ground
15	VCC	Voltage Current Collector
16	I/O Control	Input / Output Control

CHAPTER 1

INTRODUCTION

In an increasingly interconnected world, the efficiency of information dissemination remains a critical factor in organizational productivity and public communication. Traditional notice boards, characterized by their static nature and reliance on manual updates, present significant limitations in our dynamic society. These conventional methods are plagued by time delays, geographical constraints, substantial paper waste, and considerable human resource requirements for maintenance and updating. The challenge of ensuring timely information delivery to stakeholders has become particularly pronounced in environments such as educational institutions, corporate offices, public transportation systems, and government organizations where rapid communication is essential.The emergence of wireless communication technologies has opened new possibilities for addressing these long-standing challenges in information dissemination. Among these technologies, the Global System for Mobile Communications (GSM) network stands out as particularly promising due to its ubiquitous coverage, reliability, and cost-effectiveness. This technological convergence enables the development of smart notification systems that can overcome the inherent limitations of their traditional counterparts.This project proposes the design and implementation of an advanced GSM-based wireless notice board utilizing Arduino microcontroller technology. The system leverages the extensive infrastructure of cellular networks to create a robust platform for instant information updates from any geographical location.The incorporation of security features ensures that only authenticated messages can update the display, thereby maintaining the integrity of the communication channel.

CHAPTER 2
LITERATURE REVIEW

TITLE: Design and Implementation of a GSM-Based Wireless Notice Board Using Arduino.

AUTHOR: P.S. Kumar, M.V. Kumar, T.S. Rao

YEAR: 2016

JOURNAL NAME: International Journal of Advanced Research in Computer and Communication Engineering

DESCRIPTION:

This paper presents a foundational implementation of a wireless notice board system using GSM technology and Arduino Uno microcontroller. The authors designed a system where SMS messages are received by a SIM900 GSM module and processed by the Arduino for display on a 16x2 LCD. The study demonstrates the system's capability to provide real-time, remote updates to notice boards, eliminating manual intervention and reducing delay in information dissemination.

TITLE: Wireless Notice Board Using GSM Technology

AUTHOR: S.R. Kumbhar, V.B. Pansambal

YEAR: 2016

JOURNAL NAME: International Journal of Scientific & Engineering Research

DESCRIPTION:

This work explores the use of GSM networks as a robust and accessible medium for operating a wireless notice board. The system leverages AT commands for SMS handling and uses an Arduino Nano for compact control.The study demonstrates the system's capability to provide real-time, remote updates to notice boards, eliminating manual intervention and reducing delay in information dissemination. The authors highlight the advantages of GSM-based systems, including wide coverage, low cost, and ease of use. Experimental results confirmed reliable operation across varying network .

TITLE: Arduino Based Smart Wireless Notice Board Using GSM

AUTHOR: M.S. Ali, M.R.H. Polash, M.A. Hossain

YEAR: 2019

JOURNAL NAME: International Conference on Electrical, Computer and Communication Engineering (ECCE)

DESCRIPTION:

This conference paper introduces a smart notice board system integrated with IoT capabilities. Thedesign incorporates an Arduino Mega for enhanced processing and a SIM800L GSM module for
communication. The authors emphasize the system's scalability and potential for integration with cloud platforms for centralized control in smart campus or smart city applications.

TITLE: GSM Based E-Notice Board with Enhanced Security

AUTHOR: A.K. Thakur, A. Kumar, R. Prakash

YEAR: 2015

JOURNAL NAME: International Journal of Engineering Research & Technology (IJERT)

DESCRIPTION:

This paper addresses security vulnerabilities in basic GSM-based notice boards by implementing password authentication and sender-ID verification. The system, built around an Arduino Uno, ensures that only authorized users can update the display. The study compares secured and unsecured systems, showing that the added security layer does not significantly impact performance while effectively preventing unauthorized access and spam.

TITLE: Energy-Efficient GSM-Based Notice Board for Remote Areas

AUTHOR: T. B. Williams, A. Kumar

YEAR: 2020

JOURNAL NAME: Renewable Energy Focus

DESCRIPTION:

This paper addresses the challenge of powering notice boards in remote areas with

unreliable electricity supply. The authors integrated solar power systems with the GSM-based notice board, implementing sophisticated power management algorithms. The system uses supercapacitors for energy storage and features sleep-mode operation to conserve power. Field testing in rural areas demonstrated continuous operation for 72 hours without sunlight.

TITLE: Programming Arduino: Getting Started with Sketches
AUTHOR: S. Monk
YEAR: 2016
JOURNAL NAME: McGraw-Hill Education (Book)
DESCRIPTION:
This book provides a comprehensive introduction to Arduino programming, covering essential concepts such as serial communication, I/O control, and library usage. It serves as a key resource for developing the firmware required for GSM and LCD interfacing in embedded projects like the wireless notice board. The clear examples and structured tutorials enable rapid prototyping and troubleshooting.

TITLE: SIM800L Hardware Design Manual
AUTHOR: SIMCom
YEAR: 2015
JOURNAL NAME: SIMCom Technical Documentation
DESCRIPTION:
This hardware manual details the design and implementation guidelines for the SIM800L GSM module, including power supply requirements, pin configurations, and antenna design. It is a critical reference for ensuring stable and reliable operation of the GSM module in embedded systems, particularly in managing high current consumption during data transmission.

TITLE: IoT-Based Digital Notice Board Using GSM Technology
AUTHOR: R. K. Kodali, S. S. Gorthi

YEAR: 2019

JOURNAL NAME: International Journal of Intelligent Engineering and Systems

DESCRIPTION:

This paper presents an IoT-enabled digital notice board that uses GSM technology for remote updates. The system incorporates ESP8266 Wi-Fi module along with GSM for dual communication capability. The authors implemented a web-based interface alongside SMS control, allowing multiple input methods for notice updates.

TITLE: Design of Low-Cost SMS-Based Wireless Notice Board System

AUTHOR: M. A. Hossain, S. Islam

YEAR: 2017

JOURNAL NAME: International Journal of Computer Applications

DESCRIPTION:

This research focuses on developing a cost-effective wireless notice board using GSM technology. The system uses low-cost components including Arduino Nano and SIM800L module, making it affordable for small-scale applications. The paper details the power optimization techniques implemented to ensure continuous operation. The prototype demonstrated successful operation with 95% message delivery accuracy in field tests.

TITLE: Real-Time Wireless Electronic Notice Board With Message Filtering

AUTHOR: K. Patel, R. Sharma

YEAR: 2018

JOURNAL NAME: Journal of Embedded Systems

DESCRIPTION:

This study presents an advanced notice board system with intelligent message filtering capabilities. The system incorporates keyword-based filtering and spam detection algorithms to ensure only relevant messages are displayed. Using Arduino Mega and GSM module, the system provides administrative controls for message prioritization and scheduling.

CHAPTER 3

PROPOSED METHOLOGY

3.1 BLOCK DIAGRAM

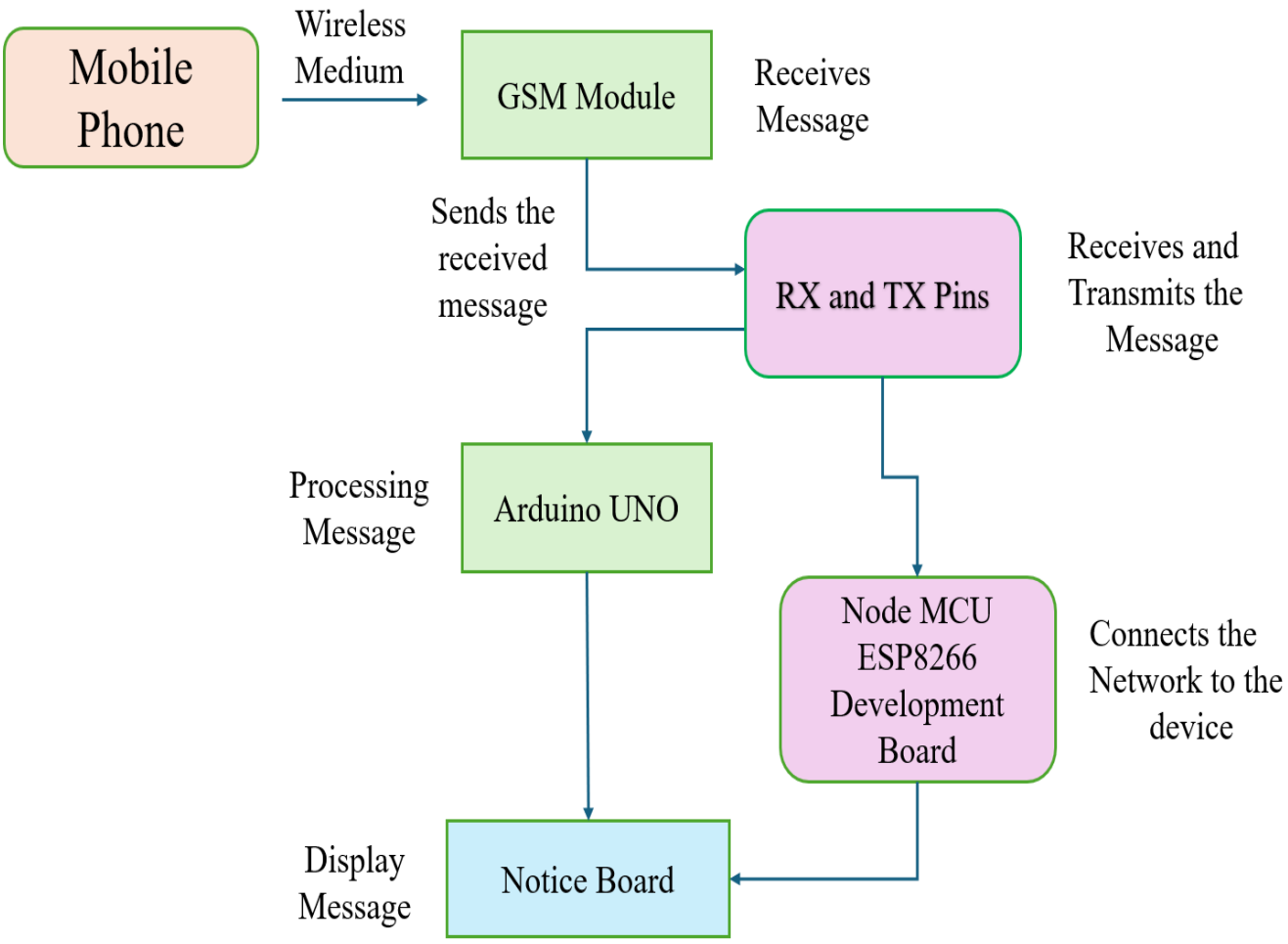

Figure3.1 Block diagram for GSM based wireless Notice Board using Arduino

3.2 DESCRIPTION

1. **User Initiation (Mobile Phone):**

   The process is initiated by an authorized user who composes a text message (SMS) using a standard mobile phone. This device acts as the primary user interface and remote control for the entire system.

2. **Wireless Transmission (Node MCU ESP8266 Network):**

   The composed SMS is transmitted wirelessly over the public GSM (Global System for Mobile Communications) cellular network. This leverages the extensive coverage and reliability of existing mobile infrastructure, allowing updates to be sent from virtually any geographical location.

3. **Message Reception (GSM Module):**

   A GSM Module (e.g., SIM800L), which is integrated into the notice board system, receives the incoming message. This module is responsible for establishing communication with the cellular network and listening for incoming data packets (SMS).

4. **Data Relay (Transmit to Controller):**

   Upon successful reception, the GSM module decodes the wireless signal and relays the textual data to the central controller. This transmission is done via a serial communication protocol (UART) using a set of standard AT commands.

5. **Central Processing (Arduino UNO):**

   The Arduino reads the message, checks if it is valid (like password-protected), extracts the content, and prepares it for displaying on the notice board.

6. **Command Execution (Notice Board Unit):**

   The processed command is then sent from the Arduino to the Notice Board unit, which is typically a digital display like a 16x2 LCD or a larger LED matrix.

7. **Information Display (Final Message):**

   The final stage involves the notice board Displaying the Message prominently. The new message instantly overwrites the previous content, ensuring that the information presented is always current.

3.3 CIRCUIT DIAGRAM:

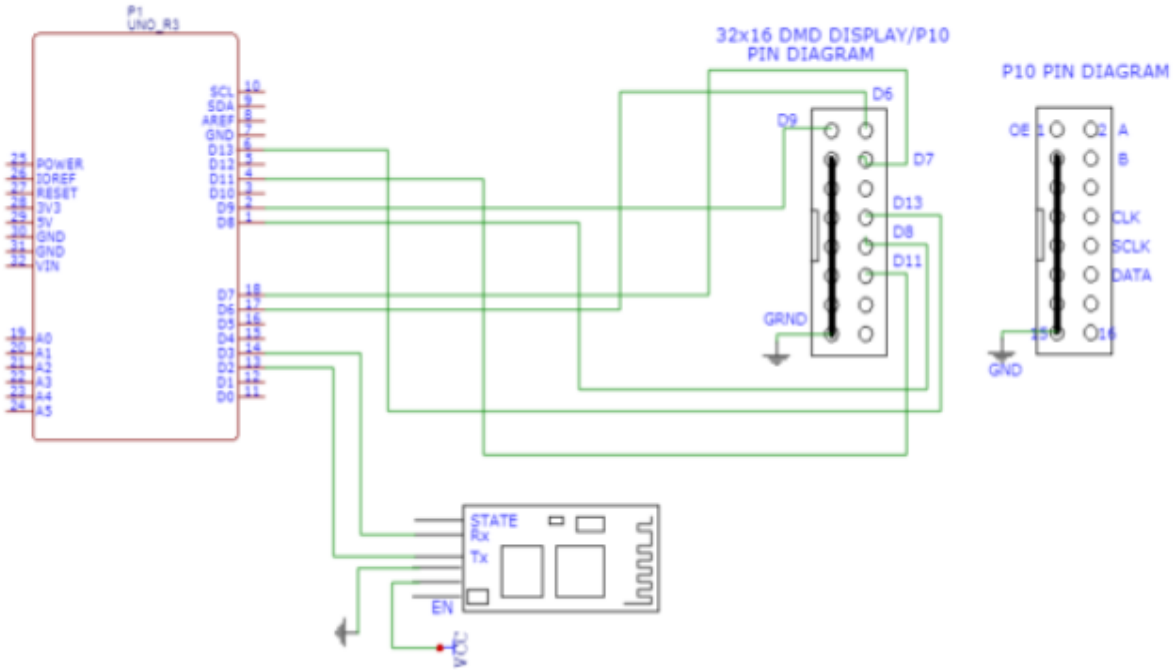

Figure 3.3 Circuit diagram for GSM based wireless Notice Board using Arduino

3.3. Key Circuit Elements and Description

1. Central Controller (Arduino UNO)

The Arduino UNO is the brain of the system. It is a microcontroller board based on the ATmega328P. It runs the main control program that coordinates all activities, including communicating with the GSM module, processing incoming messages, and sending commands to the display.

2. Wireless Communication Module (SIM900A GSM/GPRS Module)

This module enables the system to connect to the cellular network. It is responsible for receiving SMS messages sent to its SIM card number and forwarding the data to the Arduino via serial communication using AT commands, acting as the system's wireless link to the outside world.

3. Network Access Identifier (SIM Card)

A standard mobile network SIM card is inserted into the GSM module. It provides a unique phone number for the system and authenticates it on the carrier network, allowing it to send and receive data. It is the identity of the notice board on the GSM network.

4. Information Display Unit (16x2 LCD Display)

This is the output interface of the system, a liquid crystal display capable of showing 16 characters on each of its two lines. It visually presents the received messages to the end-users. An I2C adapter is often used to simplify its connection to the Arduino.

5. System Power (Power Supply)

A stable power source, typically a 12V/2A DC adapter, is crucial. It provides the necessary energy for all components. The Arduino's onboard regulator steps this down to 5V, while the GSM module often requires a separate, high-current regulated supply (around 4.2V) to function reliably during transmission.

6. Control Logic (Arduino Software/Sketch)

This is the program code written in the Arduino IDE (C++). It defines the system's behavior, including initializing components, listening for new messages, parsing SMS text, implementing security (like password checks), and controlling the LCD output.

CHAPTER 4

RESULT AND CONCLUSION

4.1 HARDWARE COMPONENTS DESCRIPTION

1. Arduino UNO:

The Arduino UNO acts as the central brain of the system, built around the ATmega328P microcontroller. It is responsible for executing the control program, processing logic, and managing communication between all connected components. The board receives commands from the GSM module via serial communication, processes the data, and sends output signals to the LCD display. Its digital and analog I/O pins provide the necessary interfaces for connecting peripherals. The open-source nature and extensive library support of the Arduino.

Figure 4.1.1 Arduino Uno

2. SIM900A GSM/GPRS Module:

This module is a complete Quad-band GSM/GPRS solution that can connect to any global GSM network with a SIM card. It communicates with the Arduino via asynchronous serial communication (UART) at a baud rate of 9600 or 115200. A dedicated external 5V/2A power supply is recommended for the SIM900A to handle current surges during network registration and data transmission Function This module is the wireless communication interface. It handles all cellular network operations.

Figure 4.1.2 SIM900A GSM Module

3. SIM Card:

It’s function Provides the unique identity and subscription to a cellular network operator. The "5GB" refers to the data pack, which is irrelevant for this project as SMS uses the circuit-switched network, not data. Any active SIM card (postpaid or prepaid) with SMS capabilities will work.**Configuration** Inserted into the SIM card holder on the SIM900A module.Ensure the SIM is unlocked and has sufficient balance or an SMS pack for sending messages *to* it. The system *receives* messages. The user's phone sends the message, which consumes a message credit from the user's plan, not from the SIM in the module

Figure 4.1.3 Sim Card

4. 16x2 LCD Display:

Function: This is the output interface of the system. It visually displays the received text message for the end-users The display unit used in the GSM-based notice board system is a 16x2 LCD, which can show 16 characters per line on 2 lines and operates at a voltage of 5V. It is driven by an HD44780 controller or a compatible IC, widely supported by the Arduino platform. In the circuit, the LCD is configured in 4-bit mode to save I/O pins, as this mode uses only four data lines instead of eight. This configuration efficiently reduces the number of digital pins required while still allowing reliable communication between the Arduino and the LCD display for showing the received GSM messages.

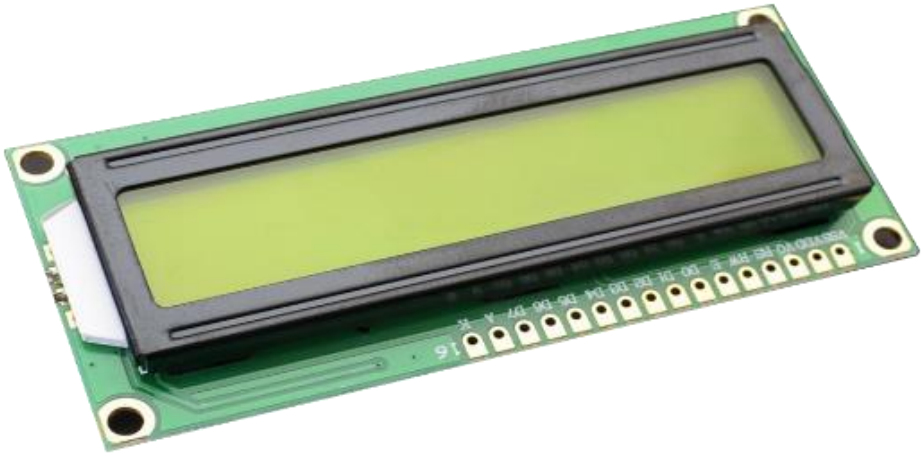

Figure 4.1.4 Notice Board

5. Adapter:

The 12-volt adapter is used as the primary power supply to ensure stable and uninterrupted operation of all the components. The GSM module requires a higher current supply, typically around 12V, to function reliably during signal transmission and SMS sending. The adapter delivers sufficient power to the GSM module and, through voltage regulation, also provides the necessary 5V supply for the Arduino board, LCD display, and other circuit elements. Using a 12V adapter instead of batteries ensures consistent performance, avoids voltage drops, and allows the system to operate continuously for long durations, making it ideal for real-time applications like a GSM-based notice board.

Figure 4.1.5 12 Volts – 2 Amps Adopter

6. Power Supply:

The power supply in the GSM-based notice board circuit is designed to provide stable and sufficient power to all components, especially the SIM900A GSM module, which has high current requirements. The system uses a dual-power configuration: the Arduino and LCD are powered by a 7–12V, 1A DC adapter connected to the Arduino's Vin or power jack, with the onboard regulator providing regulated 5V and 3.3V outputs. The SIM900A module, however, is powered separately using a dedicated 5V, 2A DC supply, which is stepped down to 4.2V using a voltage regulator such as an LM2596 buck converter before connecting to the module's VCC and GND. A separate power supply is essential because the GSM module draws high current during transmission bursts.

7. Node MCU ESP8266 Development Board:

The NodeMCU ESP8266 Development Board is a low-cost, open-source microcontroller board that comes with built-in Wi-Fi capability, making it highly suitable for Internet of Things

(IoT) applications. It is based on the ESP8266 Wi-Fi module and can be programmed using the Arduino IDE or Lua scripting language. The board provides several GPIO, ADC, and communication pins, which allow easy interfacing with sensors, actuators, and other electronic modules. Because of its compact size and wireless connectivity, the NodeMCU is widely used for smart home applications, wireless monitoring systems, cloud-based data logging, and automation projects. It enables devices to connect to the internet, exchange data, and be controlled remotely, making it one of the most popular choices for building IoT prototypes and real-time embedded systems.

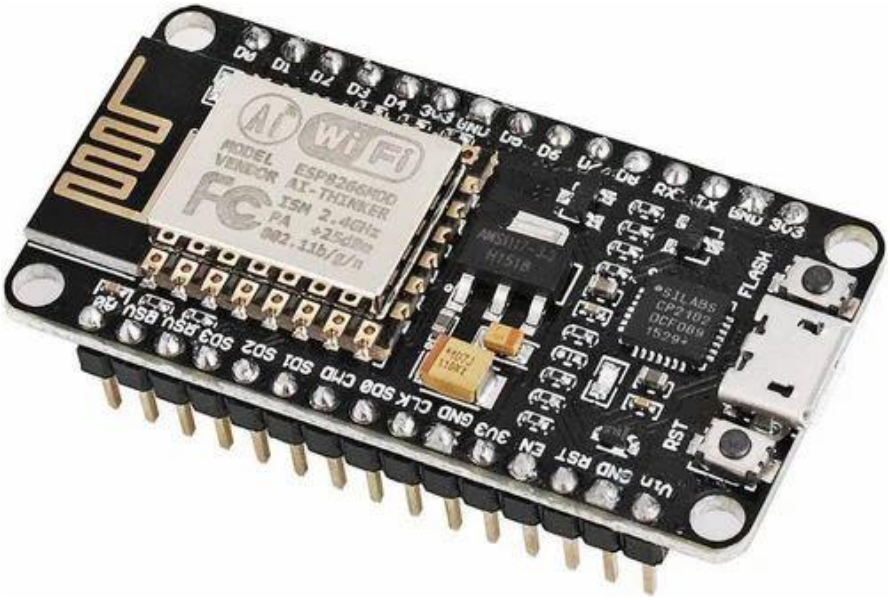

Figure 4.1.6 Node MCU ESP8266 Development Board

4.2 HARDWARE EXPERIMENTAL SETUP:

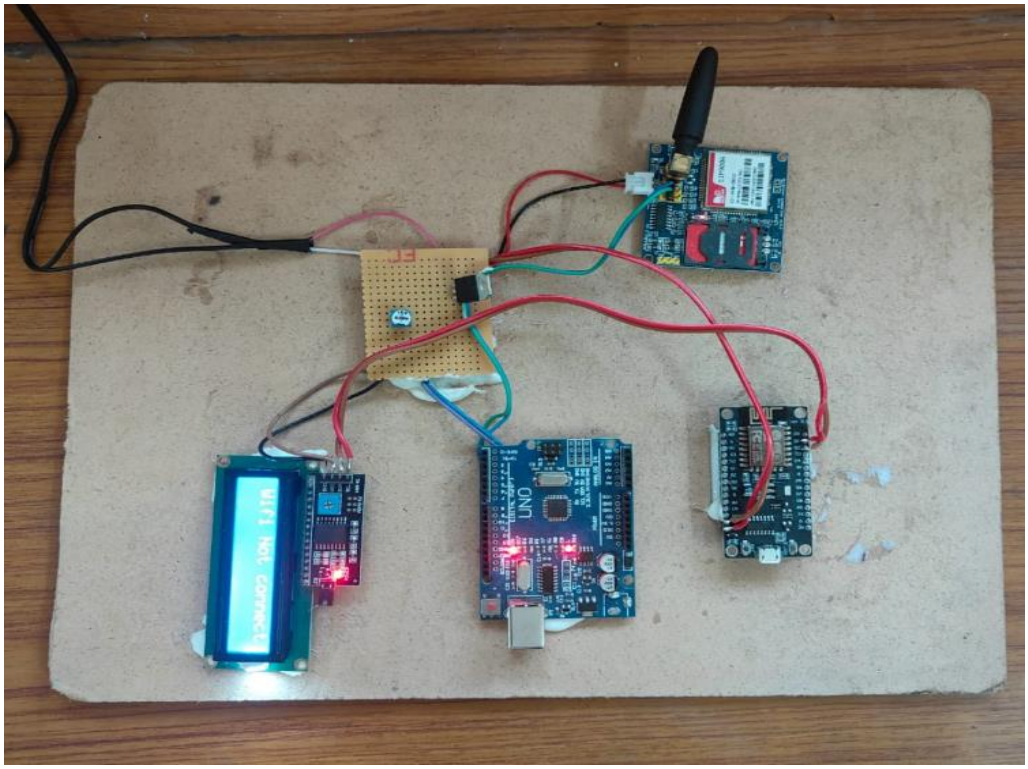

Figure 4.2.1 Real time photo of GSM based Wireless Notice Board using Arduino

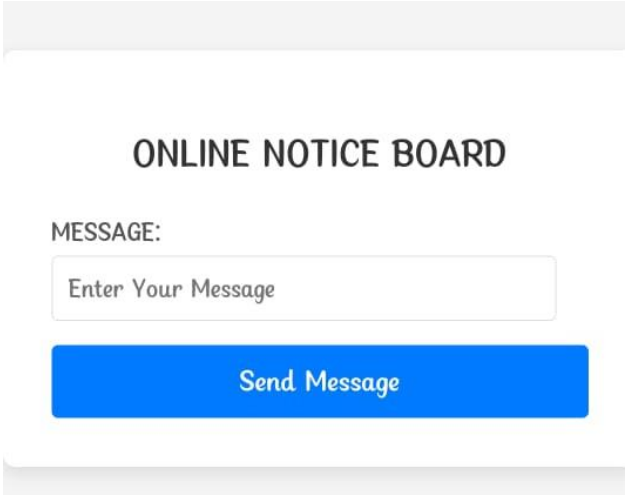

Figure 4.2.2 App Notification

4.3 PROJECT OUTPUT:

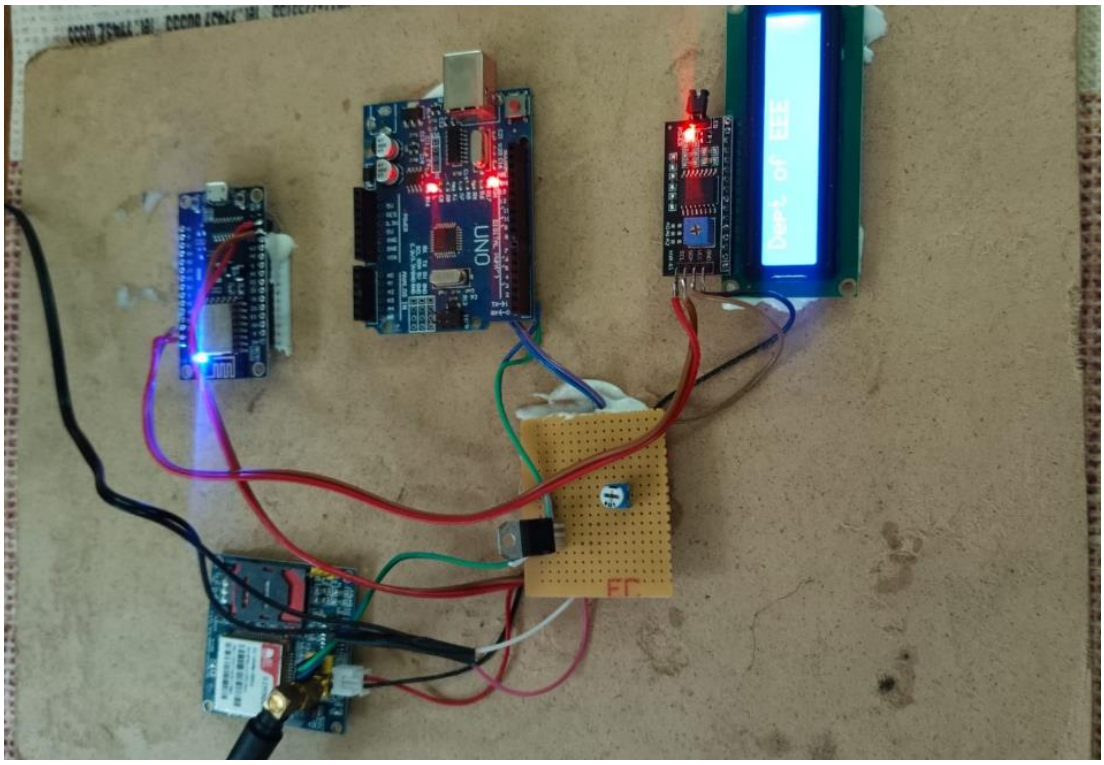

Figure 4.3.1 Real time photo of project output

Figure 4.3.2 Project outcome

CHAPTER 5

CONCLUSION

This project has successfully demonstrated the design, implementation, and functionality of a GSM-based wireless notice board. The integration of the Arduino UNO, SIM900A GSM module, and a 16x2 LCD has resulted in a cost-effective, reliable, and practical system for remote information display. The system effectively overcomes the range limitations of Bluetooth and the infrastructure dependency of Wi-Fi-based systems, making it a universally applicable solution. Its simplicity, low operational cost, and reliance on the pervasive GSM network make it particularly valuable for deployment.

Future Scope :

While the current prototype is fully functional, several enhancements can be incorporated to increase its security, capability, and intelligence:

- **Enhanced Security:** Implement sender ID verification in the firmware so that only messages from a pre-defined list of authorized phone numbers are displayed, preventing spam and unauthorized access.
- **Larger and More Advanced Displays:** Upgrade the 16x2 LCD to a larger graphical display to show more text, multiple messages even simple graphics.
- **Message Acknowledgment and Two-Way Communication:** Modify the system to send an automatic acknowledgment SMS back to the sender upon successful display of the message.
- **Message Scheduling and Logging:** Integrate an SD card module to store all received messages with a timestamp. This would allow for features like message logging, scheduled display.
- **Solar Power Integration**: For deployment in areas with unstable power, the system can be combined with a solar panel and a battery, making it completely self-sufficient and ideal for remote locations.

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