Embedded System based Smart Automation for Elderly and Disabled People

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ABSTRACT : Physically challenged people find difficulty in switching ON/OFF their home loads such as light, fanetc., and they require an attendee to do. This smart home automation will help the handicappedpatients and elderly people with locomotion problem.They can have control over the appliancesfrom anywhere in the house. This application is capable of tracking the location of a person throughGPS. Moreover, this device willdetect if a person has fallen down and inform his/her familymembers through mobile device, so that they can get help in time. Arduino microcontroller is used astheheart ofthis system.

PROPOSEDSYSTEM

Homeautomationhasbeenprovedtobeatremendousbenefitforthedisabledandelderly.HANDSFREE COMMUNICATION SYSTEM is designed so that disabled persons find it easy toperform the tasks. Turning ON/OFF light, fan etc.. is very difficult for the elderly or disabled. Thetechnology allows the lights and fans to be controlled with an app on a smart phone or a remotecontrol can be an excellent option for those who have trouble with mobility . Accidental fall ofelderly canalsobe alerted to the family members by pressing the alert button in the device.Microcontroller intelligence for operating different devices by taking input from the automationdevice.

INTRODUCTION

In recent years, there has been a significant increase in the population of elderly people due toincreasing life expectancy and few of them require help to meet their personal needs. Theywillprefer independent life in   home which will give comfort feel to them, and also reduces depression.In the point of economic view, the cost living cost at home with devices monitored and intelligentappliancesarequietlessexpensiveandalsobeneficialthanmedicalcentersandalsonursessuperv ising. Also, implementing the smart home system withmonitoring controls and the capabilityof healthcare will reduce the personal aid expensesat home. The aim of this smart home automationistoallowtheelderlypeople,handicappedanddisabledpeopletohavecontrolovertheappliance sby commanding the device without moving to the nearest control point. Additionally, it will track thelocation of the person and detect the accidental fall of elderly. Home automation with IOTwill behelpful the user to use the appliances of home by the devices being connected to the internet.Nowdays the modern houses are being automated with the internet such as automatic turning on/offlights, security/monitoring , smart door locks etc... This type of home appliances were controlled bythe wireless devices like laptop, tablet and smartphones.These type of appliances and devices havesensors being connected with the internet. Nowdays, homes are interfacedwith numerous electronicdevices –   From a TV to CCTV. When such devices being connected with software and internetthey became IoT. Smart home automation was tremendously helpful for elder people and physicallychallenged persons in such more ways. Here Both the embedded IOT technology is combined to givetheeffectivesolution forelderly and disabled persons.

WORKINGPRINCIPLE

Embedded system based smart automation has been proposed ultimately to help elderly people andthe disabled persons.They can make use of the technology.Here we have emergency switches whichwill automatically on/off fans,lights which will be more helpful for them.And also accelerometer

willchecktheirmovementsandwillsendmessagesaccordingly.Inthistypesystemarebeinginterfacedtoco nnectwithArduinomicrocontroller.ThesignalsarebeingtransferredbytheBluetoothmodule.The

authorized persons will receive the mesaages,notifications.Messages are send throughNode MCU wifimodule.Bluetooth network will be helpful for the user for controlling devices withtheranges of specification.
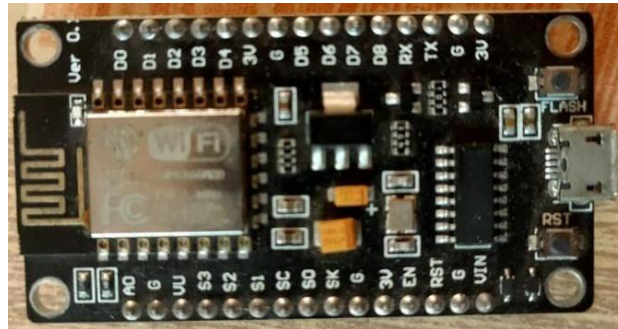
BLOCKDIAGRAM
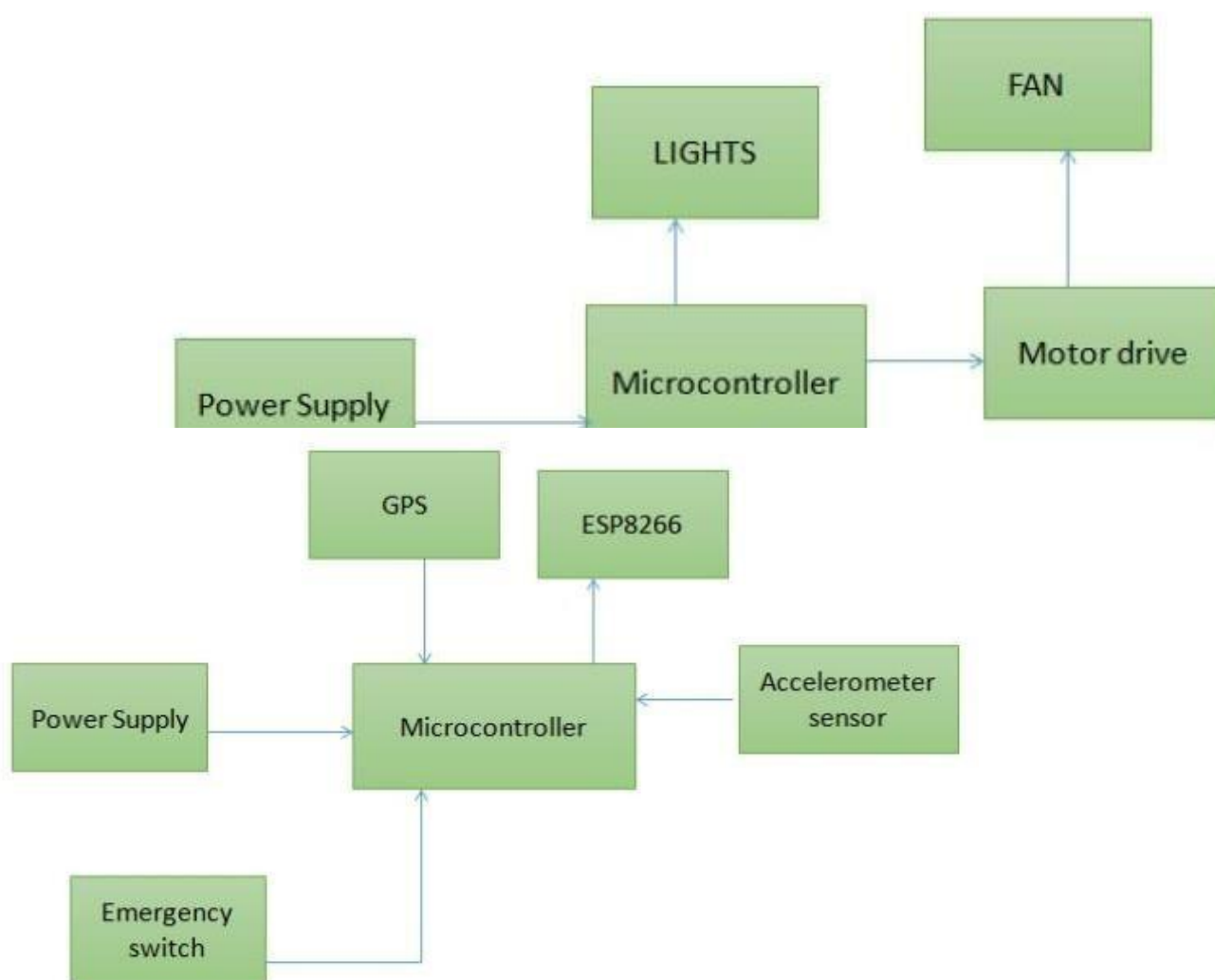
Figure1:Block Diagramoftheproject

HARDWARECOMPONENTS:

I.   Node MCU

Figure2:NodeMCU

Node mcu is based on the IoT platform and it's an affordable price.ESP8266 WiFi-SoCEspressifsystem is which is used to run on the frimware and ESP-12 module is a hardware are included inNode mcu .Node mcu project is achieve to develop the ESP8266.Lua scpriting language have beenused in this frimware and its based on the eLua project.it can be powered using micro USB port andVin pin.It has 4 Mb flash memory to store the program and the data. And also 128KB for RAM. Itcan be used for IOT projects. It has an inbuilt wi-fi module for wireless connection. It is an opensource firmware. It contains RAM, CPU ,modern operating system etc., Node MCU will providemoreconsistency and itwillbemoreaccessible forIoTdevelopers.

### II.   GPS

Figure3:GPS

GPS also known as (Global Positioning System) is a navigation basedsystem. Itis made upof atleastwithasatellitecountof24.GPSworksinallconditionsofweatherandworksallovertheworld and it works every second of the day. It has no setup charges or subscription fees. Exactlocation can be got by using this information and trilateration from GPS. Distance is measured GPSreceivers. Measuring the distance from satellites, the position of the user can be determined. And itcan be displayed. For calculation of 2-Dposition i.e., latitude and longitude, a minimum of 3satellites must be locked with receiver. For calculation of 3-D position, 4 or more than 4 satellites isused.Depending upon the time and location, a GPS receiver is capable oftracking 8 or moresatellites. With the measurement of distances from the satellites, the receiver will be able to identifythepositionofuserandalsodisplaythatelectronicallytomeasuretherunningroutes,tofindawayto
home etc.,Also the GPS receiver in our phone will listen to the signals and when the receivercalculates the distance with the help of four or more GPS satellites it will be able to figure out wheretheperson wasand alsoour earth was surroundedbynavigation satellites.

III. ACCELEROMETERSENSOR
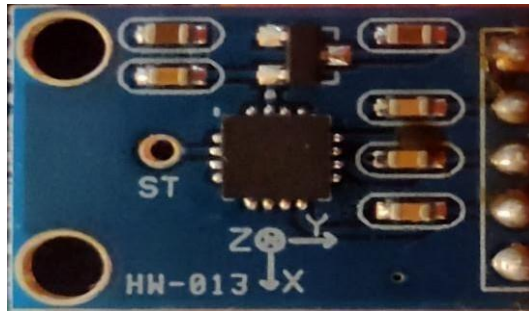
Figure4:Accelerometersensor

ADXL335 is accelerometer sensor. It uses Piezoelectric effect principle to work. Communicationwith other devices like Arduino analog interfacing is use. Any gesture controlling robots ,motiondetection oriented projects, smart phones and smart watches etc can use this device. Accelerometersensor will measure and give us the proper acceleration. A proper acceleration is defined as aacceleration of our body in its restframe andfromthe different coordinate accelerations. Theprinciple of accelerometer is dumped mass on spring. When the device gets accelerated the mass willbe displaced till the spring so that spring will move the mass easily,which will be the same rate thatwillbeequaltoaccelerationitsensed.Acceleromerwillconvertsmechanicalenergyintotheelectricalen ergy.Thusaccelerometerwillprovideusanaccurateaccelerationmovement,motion ,vibrationoftheuser.

IV. MOTORDRIVER:

The L293d IC (integrated circuit) is a typical motor driver which will allow only the direct current(DC) motor to drives inany direction.In this L293d has an 16 pin in aIC.This ICcan control thetwo set of DC motor instantaneously and it can be controlled separately or independently in anydirection. So we will be able to control the two DC motors with one L293d IC. The dual H-Bridgemotor IC driver will comes under the l293d IC .Motor driver will acts as autonomous between thearduino and the motors. The 16 pin L293d motor driver is having eight pins on each sides which willbe used to control the motors. Also it is the inexpensive and easy way for controlling the motor tointerfacethearduinowiththeL293dmotordriverIC.TheH-Bridgeisusedtocontrolthedirectionofrotation. ThisL293d motor driverishaving vcc1 andvcc2 as thetwo input powerpins.

V. TRANSFORMER
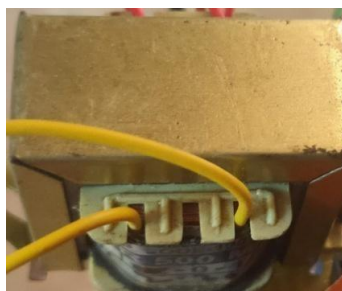
Figure5:Transformer

A transformer is defined as a passive electrical device which transfers electric power from one circuitto another of the same frequency. The voltage can be increased or decreased in the current rating inthe circuit. It is mostly use to decrease high AC voltage at low current or increase low AC voltage athigh current.In this system we use step down transformer. Itdowns230V to 12v.Itprovidesisolationbetweencircuitandpowergrids.Transformerisoperatedbasedontheprincipleofelectromagnetic induction. Transformer have magnetic core with two sets of windings called asprimary andthesecondary.

## VI.   PUSHBUTTON
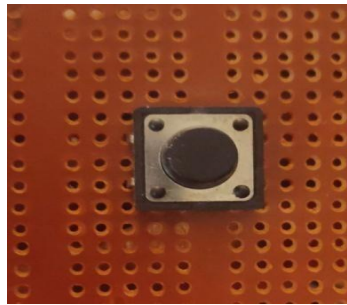
Figure6:PushButton

To control machine or a process a simple witch mechanism can be used. It is called as push button orsimply button. When push button is pressed it allows the power to pass on the circuit. When itsreleased, it breaks the circuit and stop passing power. It have been used in various applications likemechanical, eletrical and electronic home appliances, commercial and industries.some ordinary usesofpush buttonexamplearepush Buttontelephone, calculators,push buttonstart incar aswell.

CONNECTION:
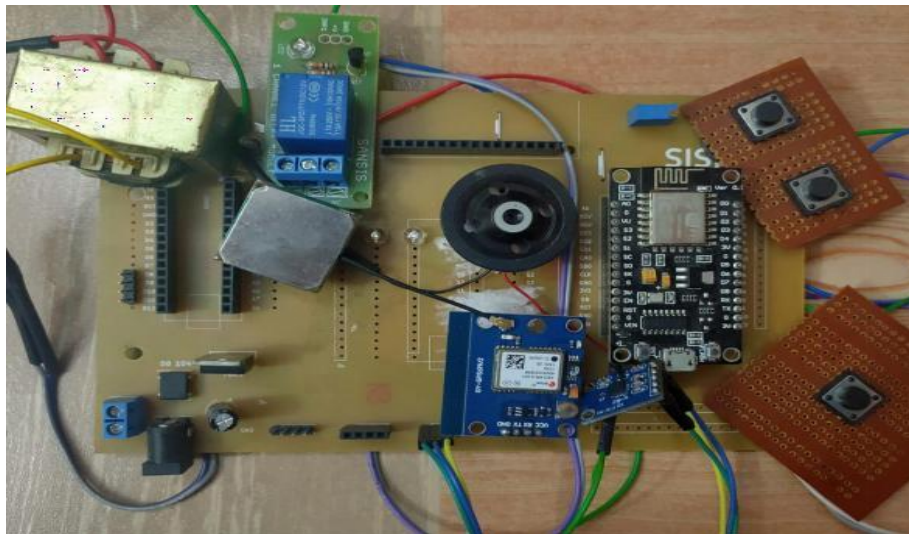
Figure7:Diagramof theconnection

Figure8:Initial resultofsoftware

OUTPUT
I.   SOFTWAREOUTPUT

II.   NOTIFICATIONSINMOBILE

Figure9:Alertnotificationsinmobile
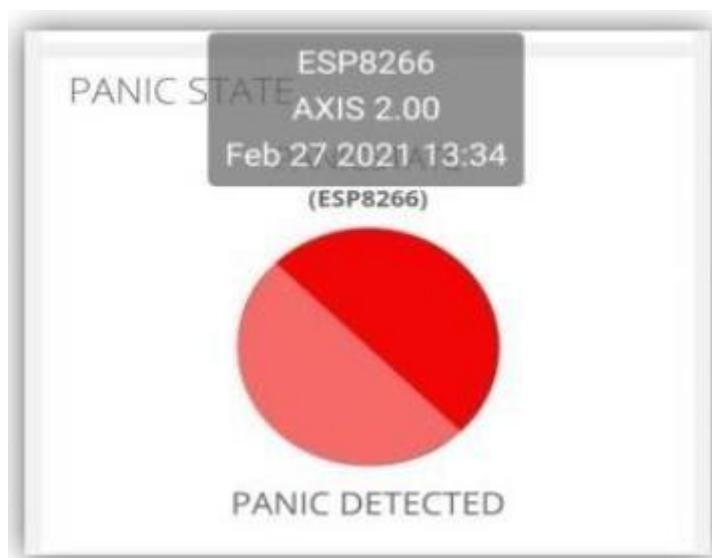
III. PANICSTATERESULT

Figure10:Outputof panicstate

IV. ACCELEROMETERSENSOR

Figure11:Outputofaccelerometersensor

CONCLUSION:

We conclude that, using various technologies home automation can be developed.This smartautomation is used formaking the physicallychallengedand older people beselfdependent.Infuture scenario , we can also use artificial Intelligence for further enhancement of this application.Also it will be helpful forthecaretakersof theelderly and physically challenged persons becausethey are getting immediate notification or message so that they can help them in

need of anyemergency situations and they can also the monitor the conditions of elderly and disabled personsmovementand healthconditions.

FUTURESCOPE:

➢ IOTplaysanimportantroleinalldifferenttechnologies.

➢ Microcontrollerisusedtocontrolappliances.

➢ Wi-Fimodecan beusedforcontrollinghomeautomation.

ADVANTAGES:

➢ Itprovidesgreatconvenienceandcomfort.

➢ Itisauserfriendlyapplication

➢ Itisvery costeffective.

➢ HomeautomationsystemusingWi-ficouldbeoperatedwiththehelpofwi-fimodetransmission.

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