ISSN 2455 – 9091
IJCSET MARCH Volume 9 Issue 3
International Journal of Computer Science Engineering and Technology (IJCSET)
https://www.doi.org/10.5281/zenodo.8382136

IOT BASED HOME AUTOMATION SYSTEM

[1] Sandela Kiran Kumar
[1] Assistant Professor,
[1] Department of Computer Science Engineering,
[1] St. Martins Engineering College,
[1] Secunderabad, Telangana.

ABSTRACT: This project proposes the development of a home automation system using Wi-FiandESP8266. Thesystemwillallowuserstocontrolvarioushouseholdappliancessucha slights, fans, air conditioners, and electronic devices using their smart phones or other connected devices. The proposed system will use the ESP8266 microcontroller, which has Wi-Fi capabilities, to connect to the internet and receive commands from the user's device. The system will use a web interfacethatwillallowusersto control and monitor their devices remotely. The web interface will be hosted on a local server, and the system will use MQTT protocol for data communication. We created the Flutter application to turnonandofftheallhomeappliances through the application.

1. INTRODUCTION

Homeautomationreferstotheapplicationofcomputerandinformationte chnologyforcontrolofhomeappliancesеasily.Homeautomationforthee lderlyanddisabledcanprovide increased quality of life for persons whomightotherwiserequirecaregiversorinstitutionalcare.Thepopulari tyofhomeautomation has been increasing in recent yearsduemuchhigheraffordabilityandsimplicitythrough Smartphone and tablet connectivity. Internet of Things (IOT) is a concept whereeachdeviceisassign to an IP Address and throughthatIPaddressanyone makes that device identifiable oninternet. Themechanicalanddigitalmachinesare providedwith unique identifiers (UIDs) and the ability totransfer data over a network without requiringhuman-to-humanorhuman-to-computerinteraction. Basically, it started as the “Internetof Computers.” Research studieshave forecastan explosive growthin the number of “things”or devices that will be connected to the Internet. The resulting network is called the “Internet of Things” (IoT).

Therecentdevelopmentsintechnologywhichpermittheuseofwirelessco ntrollingenvironmentslike, Bluetooth and Wi-Fi that haveenableddifferent devices to have capabilities of connecting with each other.It will indirectly reduce the cost of this system.Eachoftheconnectionhastheirownuniquespecificationsandap plications.

2. Problem Statement

The traditional home automation systems are often complex and expensive, making it difficult for the common house hold to adopt them. Additionally, many of these systems are not easily accessible from a remote location, makingitchallengingtomonitorandcontrolhomeappliances when away from home. The proposed IoT based home automation systemaimstoaddress these issues by providing an affordableand user-friendly solution that can be accessedfrom anywhere using a smartphone application. Thesystemwillsimplifytheautomationprocess and reduce the complexity of the system whileensuring that it is accessible to a wider audience. By using the ESP8266microcontroller and Flutter framework, the system willprovideacost-effectiveandefficientsolutionthatwillenable users to control all home appliances fromasingleplatform.

3. PROPOSEDSYSTEM

The proposed system consists of two primary components: the hardware and the software. The hardwarecomponentincludes the ESP8266microcontroller, whichisusedtocontroltheappliances, whilethesoftwarecomponentincludes the Flutter framework, which is used todevelopamulti-platformapplicationforcontrollingtheappliances. The followingsectionsprovideadetailed descriptionoftheproposedsystemcomponents.Thehardwareco mponentofthesystem consists of the ESP8266 microcontroller, whichactsasthecentralprocessingunit(CPU)ofthesystem.TheE SP8266isalow-cost,Wi-Fienabledmicrocontroller that can be easily programmedusingtheArduinoIDE.TheESP8266communicate s with the home appliances usingvariousprotocols,suchasInfrared(IR)orRadioFrequency(RF)communication.Tocontroltheappliances,theESP8266iscon nectedtoarelay boardthatswitchestheappliancesONorOFFbasedontheuser'sco mmands. The relay board is connected to theESP8266 via GPIO pins, and the appliances areconnectedtotherelayboard.Thesoftwarecomponent of the system consists of the Flutterframework, which is used to develop a multi-platformapplicationforcontrollingtheappliances.Flutterisanop en-sourcemobileapplication development framework that allowsdevelopers to create high-performance, visuallyattractiveapplicationsforbothAndroidandiOSplatform s.Theapplicationisdesignedtoprovide users with an easy-to-use interface forcontrollingtheappliances. Theusercanturn ON or OFF the appliances, settimers, and create custom schedules for the appliances. The application communicates with the ESP8266using Wi-Fi, and the ESP8266 responds to the user's commands by switching the appliances ON or OFF.

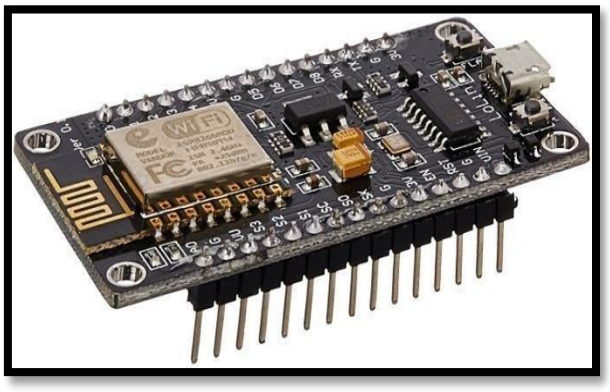

Figure-1:NodeMCUESP8266

ADVANTAGES:

User-friendly: The system is easy to use, and the smartphone application providesasimpleandintuitive interface for controlling the appliances. Multi-platformsupport: The system is designed to work on both And roid and iOS platforms, making itaccessibletoawideraudience.

Cost-effective: The use of the ESP8266microcontroller and the Flutterframeworkmakesthesystemaffordablecomparedtotraditionalhomeautomationsystems.

Energy savings: The system allows users to setschedulesandtimersfortheirappliances, reducing energy consumption and saving moneyonelectricitybills.

Convenience: The system enablesuserstocontroltheirhomeappliancesfromanywhereusing a smartphone application, providing addedconvenienceand flexibility.

Components Used

Hardware Requirements:

IOTdevice :NodeMcu(ESP8266)
Router : Wifi
OS :Android,Linux,Windows,IOSBrowser
:Anywebbrowser
Webtool :Visualstudiocode.
Backend: php
Database :MySQL
Cloudplatform:000webhostappMethodology

TheproposedmethodologyfordevelopingtheIoTbasedhomeautomationsysteminvolves

The followingsteps:

Hardware Setup: The first step involves settingupthehardwarecomponentsofthesystem,including the ESP8266 microcontroller and therelay board. The ESP8266 is connected to the relayboard, which is then connected to the home appliances. Software Development: The next stepinvolvesdevelopingthesoftwarecomponentsofthesystem,including thesmartphone application. The Flutter framework is used to develop the application, which is designed to communicate with theESP8266microcontroller over Wi- Fi. Integration: Oncethehardwareandsoftwarecomponentsaredeveloped,thenextstepinvolvesintegratingthemtocreateafunctionalsystem. Thesmartphone applicationisconfiguredtosendcommands to the ESP8266, which processes thecommands and switches the appliances ON orOFFaccordingly.Testing:Thefinalstepinvolves testing the system to ensure that it isfunctioning correctly. The system is tested forvarious scenarios, including turning appliancesON and OFF, setting schedules and timers, andcreatingcustom controlsettings.

WorkingModules:

Hardware module: This module comprises thehardware components of the system, includingthe ESP8266 microcontroller, relay board, andthe home appliances. The hardware module isresponsible for processing commands from thesmartphoneapplicationandcontrollingtheappliancesaccordingly.

Wi-Fi module: This module is responsible forestablishingaWi-FiconnectionbetweenthesmartphoneapplicationandtheESP8266microcontroller.TheWi-Fimoduleenables the smartphone application to send commands to themicrocontrollerover awirelessnetwork.

Smartphoneapplicationmodule:Thismodulecomprises the smartphone application developedusingtheFlutterframework.The applicationmodule is responsible for sending commands totheESP8266microcontrollertocontroltheappliances, setting schedules and timers for theappliances, and creating custom control settings.Control module: This module isresponsible forprocessingthecommandsreceivedfromthesmartphoneapplicationandcontrollingtheappliancesaccordingly.Thecontrolmodulecommunicateswiththehardwaremoduletoswitch the appliances ON or OFF based on thereceivedcommands.

Storage module: This module isresponsible forstoring the schedules, timers, and custom controlsettings for the appliances. The storage moduleenablesuserstocreatecustomschedulesandsettingsfortheirappliancesandensuresthatthesesettingsareretainedevenifthe microcontrolleris resetor powered off.

4. LiteratureSurvey

In this paper [1] the author experimented, theimplementedsystem'sthatisconnectallthedevices with the sensors and the automatedhomeis controlled by the controller. But there is somelackingintheotherexistingsystem. Thesecurityisalittlebitweakinthatobservedprocess.Inourhome automationsystem,there are huge benefitsthan the othersystems. Our system controls all the instrumentsofourhousethroughmobilephonesorcomputers.The systemwebuild thereisnolackinginsecuritybecauseweimprovedthesecuritysystemofourproposedsystem.Oursystemismuchsecurebecauseher eweuseidentical eyeretinascanpattern.

Inthispaper[2]theauthorexperimented,the projectedsystemisenforcedvictimisationNodeMCUbyovercomingallthedrawbacksofpreviousexistingstrategiesduringthisprojectallthesensorssquaremeasureconnectedtotheNodeMCUboardandtherefore results may be seen in phone. for eachsecond it shows new worth The camera moduleis connected to the Arduino UNO board as aresult of in Node MCU board we've just oneanalog pin for camera module we are going touse lot of analog pins. The captured pictures aregoing to be holdon in folder of our computerand,itsendsCapturedpictures totheuseremail.

Inthispaper[3]theauthorexperimented,association with the server, the information of devicesquaremeasuresenttothewebserverfor checking of the framework. The web serverpagethatisreadytoswitchtoscreenandmanagement the framework. By stepping intothedistributedsubjectaddressinsidenetprogram this internet server page willshow up.The web server offers the

data relating to thetemperature in higher places of the house andmovementstateinsidethehouse.Alltherequireddatais place awayinsidethecloud.

CONCLUSION

In conclusion, the IoT based home automationsystem is a practical solution for homeownerslookingtoautomatetheirhomesandcontroltheir appliances from asmartphone application.ByintegratingtheESP8266microcontrollerwith a relay board and developing a smartphoneapplication using theFlutter framework, userscancontroltheirappliancesremotelyandsetcustomschedulesandcontrolsettings.Thesystem'smodulardesignenableseasymaintenance andscalability, and the use of Wi-Ficonnectivityallowsforseamlesswirelesscommunicationbetweenthe smartphoneapplication and themicrocontroller.The proposedsystemoffersseveraladvantages,includingimprovedenergyefficiency,enhancedconvenience,andgreatercontroloverhomeappliances. It also provides an opportunity forfutureenhancementssuchasvoicecontrol,machine learning, and energymonitoring. Overall, theIoTbasedhomeautomationsystemrepresentsapracticalandscalablesolutionforhomeownerslookingtoautomate their homes and improve their qualityoflife.

Future Enhancement

Voicecontrol:Addingvoicecontrolfunctionalitytothesmartphoneapplicationwouldenableuserstocontroltheirhome appliances using voice commands. This wouldenhance the usability of the system, particularlyforindividualswithdisabilitiesormobilityissues.

Machine learning: Integrating machine learningalgorithmsintothesystemcould enable it tolearn from the user's behavior and automaticallyadjusttheappliances'settingsbasedontheirpreferences.Thiscouldimprovethesystem'sefficiencyandreducetheneedformanualintervention.

Security features: Adding security features suchastwo-factorauthentication, dataencryption, and userauthenticationcouldenhancethesystem'ssecurityandprotectuserdatafromunauthorizedaccess.

Energymonitoring: Adding energymonitoring Functionalitytothesystemcouldenableusers to track their energy consumption and identifywaysto reduce theirenergyusage.

Integration with smart devices: Integrating thesystem with other smart devices such as smartspeakers, smartthermostats,andsmartlockscouldcreateamorecomprehensivehomeautomationsystemandenhancetheuserexperience.

Solar power integration: Integrating the systemwith solar panels could enable users to powertheir home appliances using renewable energy,reducing their reliance on grid electricity andloweringtheircarbonfootprint.

REFERENCES

[1]. Nazmul Hossain, Md. AlamHossain, Rafia Sultana and Farzana Akter Lima “A Security Framework for IOT based Smart Home Automation System ”Jessore University of Science & Technology(JUST).

[2]. Sudha Kousalya, G.ReddiPriya, R.Vasanthi, and B Venkatesh “IOT Based Smart Home Automation” Aditya College of Engineering Madanapalle, Chittoor, India.

[3]. S.Hrushikesava , Dr.M.Nagabhushana Rao, N.Sudheer andP.Kavitharani“ IOT Based Home Automation System with Cloud Organizing” SiddharthInstitute of Engineering & Technology, Puttur, Andhra Pradesh.

[4].ShivanandS.Rumma“IoTBasedSmartSecurityandHomeAutomationSystem”GulbargaUniversity, Kalaburagi.

[5]. Ravi Kishore Kodali, Vishal Jain, SuvadeepBoseand LakshmiBoppana“IoT BasedSmart Securityand Home Automation System ”NationalInstitute of Technology, Warangal.

[6]. DaneshwariJotawar, KaveriKaroli, MohanraoBiradar and NyakantiewPyruth “IOTBASEDSMARTSECURITYAND HOMEAUTOMATION”AngadiInstituteofTechnology&Management,Belagavi,Karnataka,India.

[7]. J Preethi, S Sowmiya, Emotion recognition from EEG signal using ISO-FLANN with firefly algorithm, IEEE, 2016 International Conference on Communication and Signal Processing (ICCSP),1932-1936

[8].JPreethi,S Sowmiya, RShalini, A Survey on EEG Based Emotion Analysis Using Various Techniques, The International Journal of Science and Technoledge,2016/2/1, 35

[9]. S. Sowmiya, S. P. Yazhini,, Identification ofSatelliteImagebyUsingDPClusteringAlgorithmforImageSegmentationandClustering,JournalofChemicalandPharmaceutical Sciences,2017/2, 96-100

[10]. Ms. SowmiyaSekaranDr.J.Preethi, Mrs.Shalini Raju, A SURVEY ON LUNG TISSUECATEGORIZATION,2016 International Journal of Advanced Research inComputerEngineering&Technology, 270-275

[11].R Devaki,S Sowmiya, Minimization of Energy Utilizationin Wireless Sensor Networks, COMPUTATIONALMETHODS, COMMUNICATION TECHNIQUES AND INFORMATICS,233.