ELSEVIER

Scopus

doi

Journal of Vibration Engineering

ISSN:1004-4523

Registered

- SCOPUS
- GOOGLE SCHOLAR
- DIGITAL OBJECT IDENTIFIER (DOI)
- IMPACT FACTOR 6.1

Our Website
www.jove.science

SMARTWIFINOTICEBOARD

VithiyaR[1],KavyaPrithiP[2],ThangalakshmiM[3],VaishnaviG[4]

[1234]DepartmentofECE
ManakulaVinayagarIn
stituteofTechnology
Pondicherry,India

Abstract*—Thenoticeboardis acrucialelementininstitutions, organizations,andpublic facilities. Traditionally, sharing information has been a manual process, limiting its reach. Posting various notices can be challenging, requiring a designated person to oversee the task. Thisprojectaimstointroduceadigitalnoticeboardthatutilizesa Wi-Fimodule.Theobjective is to offer users a straightforward, speedy, and dependable means of displaying significant notices on a P5 LED screen. Users can send their messages to be circulated through the display. In this project, a web application has been developed to send messages via the Wi-Fi module. The system control is managed by an Arduino and the communication is performed usingWi-Fitechnology. The messageisthen sentthroughtheaforementioned webapplication. The hardware used in this project includes a Node MCU-ESP8266 Wi-Fi module, an LED display, and a user-friendly web application that utilizes Firebase. This device can be used anywhere as long as there is mobile network connectivity available.*

Keywords—P5LEDdisplay,Arduino,NODEMCU-ESP8266,Wi-FiModule,FirebaseWeb,

1. INTRODUCTION

A smart notice board is a revolutionary device that combines the power of Wi-Fi technology andArduino UNOto have an interactive information displaysystem.This innovative solutionhastransformedtraditionalnoticeboardsintodigitalandconnectedplatforms,enhancing communication which engaged in various environments such as schools, offices, and public spaces. By utilizing Wi- Fi connectivity, the smart notice board can seamlessly receive and displayreal-timeinformation, includingannouncements, updates, and schedules.Anychanges or new announcements can be instantly updated on the notice board ensuring that users are kept informed up-to-date. The Arduino acts as the brain of the system, controlling the display, processinguserinputs,andmanagingthewirelesscommunication.Withitsuser-friendlyinterface andcustomizablefeatures,thesmartnoticeboardprovidesaconvenientandefficientwaytoshare information. The Firebase platform is highly effective and extensively utilized, and it has the potentialtosignificantlyimprovethefeatures andabilitiesofasmartnoticeboard.With Firebase authentication, administrators can control who has the ability to create or edit content on the noticeboard,ensuringthatonlyauthorizedindividualscanmakechanges. Thesefeaturesenhance thefunctionality,security,anduserexperienceofthesmartnoticeboard,makingitapowerfuland efficient communication tool. This smart notice board has the potential to revolutionize communication and transform static information displays into dynamic and interactive hubs of information.

ESP8266WIFIMODULE

Popular Wi-Fi modules like the ESP8266 are frequently utilized in IoT (Internet of Things) applications, such as smart Wi-Fi notice boards. It is based on the ESP8266 chip, a modulethatcombinesamicrocontrollerandaWi-Firadio.Thebreakdownofhowitworksisas

follows:

TheESP8266module's featuresinclude:

- Wi-FiConnectivity:ByenablingdevicestoconnecttoWi-Finetworks,theESP8266 module enables communication and data exchange betweenthem over theinternet.
- Microcontroller:Themodulehasarobust32-bitmicrocontrollerthatcanexecuteuser-defined code and manage several elements of the Wi-Fi-enabled smart noticeboard.
- TheESP8266module'sGPIOpinsserveasameanstoconnectexternaldevices,such as sensors and LEDs, through general purpose input/output.
- Storage:Thenoticeboardcontainsanintegratedflashmemorythatmaybeusedtohold any necessary programe code, web pages, orotherdata.
- Programming: Developerscan access the module easily as it canbe programmed using multiple programming languages and frameworks such as the Arduino IDE, Micro Python, and Lua. It also offers flexibility.

2. LITERATURESURVEY

This research paper presents a cost-effective, portable, wireless electronic notice board that facilitates information exchange over a network The study primarily concentrates on guaranteeing data authenticityand security. The device employs Bluetooth andZigBee are two wirelesstechnologiesintegratedwithinAtmel'sATmega32microprocessor.Itisnoteworthythat the notice board's display component is a 128x64 graphical LCD based ontheKS0108. [1]

A digital notice board that complies to Internet of Things (IoT) principles is created using the Raspberry Pi. This technique makes it easier to post notices online and show informationonadigitalnoticeboard.Registereduserscanalsogetnotificationsontheir Android phones, and it allows remote updating of notices via the website. This research aims to investigate the basic idea of a digital display that uses a Raspberry Pi the Internet of Things context. The notice board can be updated by an administrator using a dedicated website accessible on the internet. This enables the rapid transmission of data to any location, with display updates occurring within seconds. The data transmitted typically consists of text and images. A personal computer is used for information storage and transmission, while the Raspberry Pi connects to the PC via Wi-Fi at the receiving end. [2]

The primary focus of this paper is to address the challenges associated with sending and monitoring numerous notices on a daily basis. Currently, this process requires a dedicated individual to handle the notices. To overcome these limitations, the paper proposes an advanced notice board system. The system features a scrolling display that is specifically designed for schools and colleges to continuously display everyday information. The system provides a more efficient display of flash news compared to traditional programmable systems by using Wireless Fidelity (Wi-Fi) technology. Furthermore, a keyboard-based display scheme can be utilized in various publicareas like hospitals,railwaystations,colleges,hotels,and malls.The display board that scrolls is made up of two parts: a receiver and a toolkit for programming shows. Messages arereceivedbythereceiverviaaserialportandarethendisplayedafterbeingconvertedintocode. [3]

Thepurposeofthisstudyistoreporttheresultsofaprojectthataimedtodevelopawireless electronic notice boardthat couldcontrol how datais displayed. across multiple displaysina particularspace.Thenoticeboardisdesignedtoreceiveinformationfromacentralcontrolunitvia a serial communication protocol andthen displaythat information accordingly. The paper provides an overview of the project'sresults and outcomes. [4]

Institutions,organisations,andpublicutilitiesregularlypostinformationonnoticeboards

in places like parks, train stations, and bus stops. However, the task of managing and updating these boards on a daily basis can be difficult and may necessitate the employment of dedicated personnel. Although traditional bulletin boards can provide comprehensive information to the public,keepingthem up-to-date can be achallenge.Theobjective ofthisundertakingistotackle theseobstaclesbycreatingasophisticatedannouncementboardwithcutting-edgefunctionalities. The setup will employ a Node MCU, allowing users to updatethe bulletin board from a distance via Google voice assistant. This will grant users the liberty to append, delete, or revise the text exhibited on the board in accordance with their particular prerequisites. [5]

Advancements in technology have significantly improved human life, as seen in the transitionfromlandlinephonestosmartphones.Nowadays,individualsaresurroundedbysmart devicesthathavereducedtheneedforhumaninterventioninperformingmanualtasks.Onearea where physical effort remains high is in advertising or displaying notices through traditional paper-basedmethods.Toaddressthisissue,microcontroller-baseddigitalLEDboardshavebeen introduced.Messagescanbeprogrammedintothemicrocontrollerthroughtheboards,whichare thendisplayedontheLEDboard.However,modifyingthemessagenecessitatesreprogramming the microcontroller each time. This paper concentrates on creating an IoT-based LED display board in real-time using ESP32 andArduinoto overcome this challenge. The system integrates novel wireless IoT technology, obviatingthe need for manual reprogrammingand allowing for real-time updates ofmessages on the LED board. [6]

The current paper showcases the creation of an intelligent display system that utilizes the Internet of Things (IoT) concept. The system's primary purpose is to present class schedules at the entrance of classrooms within educational institutions. The display comprises ofa series of LEDs arranged in four linesof text, each line containing 8x32 LEDs . The primary interface of the program permits the user to enter data for every time slot of the day, whichincludes the name or number of the room, the discipline being taught, and the academic year linked to the discipline. The information is saved in a file and sent to the display controller from a remote location. Whenever alterations are necessary, the file can be retrieved without having to re-edit all fields. This display system is useful for managing the schedules of many rooms at other facilities, where a responsible person is in charge. [7]

This article presents a wireless digital notice board system that provides a fresh and intelligent method for sharing information. The notice board utilizes wireless technology and includes an LCD display, as well as a password-protected, SMS-based system. To enhance the system's versatility, a multiuser notice management and display system has been implemented, allowingmultiplenoticestobedisplayedsimultaneously.Furthermore,usershavethecapability to print specific notices that are of particular interest to them. A simple logic and a robust algorithm were used in the system's design. It uses an LCD, GSM module, midrange PIC microcontroller, as well as other readily available electronic parts. This guarantees that the system is efficient, dependable, and cost-effective.. [8]

An LED display system for colleges and universities is discussed in this study. It broadcastsdailynewsorannouncementsduringbusinesshours.ThesystemmakesuseofGSM technology, which shows flash announcements or news more quickly than conventional programmable systems. A receiver and a display board make up the LED display system. An Arduino can be used to reprogram these parts. The technology serves as an electronic notice board that instantly displays critical information without any latency problems. Regardless of locationor requirement,theLEDdisplaysystemisalsohighlyversatileandcanreadilyscaleup to add more displays. [9]

Constructionofawirelesslyremote-controllablenoticeboardistheprimarygoalofthis project. utilizing an Arduino board and an Android OS smartphone. With the progress of technology, information is evolving into a more

dynamic and interactive state, and is shifting away from regular notice boards to centralized control systems that incorporate Wi-Fi. The current approach of having notice boards placed in differentlocations poseschallenges forusers whoneedto physically access each boardtooperate it. In this system, the main controller is an Arduino board, acting as the master, while four other Arduino boards serve as slaves. The data is transmitted from one location to the next using shift registers, creating a gradual scrolling effect. Each slave line in the system displays different data that is received from the master and scrolls accordingly. [10]

Semiconductors have taken over in recent times, resulting in LED light sources rising in popularity due to affordability. The project's authors centered on using LEDs in graphic displays withthemaingoalofcreatingaflexiblesystemthatcouldbealteredtosuitmultipleapplications. Thiswasdonebycreatingsimilarsegmentsthatcouldbeeasilymergedwhenneeded.Thedevice might be used to produce a straightforward one-segment clock or a more complex display for advertising.The 8-bit shift registersoperatetheLEDmatrices. These shiftregistersarecontrolled by AVR microcontrollers. The RS232 interface facilitates communication between the microcontrollerandapersonalcomputer.Thisallowsforthedisplaytobedrivenusingthe TCP/IP protocol. [11]

Information is often spread through the use of digital notice boards in institutions, organizations,and publicutilitylocations. However,managingandsendingmultiple notices ona daily basis can be a burdensome task, requiring dedicated personnel. This paper presents an advancednoticeboardsystemthataddressesthesechallenges.OurproposedsystemutilizesGSM technologyandsmartphonestowirelesslytransmitnoticestothenoticeboard.Additionally,users receive automatic notifications on their smartphones through the parse cloud service.The ATMEGA 328 microcontroller, programmed in the C language, runs the system. When a registeredsmartphoneuserdeliversamessage,theparsecloudusesreal-timeparsingtodisplayit on the notice board. Additionally, other users receive automatic notifications ontheir smartphones.Furthermore,thesystemcanbecompatiblewithmultiplewirelesstechnologies,and IoTconnectivityallowsforautomaticstatusupdatesofthenoticeboardsoncellulardevices. [12]

This paper focuses on addressing the challenges associated with updating information on noticeboardsbyintroducinganSMScontrolledE-noticeboardthatenablesautomaticandremote updates. Thestudyconcludes that GSMtechnology can beeffectively utilizedinvarious systems and contexts. The system utilizes a GSM module toreceive the required messagetobe displayed, which is transmitted as a message. The received SMS is then sent to the microcontroller via the COM port for validation,and finally,the message is displayed on theLCD display. [13]

3. PROPOSEDSYSTEM

Theproposedsystemforadigitaldisplaymoduleisconnectedtoamicrocontrollerinthe suggestedWi-Fi-basedsystemforaSmartNotice Board,andthemicrocontrollerismanagedby a web or app interface. This system is designed to provide an efficient and flexible way to display information in a dynamic and interactive manner. The Smart Notice Board usingWi-Fi technology offers numerous advantages over traditional physical notice boards, including easy updatingandmanagementofdigitalcontent,real-timedisplayofinformation,remoteaccessand control, and the abilityto displaydynamic and interactive content.

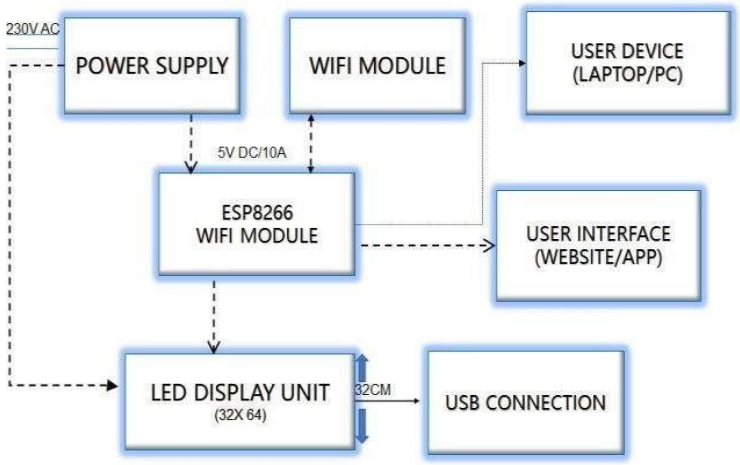

Figure1.Proposedsystem

InFig1.1theWi-Firouteris usedtoestablisha wirelessconnectionbetween theSmart Notice Board and the user's device. The ESP8266 Wi-Fi module is connected to the Arduino boardand allows forWi-Ficonnectivity. Thedisplaymodule, whichcouldbean LEDscreen or any other type of display, is connected to the Arduino board. The user interface, such as a web orapp interface, allows the user tosend messages orupdates to the Smart Notice Board, which are then sent through the Wi-Fi network and received by the Wi-Fimodule.

TheWi-FimoduleandArduinoboardconnectwitheachotherviaserialcommunication, with the Arduino board serving as the Smart Notice Board's primary controller. The Smart Notice Board can detect changes in its environment thanks to the sensors, which include a PIR sensor, which are also connected to the Arduino board. An Arduino-based smart Wi-Fi notice board is a project that combines the capabilities of an Arduino microcontroller and Wi-Fi connectivity to create a electronic notice that board can display notifications, and other information.Itcanbeausefultoolfordisplayingdynamiccontentinhomes,offices,schools,or otherenvironmentswhereinformationneedstobeshared.Overall,thisblockdiagramrepresents the basic architecture ofa Smart Notice Board usingWi-Fi

4. EXPERIMENT

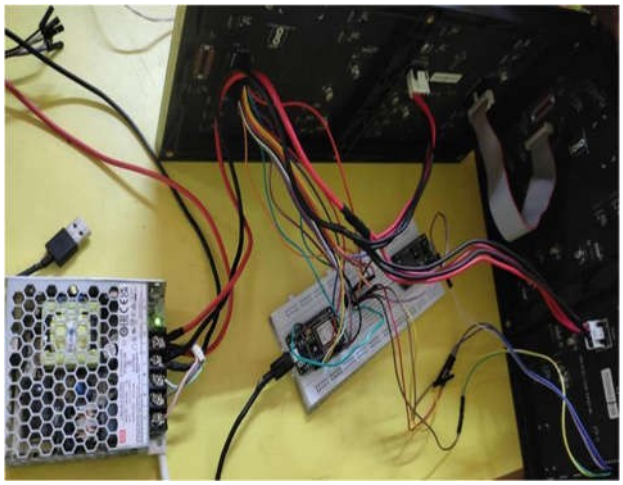

Figure2.ConnectionofP5MatrixDisplayUnit

In Fig 1.2, the connections with the hardware components for P5 display unit is shown. This set-upshowstheconnectionforp5matrixdisplay.HereweuseSwitchmodepowersupplyforthe power supply which is connected with the help of jumping wires. Also, we use Breadboard and ArduinoUnoforinterfacingwith the ESP8266module.We useWi-Fi networkfortransmission ofMessages.HUB75isinterfacedfromP5panelto BreadboardthroughjumpingwiresforthePin configuration.

Webapplication

Here, we have used Firebase to create a website that serves as the user interface and the web URL is mapped with website to Arduino, which serves as a platform to connect with ESP8266. The ESP8266 writes the data to the P5 display, which displays the information to the user. Firebase plays a critical role in this process by providing a reliable and scalable platform for hosting your website and storing and synchronizing data.

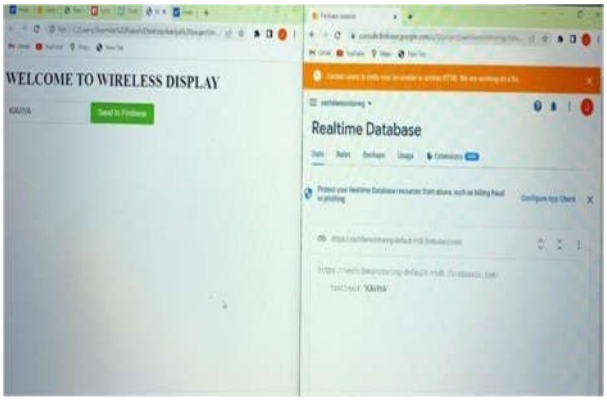

Figure3.Webapplication

In Fig 3. shows the Web Dashboard for display and we have used Firebase hosting to host the website and make it accessible to users ontheinternet.

InFig4. shows theinterfacingofWebAppfor displaytouseFirebase authentication to restrict access to certain parts of website and ensure that only authorized users can view and interact with application.

Figure4.InterfaceofWebAppforWirelessDisplay

A smart notice board using Wi-Fi and Arduino can display a variety of information, such as messages, news headlines, weather updates, are shown. Here are the steps how the output could be displayed:

STEP1:Whenthedeviceispoweredon,itwilldisplayawelcomemessageorlogoonthe

screen.

STEP2:IfthenoticeboardisconnectedtoWi-Fi,itwillconnecttotheinternetandstart receiving data from a remote server or API.

STEP3:Thedatareceivedfromtheservercanbeinvariousformatssuchastext,images,or videos. The Arduino board can decode the data and display it on the screen.

STEP4:Iftherearеanynewmessagesorupdates,theywillbedisplayedonthescreeninreal- time.

STEP5:Theboardcanalsobeprogrammedtodisplayalertsornotificationsincaseofany emergency situations or important events.

STEP6:Theboardcanbecontrolledremotelythroughasmartphoneapporawebinterface. This allows users to updatetheinformationon the board from anywhere and at anytime.

STEP7:Theboardcanbecustomizedtodisplayinformationthatisrelevanttotheusers,such as reminders, schedules, and to-do lists.

5. OUTPUT

Figure5.DisplayofWirelessNoticeBoa

In figure 5. A smart notice board using Wi-Fi and Arduino can display a variety of information, such as messages, news headlines, weather updates will be shown. Here are the steps how the output could be displayed:

STEP1:Whenthedeviceispoweredon,itwilldisplayawelcomemessageorlogoonthescreen.

STEP2:Ifthenoticeboardis connected toWi-Fi,itwillconnecttotheinternetandstartreceiving data from aremote server or API.

STEP3:Thedatareceivedfromtheservercanbeinvariousformatssuchastext,images,orvideos. The Arduino board can decode the data and display it on the screen.

STEP4:Iftherеareanynewmessagesorupdates,theywillbedisplayedonthescreeninreal-time.

STEP5:Theboardcanalsobeprogrammedtodisplayalertsornotificationsincaseofany emergency situations or important events.

STEP6:Theboardcanbecontrolledremotelythroughasmartphoneapporawebinterface.This allows usersto update theinformation onthe board from anywhere andat any time.

STEP7:Theboardcanbecustomizedtodisplayinformationthatisrelevanttotheusers,suchas reminders,schedules, and to-do lists.

6. CONCLUSION

The combination of Wi-Fi, Arduino, and Firebase in a smart notice board system offers a dynamic and interactive way to share information. It simplifies the process of updating and displaying messages, enhances user engagement, and provides a flexible platform that can be customized to meet specific requirements. Whether in educational institutions, offices, or public spaces, a smart notice board using Wi-Fi and Arduino technology is a valuable tool for effective communication.

7. REFERENCES

[1] Sharma, Dharmendra Kumar, Vineet Tiwari, Krishan Kumar, B. A. Botre, and S.A. Akbar. "Small and medium range wireless electronic notice board using Bluetooth and ZigBee." In 2015 Annual IEEE India Conference (INDICON), pp. 1-5. IEEE, 2015.

[2] Kumar, Venkatesh S., S. Amirthasri, M. Ananya, and S. Esther. "A Novel Method of IoT BasedSmartNotice Board Using Raspberry PI." In2022 International ConferenceonComputer,Power and Communications (ICCPC), pp.60-64.IEEE,2022.

[3] Poudyal, Suman, Rajena Pradhan, Deepak Rasaily, Sabina Sharma, Tenzing Sherpa, Mukesh Kumar Sharma, and Abishek Pradhan. "Wi-Fi Based Scrolling Digital Display With RTC using Arduino." In 2019 2nd International Conference on Intelligent Communication and Computational Techniques (ICCT), pp. 199-202. IEEE, 2019.

[4] Simha, Kruthika, Chethan Kumar, C. Parinitha, and ShashidharTantry. "Electronic notice board with multiple output display." In 2016 International Conference on Signal Processing, Communication, Power and Embedded System (SCOPES), pp. 1558-1561. IEEE, 2016.

[5] Singaram, M., A. Pramodh, P. J. Harini, R. Praveen, S. Hari Pranav, and K. Vijayakumar. "IOT based LED Electronics board." In 2022 International Conference on Innovative Computing, Intelligent Communication and Smart Electrical Systems (ICSES), pp. 1-5. IEEE, 2022.

[6] Anuradha, P., and K. SaiTheja. "IoTBased Real Time LED Display Board." In2022 International Conference on Recent Trends in Microelectronics, Automation, Computing and Communications Systems (ICMACC), pp. 1-4. IEEE,2022.

[7] Szolga, LorantAndras, and Mihai Boca. "LED Display for Timetables Controlled by IoT." In 2021 International Conference on Electrical, Communication, and Computer Engineering (ICECCE), pp. 1-5. IEEE, 2021.

[8] Morsalin, Sayidul, Abdur Rahman, Abu BakarSiddiqe, PrattaySaha, and Reduanul Halim. "Password protected multiuser wireless electronic noticing system by GSM with robust algorithm." In 2015 2nd International Conference on Electrical Information and Communication Technologies (EICT), pp. 249-253. IEEE,2015.

[9] Pawar, Pooja, SuvarnaLangade, and MohiniBandgar. "A paper on IoT based digital notice board using arduinoATMega328." Int. Res. J. Eng. Technol.(IRJET) 6, no. 3 (2019):7509-7513.

[10] Kulkarni,PrasadP.,ShubhamV.Patil,BalasoR.Shingate,VIKASN.MALI,SUMITS. THOKE,and SAGAR N. PAWAR. "Wireless Digital Electronic Notice Board Using Wi-Fi." International Journal of Innovations In Engineering Research And Technology (IJIERT) 5, no. 4 (2018).

[11] Swiatkowski, Michal, KlaudiuszWozniak, andLukasz Olczyk."Studentnotice board basedonLEDmatrix system controlled over TCP/IP protocol." In 2006 International Students and Young Scientists Workshop-Photonics and Microsystems, pp. 59-60. IEEE, 2006.

[12] Jacob, T. Elizabeth Darryl, K. Indhumathi, and C. Aarthi. "Real Time Digi-Notice Board System using IOT." In International Journal of Engineering Research & Technology (IJERT). RTICCT-2017 Conference Proceedings, 2017.

[13] Mishra, Payal, Pinki Singh, and Shivani Gupta. "SMS based wireless notice board display using gsm mobile." International Journal of AdvanceResearch in Science and Engineering (IJARSE)2, no. 10(2013).