IOTBASEDPETFEEDING SYSTEM

AMINIPROJECTREPORT

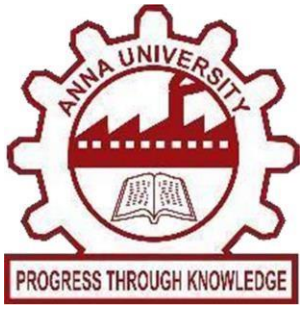
Submittedby

SOMESWARAN C 710022104045

Inpartialfulfillmentoftherequirementsforthedegree

Of

BACHELOROFENGINEERING IN COMUTER SCIENCE AND ENGINNERING



ANNAUNIVERSITYREGIONALCAMPUS COIMBATORE-641 046

ANNAUNIVERSITY,CHENNAI-600025 MAY2025

ANNAUNIVERSITY:CHENNAI-600025
BONAFIDE CERTIFICATE

Certifiedthatthisprojectreporttitled"**IOTBASEDPETFEEDINGSYSTEM**"isthe

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ACKNOWLEDGEMENT

Wewishtoexpressourdeepsenseofgratitudeandwholeheartedthanksto **Dr M SARAVANAKUMAR, MBA, Ph.D**., Dean, Anna University Regional Campus Coimbatore, for providing necessary facilities in the university to complete our project work successful.

Wewouldliketothankto**Dr.S.SARAVANAKUMARM.E.,Ph.D**.,Head of the Department of Electrical and Electronics Engineering, Anna University Regional Campus Coimbatore, for his kind support and providing necessary facilities to carry out the work.

Wewouldliketoexpressoursincerethankstodeepsenseofgratitudetoour gifted guide **Dr. S. SARAVANAKUMAR M.E., Ph.D**., Assistant Professor, Department of Electrical and Electronics Engineering,Anna University Regional Campus Coimbatore, for her valuable guidance, suggestions and constant encouragement paved way for the successful completion of this project work.

We also extend our sincere thanks to the entire **Faculty Members of COMPUTER SCIENCE AND Engineering** department who have rendered their valuable help in completion of this project.

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ABSTRACT

The aim of the **" IOT Based Pet Feeding System"**is to provide a viable and technically foundsolution to theproblem ofpet feeding when theowneris not at home.The project provides this option with minimal manpower and effort, through which the owner would be able to serve food to the pet even if he is sitting in any corner of the world. It uses the technology of Internet of Things to connect the entire system to the smartphones, wirelessly. The project uses minimal parts to serve the purpose, that are cheap and are also long lasting. Most importantly, it creates a two-way communication system between the ownerandthepetwhichisauniquefeatureoftheprojectthatisnotyetexploredinanyother similar projects. This system includes an additional IR sensor which can detect any type of motionanditwillmessagetoArduinoandtheArduinowillfurthersendanotificationtothe ownerwhocandecidewhethertogivefoodtothepetornot,theowneralsohastheoptionto manually postpone or prepone the timings of giving food to the pet.

LISTOFFIGURES

CHAPTER1

INTRODUCTION

Introduction:

In both the global economy and everyday life, automation is becoming increasingly necessary. Manual systems are being replaced by automatic systems.According to the findings, automatic feeding control will aid in the treatment of a variety of issues that pets experience as a result of irregular feeding patterns. Automation significantly reduces the need for human sensory and mentalrequirements,whilemechanizationprovidedhumanoperatorswithmachinestoassistusers withmuscularrequirementsofwork.Oneofthenewestinventionsforfeedingpetsistheautomatic pet feeder. It will help pet owners look after their animals when they are away from home. Pets can also be fed if their owners the are not at home. The automatic pet feeder is intended to assist petownerswithanimalcare.Anautomaticpetfeederisoneofthepetfeedersthatwillbeoperated byawirelessremotecontrol.Thewirelessremotecontrolwillruntheautomatedpetfeeder,which will automatically dispense predetermined amounts ofood at the times set by the user. The project'saimistoassistpetownersinfeedingtheirpetsontime,eventhoughtheyarenotathome. Aside from that, it may also assist the owner in understanding their pet's diet. It is important for the owner to consider the pet's diet in order to ensure that the pet is safe. This machine makes it easier for pet owners to feed their pets. The computer feeds the pet and sends the feeding information to the owner in one direction, and it feeds the pet and sends the feeding information totheownerintheother.Thecomputerwillstoprespondingforaperiodoftimeafterfeedingthe pet to ensurethat it does not overeat.When the numberofpeoplewhoown pets grows each year, so does the market for higher-quality pet care items have been increased. This has moved the Internet of Things (IoT) technology forward in this area. With Arduino Uno boards and Wi-Fi module, the three subsystems are linked to the local network. Furthermore, the information gathered by each sensor is processed and displayed on a smartphone app.

Motivation

As pet owners, users should be aware that their pets need careful dietary management as well. Life'sobligationscanalsohinderpetownersfromadequatelycaringfortheiranimals.Ifthe

customer is unexpectedly away from home or simply wants to focus on something else, they can be assured that their beloved pet will be cared for and fed on time, every time. The aim of this project is to make pet ownership easier for owners by providing an automatic pet feeder. Furthermore, we discovered a market gap while searching for a comprehensive framework for trackingandcontrollingthesethreedevices.Somepetcareapps,suchasPetsafe,onlyhaveafood feeder app rather than adding water dispensers and litter boxes to create an ecosystem.

Thefeeding and defecation roles of pet caresystems were included in the abovestudy. However, when it comes to a more in-depth health study, the data obtained by these three programmers is inadequate.Asaresult,thecurrentresearchaimstocombinethreebasicpetcaresubsystemswhile stillkeepingamoredetailedrecordofapet'shealthstatus.Asaresult,petownerscanuseamobile application to get a rundown of their pet's basic condition at any time and from any place.

Thentherareillnessesthatpetssufferfromasaresultofirrationalfeedinghabits,suchasobesity and overeating.

Fig 1.1: Dog description

CHAPTER2

LITERATURESURVEY

Introduction:

One of the issues with a dog's upkeep is daily feeding. Because of their jobs, owners sometimes neglect to feed their pets. The Smart Dog Feeder is the solution to these issues. This system will feed the dog on a daily basis without interfering with the owner's job. On their Android smartphone, owners can monitor anything they want to monitor like pet feeding and all. Smart DogFeedercanprovideRFIDauthentication,setfeedingtimeandportionperservingviaAndroid smartphone, send feeding report (completed or incomplete), and send dog arrival when feeding time arrives.[1]All feeding time, component, stock, and waiting totime settings will be rendered onAndroid,whichrequiresJellyBeanoftheversion,SDK18,andtheApplianceHubapplication tofunction.TheMQTTprotocolistheusedbytheSmartDogFeedertoobtainstockinformation, feedschedules,waittime,andtheowner'snamefromtheserverofsystem.[2]SmartDogFeeder, Android, and the server will process all information sent in JSONformat. Smart DogFeederwill savethescheduleandtriggertheRTCalarm,whichwillsoundwhenitistimetofeedthedog.The RFID tag attached to the dog's collar is checked during the authentication process. Food will be served and weighed by the load cell of the depending on the user's preferences. The experiment includespunctuality,portionaccuracy,settingdelivery,andsystemnotification.Asaresultofthe experiment, Smart Dog Feeder will receive messages from the server and feed at the appropriate time. More devices may be added to theAppliance Hub in the future.[3]

Over time, an increasing number of households started to have pets.As more pet owners struggled tofindtimetofeedtheiranimals,petfeederswerecreated.Petfeedersaredailyfooddispensersthat have been pre-programmed.[4] They are primarily timed, dispensing a certain amount of food at a specific time of day.A microcontroller is used to power the pet feeder, which is a programmable device. Users will be able to choose the food that will be served at their preferred time. [5]

One of the pet feeders that will be operated by a wireless infrared remote control is an automatic pet feeder. The automated pet feeder is operated by a wireless infrared remote control and will automaticallydispensepreset quantities offood at thetimes theuserspecifies.[6]Aspet owners, users should be aware that their pets need careful dietary management as well. Life's obligations canalsohinderpetownersfromadequately caringfortheiranimals.If usersareawayfromhome unexpectedlyorjustwantonelesschoreeotoworryabout,theycanrestassuredthattheirbeloved petwillbecaredforandfedontime,everytime.[7]Petownershipshouldbepleasure,nottaxing, andtheaimofthisprojectistomakerpetownershipeasierforownersbyprovidinganautomatic petfeeder.Theaimoftheprojectistohelpthepetownersfeedtheirpetsontime,evenwhenthey arenotathome.[8]Apartfromthat,itcouldhelptheownerunderstandtheirpet'sdiet.Toensure thatthepetishealthy,theownermustconsiderthepet'sdiet.Thismachinemakesiteasierforpet ownerstofeedtheiranimals.Thecomputerfeedsthepetandsendsthefeedinginformationtothe owner in one direction, and it feeds the pet and sends the feeding information to the owner in the other. The computer will remain quiet for a while after feeding the pet to ensure that it does not overheat.[9]

In2017apaperwaspublishedthathadthesamefunctionasoursintermsoffeedingthepet. However, the developer attempted to add a new feature into this system, which was a pet collar that was used to monitor the location of the pet.The biggest drawback is that it was made for pets whospendmostoftheirtimeathome,sousingatrackermakesnosense[10] Thisdevicewas developed as an alternative to manual feeding in the form of an automated feeding system. Thekey flaw we discovered with this system was that it relied on a web application to track and feed pets automatically. Since using a web application is not a viable choice, our device includes an Android application that can be accessed from anywhere.Thepaper “Automatic Pet Feeder Using Arduino via IOT” was published in the International Journal of Innovative Research in ScienceandTechnology(IJIRSET)onMarch3rd,2018.Asthenameimplies,thiswasasystemcreatedto automatically feed pets as an alternative to manual feeding. But the biggest drawback was that it wasbuilton Arduino,whichisn'tnecessarilyabadthing,butweprefertheRaspberryPi.“The StudyandApplicationoftheInternetofThingsin PetSystems,”apaperthatwaspublishedonline in January 2013 (http://www.scirp.org/journal/ait) and included Chinese students. The smart petdoor was the first gadget in the pet monitor scheme, and it can assist the pet owner in controlling their pet's behaviors. The smart pet feeder is the other unit. The pet owner could arrange the peteating bowl time remotely with the aid of the device.

CHAPTER3

METHODOLOGY

TheIoTbasedpetfeedersystemadoptsadynamiccontrolmethodology.Accordingtotheproposed plan,initially,theuserwillfirstfixthetimetofeedthepetasperthepet'sneed.Atthefixedtime, theuserwillreceiveanalertonthesmartphoneviaUIplatformseekingpermissiontofeedthepet, the user can also deny the same and postpone the time.

If the user gives the permission, then he would be asked for the number of doses to be given, followed by which it would send a signal to the Wi-Fi Module.

AfterreceivingthesignalfromtheuserthePIRsensorupondetectingthepetwouldsendasignal toArduino, which would permit the motor to dispense the food.

ExistingSystem

Programmable Pet Feeder and Smart Pet Care System are two examples of previous research on automatic feeders. They aren't specifically for feeding dogs, but rather for pets in general. A microchip PIC18F4520 microcontroller feeds the Programmable Pet Feeder automatically. The speed and positioning are regulated by a stepper motor, and the food is dispensed by a DC motor. Turn-Table is the name of the food dispenser, which is divided into four parts and can dispense various types of food. When feeding time arrives and the food is ready to be served, the buzzer rings. Users can utilize the LCD to program each section's schedule and input their chosen time.

Anautomaticfeeding, an automaticfaces pad, a camerawith Raspberry Pi, and asmartphoneapp make up the Smart Pet Care System.At the 2016, International Conference on Computer, Control, Informatics, and itsApplications, the automatic feeder has three layers that dispense and distribute the food.The feeding mechanism is regulated byArduino, and the serving size is determined by a weight sensor. The automatic feeder and pooping pad are both monitored using a Raspberry Pi camera.TheRaspberryPiservesasaserveraswell.Intheapp,theusercanchoosetheservingsize and the schedule for three times. The application, unfortunately, is only available in Korean.

The Programmable Pet Feeder only has four dispensers, so it can only feed four pets at a time, an d the user must set the times.

Thedevicecanbesetupusingasmartphone,buttouserwouldnotbeabletoseethefeedinghistory. It comes with a camera, so the user must watch it to see what their pet is up.The plate that feeds the pet is depicted in the diagram below.The issue is that it can only serve four items at a time, and if it becomes caught in between or has difficulty rotating, the food will not be served.

Fig 3.1:Turntable

One of the newest inventions for feeding pets is the automatic pet feeder. It will assist pet owners incaringfortheirpetswhentheyareawayfromhome.Andiftheownersarenotpresent,theirpets maybefed.Automatedpetfeedersaredesignedto assistpetownersincaringfortheiranimals.An automaticpetfeederisoneofthepetfeedersthatwillbecontrolledbyawirelesstheinfraredremote control. The machine driven pet feeder will automatically dispense the to quantity of food at the exacttimestheuserspecifiesusingawirelessinfraredremotecontrol.Usersshouldkeepinmind

that their pets, too, need to be careful of the dietary management of the pet. Life's responsibilities can also make it difficult for pet owners to provide proper care for their animals. If users are away fromhomeunexpectedlyorjustwantonelesschoretoworryabout,theycanrestassuredthattheir beloved pet will be cared for and fed on time, every time.

An Arduino Uno board, as well as an ESP8266 ESP-01 Wi-Fi module, which has an integrated TCP/IPprotocolstackandcanlinktheArduinoboardtoaWi-Finetwork, monitoreachsubsystem in this pet care device.All of the systems are also connected to the Blynk smartphone framework, which acts as a control, tracking, and statistical display platform. TheArduino board is supported byBlynk,aniOSandAndroidplatformthatsupportsavarietyofboardmodules.Asaconsequence, it is used as a GUI and to communicate with theArduino mainboard. Sensors on each that have to subsystem device send data over the Internet to a home gateway, which is then forwarded to the Blyynk server, and finally to the Blynk app on the smartphone. The actuator, on the other hand, receives the commands that the Blynk app originally sent.

Thecurrentsystem'sblockdiagramisshownbelow.SincetheyusedaMicrocontrollerinsteadofan ArduinoUNO,theirsystembecamequitecomplex.Sincetheyareusingamicrocontroller,theymust useapowersupplytoprovidepowertoit.ThentheyusedaTurntableandTray,whichallowedthem to dispense a specific form of food all at once. All of this makes their circuit very complex and difficult to use by ordinary people.

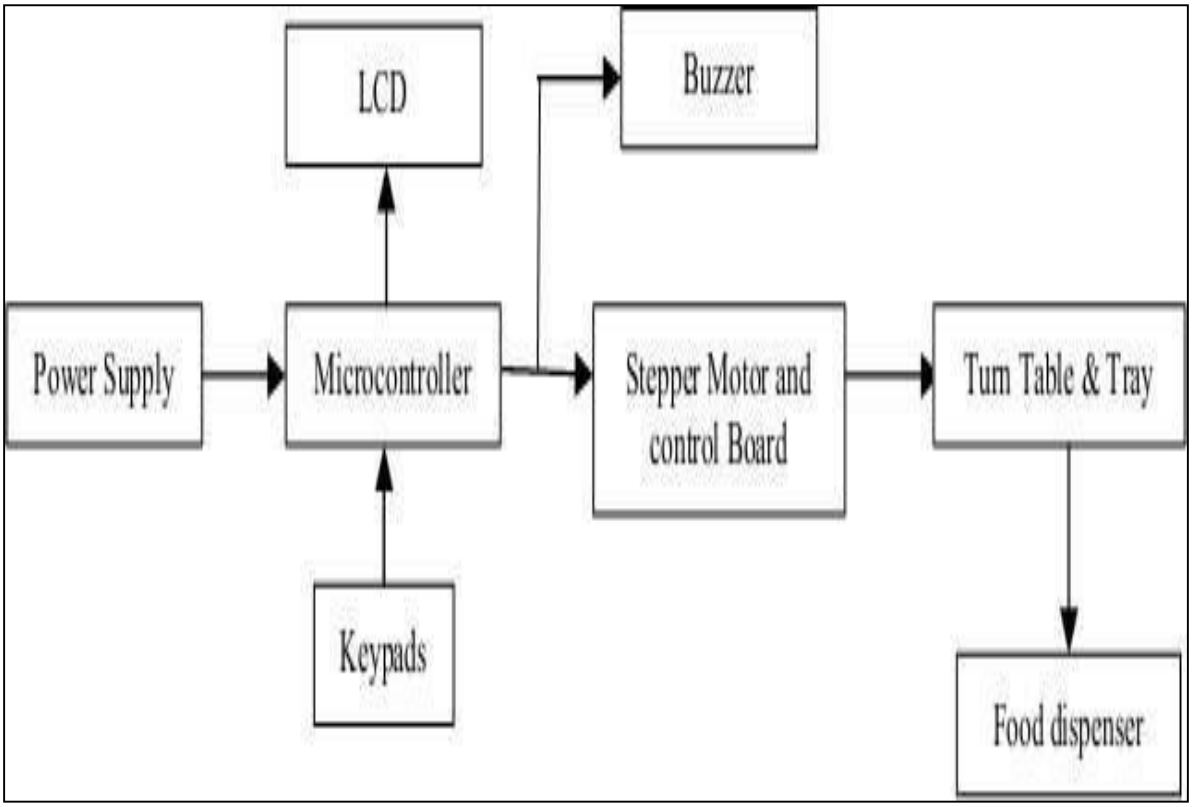

Fig3.2Block DiagramofExisting System

ProposedSystem

Intoday'sworld,people getquitebusyintheirofficeworkortheirofficeworkmakethemforget everything.Duetothis,thepeoplewhoownpets forgetaboutthemandevenforgettofeedthem. Becausethesepetsgetthediseaseorbecomeunhealthybecauseoffoodnotbegivenattheproper time. There are also times when the owner wants to go somewhere for some days but can't go becauseoftheproblemofwhowillservefoodtothepet.Tosolvethisproblemmanyprojectshave beenmade.Eventheirautomaticpetfeedersystemonamazon,whichanyonecanbuybutit'squite expensiveandmanycan'taffordit.Anotherfaultintheprojectsthathavebeenmadeonthistopic is that either the project is dependent on the owner or the pet. It means that when the food should be given is either totally based on the owner or the pet. There is no 2-way communication.

But our model cover's all the problems above mentioned and solves it. Our model is quite inexpensive. It can be brought by anyone. Our project is not dependent on anyone because it follows the 2-way communication due to some set of conditions.

WewouldbemakingourprojectusingIoT.WewouldbeusingArduinoUNO.Manysystemsused MicrocontrollersinsteadinArduinoUNOwhichmadethemmorecomplexandcostly.So,totackle this we used Arduino UNO.

TheArchitectureofProposedWork

But all theproblems described aboveareourmodel coverand solveit. Our model is fairly cheap. Itcanbedeliveredbyanyone.Ourprojectisnotdependentonanyonebecause,duetosomesetof circumstances,itfollows2-waycommunication.UsingIoT,we'dbemakingourproject.We'duse Arduino UNO. InArduino UNO, many systems used microcontrollers instead which made them more complicated and expensive. So we usedArduino UNO to fix this.

So our proposed system is like this. First, we will fix time after every how many hours the food should be given to the pet.This will be based on the pet's diet.After fixing that whenever the pet comesinfrontofthesystemthenthePIRsensorwilldetectit.Ifthetimehascometofeedthepet thenthealertwillbesenttotheowner'sphoneviaSMSorthenotification willbepoppedviathe UI that we have created on the owner's phone.Then it's upto the ownerwhether he/she wants to givethefoodtothepetornot.Nowifthepetishungryandhewantsthefoodthenifthepetstands infrontofthesystemformorethanacertaintime,analertwillbesenttotheownerthatthepetis hungry and he wants food. Then from that Dashboard, the owner can select how many doses of food he wants to give. Each dose contains the same amount of food. If let owner select 2 doses then, the bottle will rotate 2 times with the help of the Servo Motor, and 2 doses will be given. Whenever the food is being dispersed then the buzzer will begin to beep. But now, the thing that we have covered in this project that no one has covered till now is that if by chance the owner forgets to give food to the pet or he doesn't receive the notification on his phone, then the food will automatically be given to the pet. Due to this, the pet will not be hungry and the owner will besatisfiedthatifheisnotabletogivefood via UIthen alsofood willbe given.Herewehaveto set the time or duration after which the food is automatically given So,themain components that would be used by us in this project will be:

1) PIR Sensor
2) ArduinoUNO
3) Wi-FiModule
4) SpeakerorBeeper
5) Servo Motor

OursystemwillalwaysbeonlineviaaWi-Fimodule.TheWi-Fimodulewillalwaysbeconnected to thehomelocal internet orWi-Fi dueto which it will always beonline. Dueto this only wecan control all the functions of our system via Dashboard.

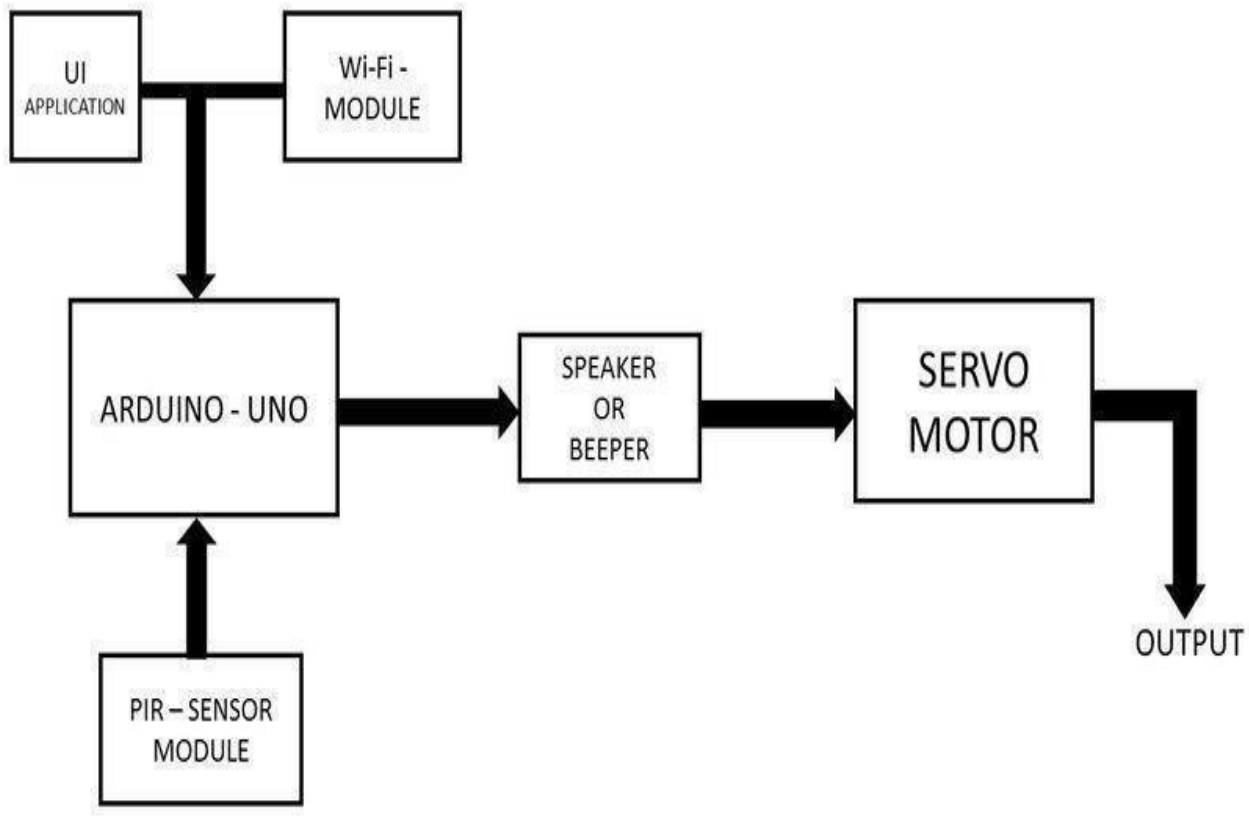

Fig3.3:ProposedSystemBlockDiagram

CircuitDiagramofProposedWork

Fig 3.4 shows the circuit diagram of the proposed Pet Feeding System. The main components in the circuit diagram are Arduino UNO, PIR Sensor, Speaker, Servo Motor, and ESP8266 WiFi Module.

Ground terminals of all the sensors are connected with the GND terminal of theArduino as you can see in Figure 3.4.As seen in the block diagram, the sensors' Vcc terminal is attached to the Arduino's +3.3V terminal.

ThePIRSensor has3 Pins:

1) Vcc-PowerSupply Pin
2) GND-GroundPin
3) I/P- Input

So,thePIRSensorpinsareconnectedtoArduinointhefollowing way:

1) The Vcc of the PIR Sensor alreadyconnected tothe +3.3V terminal pinof the ArduinoUNO.
2) TheGNDof thePIRSensorisalsoalreadyconnectedtotheGNDpinof theArduinoUNO.
3) TheI/Pof thePIRSensorisconnectedtothePIN3ofArduinoUNODigitalPin The

next main sensor used is Speaker. The Speaker has 2 Pins.

1) I/P-Input Pin
2) GND-GroundPin

So,theSpeakerpinsare connectedtotheArduinointhefollowing way:

1) TheI/Pof thespeakerisconnectedtotheArduinoUNODigitalPinPIN4.
2) TheGNDof theSpeakerisalreadyconnectedtotheGNDof theArduinoUNO. The

sensor used is the Servo Motor. Servo Motor has 3 pins.

1) Signal Pin -Input Pin
2) Vcc-PowerSupply Pin

3) GND-GroundPin

So,theServoMotor pinsareconnected totheArduino inthefollowing way:

1) TheSignalPin iswiredto theArduinoUNODigitalpin PIN12.
2) VccisalreadywiredtotheArduinoUNO's+3.3V.
3) TheGNDpinisalreadyattachedtotheArduino UNO'sGND.

And the last sensor used is the ESP8266 Wi-Fi Module. There are 8 pins in the ESP8266 Wi-Fi Module.

1) GND-GroundPin
2) TX-GeneralpurposeIOandSerialTXd
3) CH_EN-ChipEnablePin
4) GPIO2-GeneralpurposeInput/outputpin
5) GPIO0-GeneralpurposeInput/outputpin
6) RESET-ResetPin
7) Vcc-PowerSupply Pin
8) RX-Generalpurpose IOandSerialRDX

So,theESP8266Wi-FiModulepinsareconnectedtoArduinointhefollowingway:

1) 1)TheArduinoUNO's GNDpinisalreadyattachedtothe ground.
2) 2)TXiswiredtotheArduinoUNODigital pinPIN1.
3) 3)TheArduinoUNO's+3.3VpowersupplyiswiredtoCH EN.
4) 4)GPIO-2andGPIO-0arenotwiredtoanyoftheArduinoUNO's pins.
5) 5)TheArduinoUNO'sRESETpinisattachedtotheGNDpin.
6) 6)TheArduinoUNO'sVccisalreadywiredto+3.3V.
7) RXisconnected tothe PIN0 oftheArduino UNO.

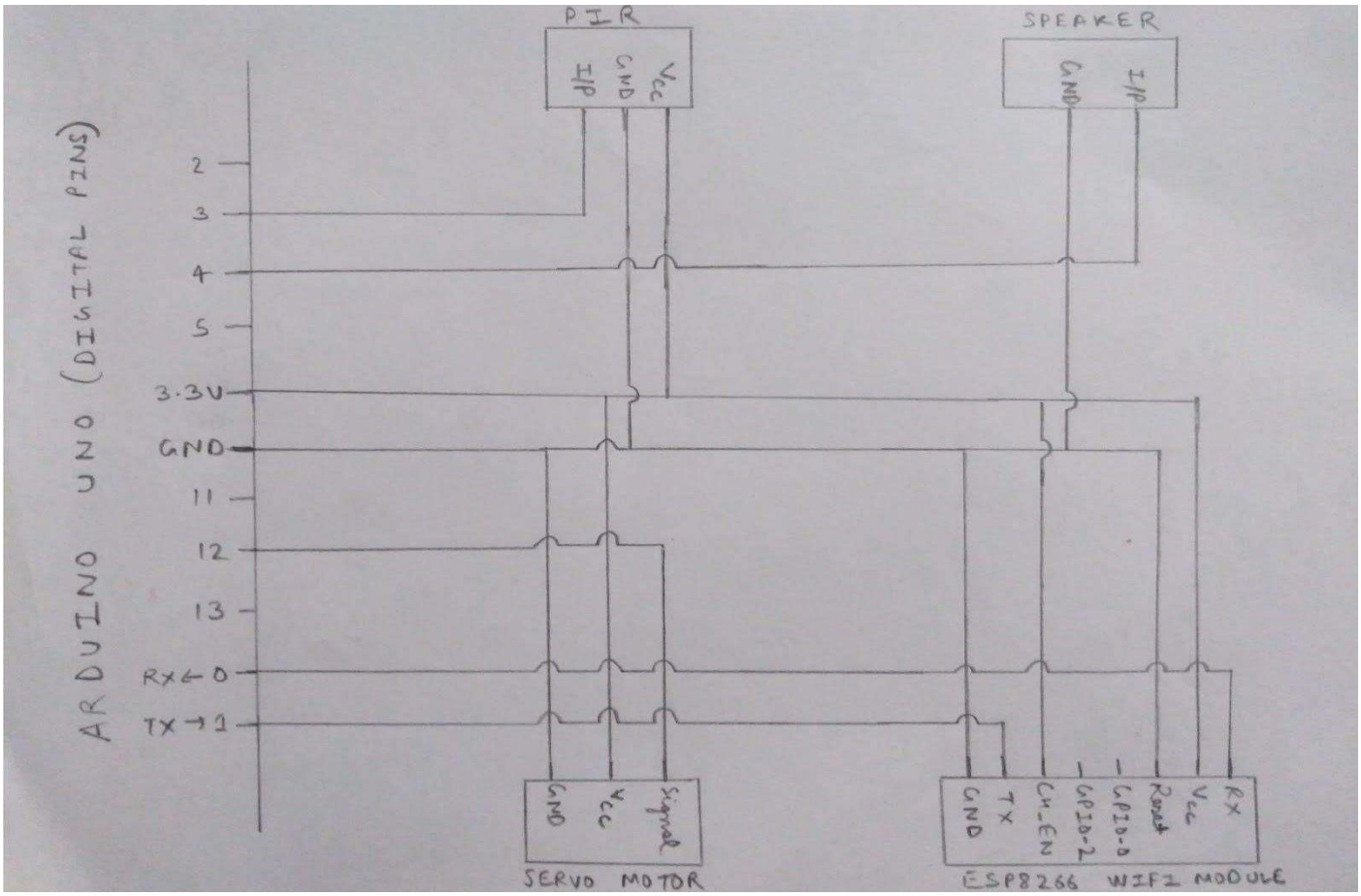

Fig3.4:CircuitDiagramofProposedSystem

(a) ARDUINOUNO

Arduino UNO is an open source microcontroller to based on the ATMega328P microcontroller builtbyArduino.cc.Theboardhasseveraldigitalandanalogueinput/outputpinsthatcanbeused toattachtoavaretyofsensorsandexpansions.Ithas14opticalinput/outputpinsand6analogue input/outputpins.WecanconnecttheArduinowithTypeBUSBcabletoanylaptoporcomputer and can code on it with the help ofArduino IDE which is the interface for coding on Arduino. Arduino is powered by a USB cable but it can also be powered using an external 9V battery. It accepts a voltage between 7V to 20V. It's working and how to useitisavailableonthewebsiteandanyonecanreadandrefertothat.Thelayoutisalsoavailable on the website with different updates.

ArduinoUNOhasvariousinputandoutputpinsoutofwhich14ofthemaredigitalpinsand6are analogpins.DidpinshaveexternalinputsArduinoUNOisdifferentfromallotherboardsandthey don't use the USB-to-Serial driver chip. Digital pins also do Pulse Width Modulation.

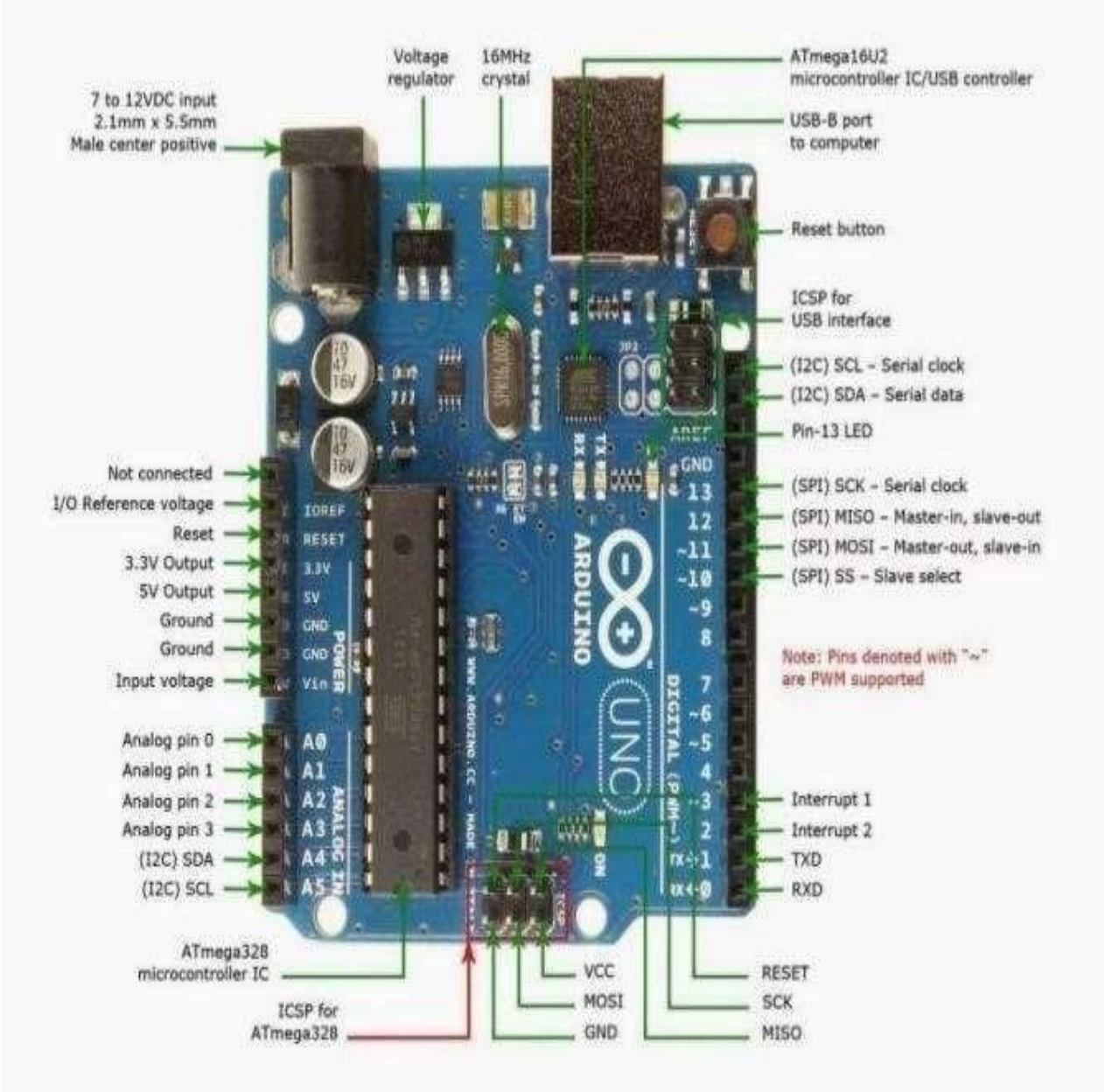

Fig3.5:Arduino UNO

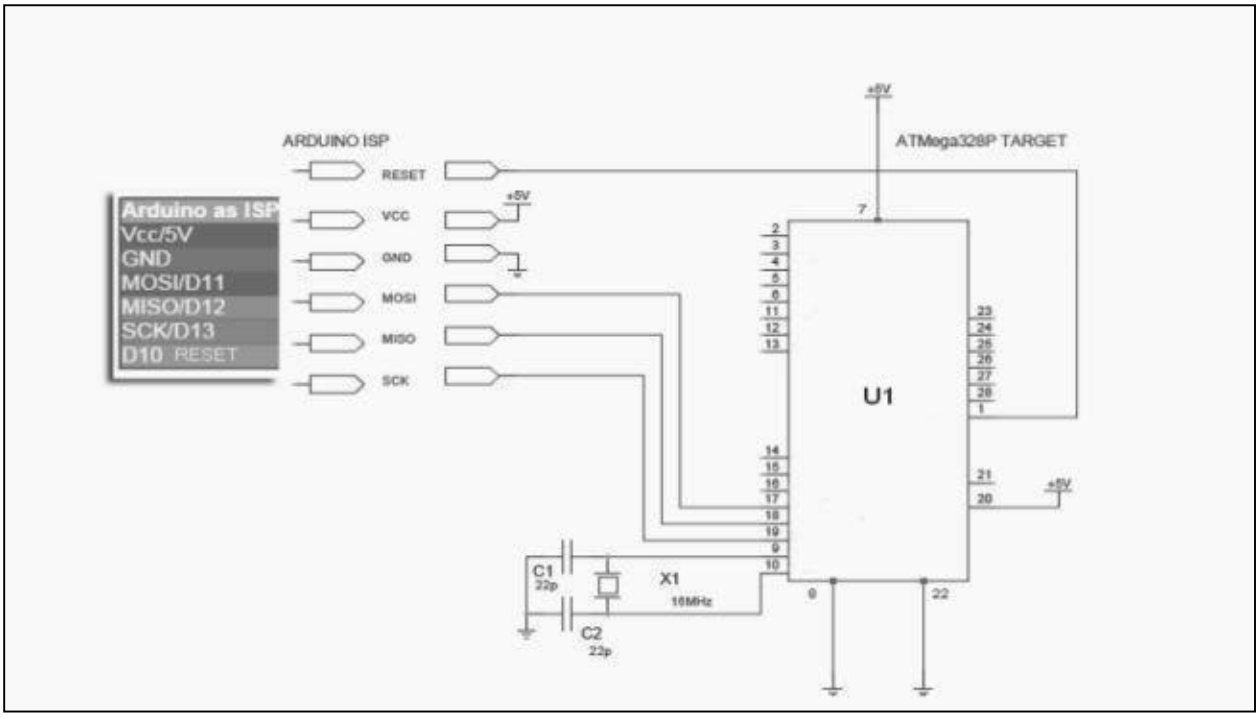

Fig3.6:CircuitDiagramofATMega328P

ThemicrochipATMega328Pcomesthatwith32KBflashmemories.ltcombinesitwiththeread– while-writecapabilities.ltisPower8-bitAVRRISC-basedmicrocontroller.ltalsohas32general purposeworkingregisters.lthasI KBofElectricallyErasable Program le Read-OnlyMemory.lt also has a watchdog timer with an internal oscillator. lt works within the range of 1.8Vto5.5V.

When these instructions are executed in a single clock cycle, throughputs of the about 1 MIPS per MHz are achieved. It strikes a balance between power consumption and processing speed.

(b) PIRSENSOR

PIRsensorissomelikeTheIRsensor.ThefullformofthePIRSensorisaPassiveInfraredSensor. lt also detects the motion of things and tells whether there is something or not. It's a sense of whetherthereisapersoninitssensingrangeornot.Theyareverycheapandeasytouse.ltuse

low power This the reason why they are commonly seen in home appliances like the remote or Tv’s etc.

Inthebelowdiagramyoucanseethatthereisametalcanwitharectangularcrystalinthecenter. ThispartisthepyroelectricsensorwhichisthePIRsensor.Thisalsodetectstheinfraredwavesin the surrounding. As every human being senses some type of radiation, so they detect that. The hotteristheobject,themoreitemitsradiation.Sowhenevertheysensesomesortofradiationthen they send a signal that there is something in their surroundings.

The passive infrared sensor does not emit any energy into the environment.To sound an alarm, it absorbs infrared radiation from the human body. Every object that has to a temperature emits infrared rays to the outside world. The human body's surface temperatbure ranges from 36 to 27 degrees Celsius, with the majority of its radiant energy disstributed in the wavelength range of 8 to 12 microns. The (infrared probes) and alarm control parts of passive infrared alarms are separated.Pyroelectricdetectorsarethemostpopularinfrareddetectors.It'sasensorthatconverts infraredradiationfromhumansintoelectricity.Ifhumaninfraredradiationisirradiateddirectlyon the detector, it can, of course, induce a temperature change, resulting in the output of a signal. However, the detection distance would not increase as a result of all of this.An optical device to absorb infrared radiation must be added to extend the detection distance of the detector. Infrared radiation is usually focused using a plastic optical reflection device or a plastic Fresnel lens.

Therangesof PIR Sensor are:

1) Indoorpassiveinfrared:detectiondistancesvaryfrom25cmto20m.
2) Outdoorpassiveinfrared:detectiondistancesrangefrom25cmto20m.
3) Indoorcurtain-typedetectorshaveadetection rangeof25cmto20 m.
4) Thedetectiondistancefor outdoorpassiveinfrared rangesfrom1 meterto 150 meters.
5) Detectorforoutdoorpassiveinfraredcurtainswitharangeof10to150 meters.

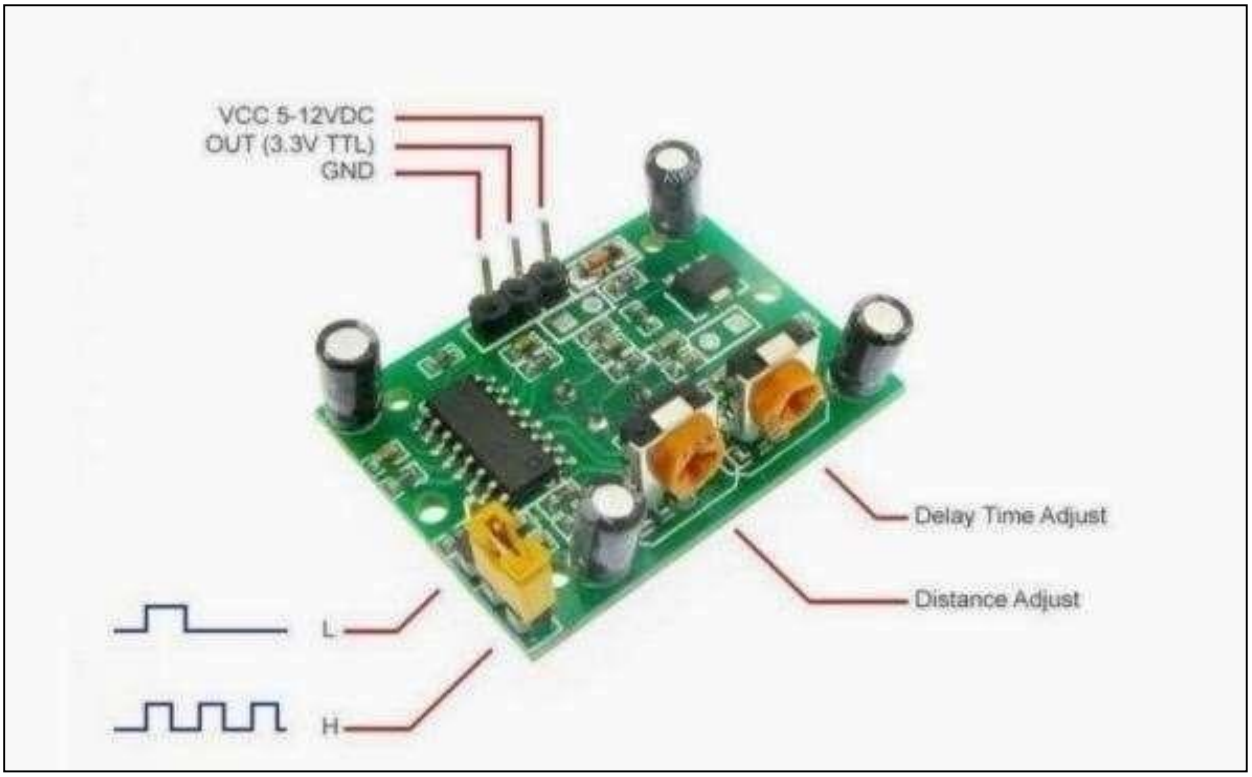

Fig 3.7: PIR Sensor

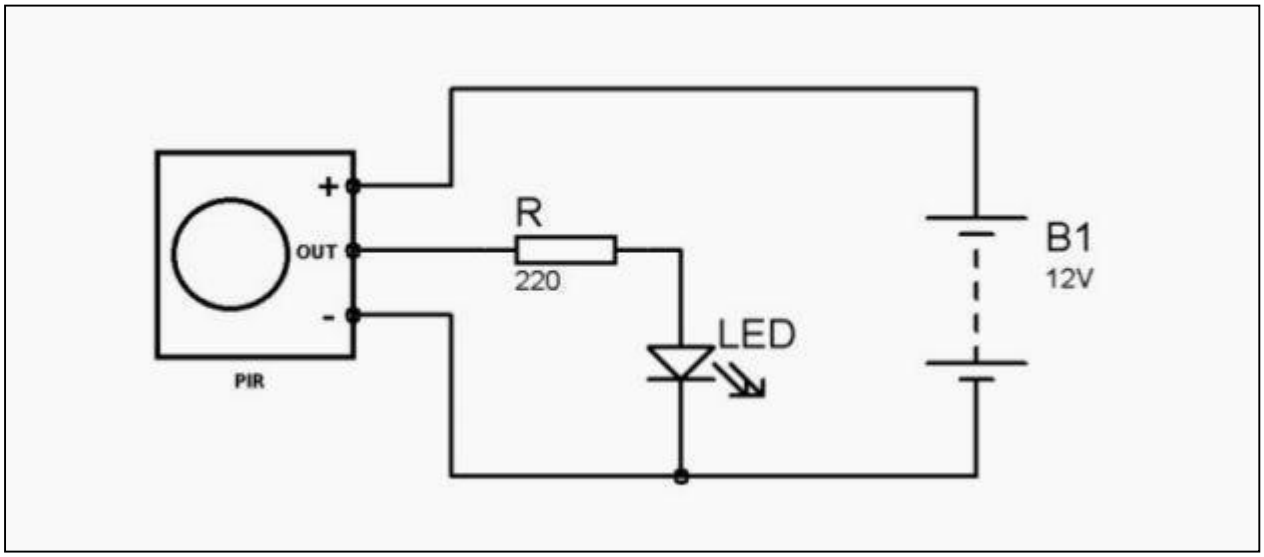

Fig3.8:CircuitDiagramofPIR Sensor

(c) EP8266WIFI MODULE

The Espressif system developed the ESP8266, a Wi-Fi-enabled system on chip (SoC) module. It's mostly used to build embedded IoT (Internet of Things) applications.

ESP8266comeswithcapabilitiesof

- Wi-Fi(802.11b/g/n,supportingWPA/WPA2),2.4GHz
- Input/outputdevicethatcanbeusedfora varietyofpurposes(16 GPIO)
- TheserialcommunicationprotocolInter-IntegratedCircuit (I2C)
- Analog-to-digitalconversionisatermthatreferstotheconversionofanaloguesignalsinto digital signals (10-bit ADC)
- SerialPeripheralInterface(SPI)isaserialcommunicationprotocolthatwasdevelopedby Intel.
- UART (on dedicated pins, plus GPIO2 can be used to allow a transmit-only UART), and pulse-width modulation (PWM).

Ona32-bitRISCCPUbasedontheTensilicaXtensaL106(oroverclockedto160MHz),itrunsat 80MHz.A64-kilobytebootROM,a64-kilobyteinstructionRAM,anda96-kilobytedataRAMall included. External flash memory can be accessed using SPI.

Tocommunicate with theESP8266wifiboard,themicrocontrollerthat must usetheseries ofAT commands. The microcontroller is connected to the ESP8266-01 module via UART at a specific Baud rate.

This chip is used by a variety of third-party manufacturers to create various modules.As a result, the module includes a variety of pin availability options, such as,

- TheESP-01has8 pins(2GPIOpins) forthePCBtraceantenna.
- TheESP-02hasan8-pinU-FLantennaconnector (3GPIOpins).
- TheESP-03has14pins(7GPIOpins)and a ceramicantenna.

- TheESP-04has14pins(7GPIOpins) andno ant.

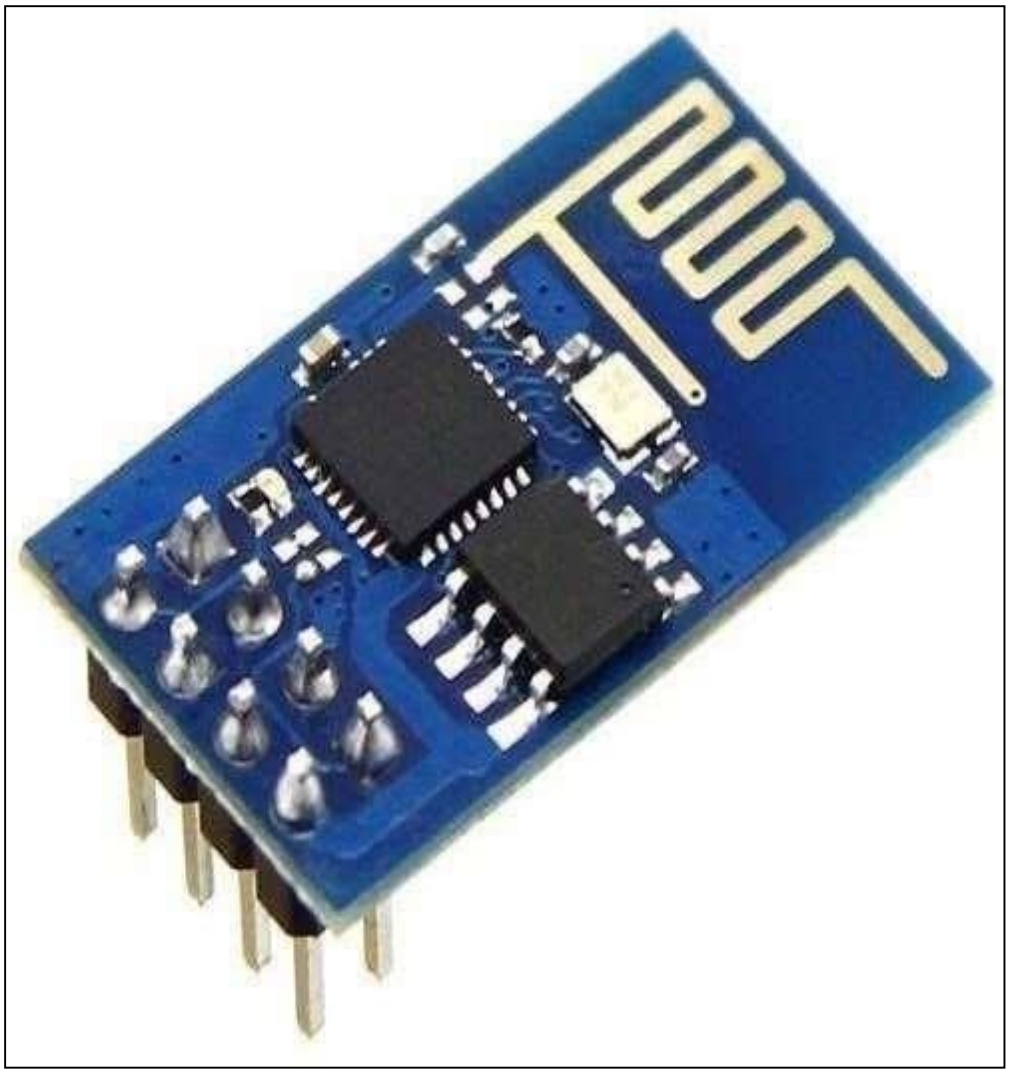

Fig3.9: ESP8266Module

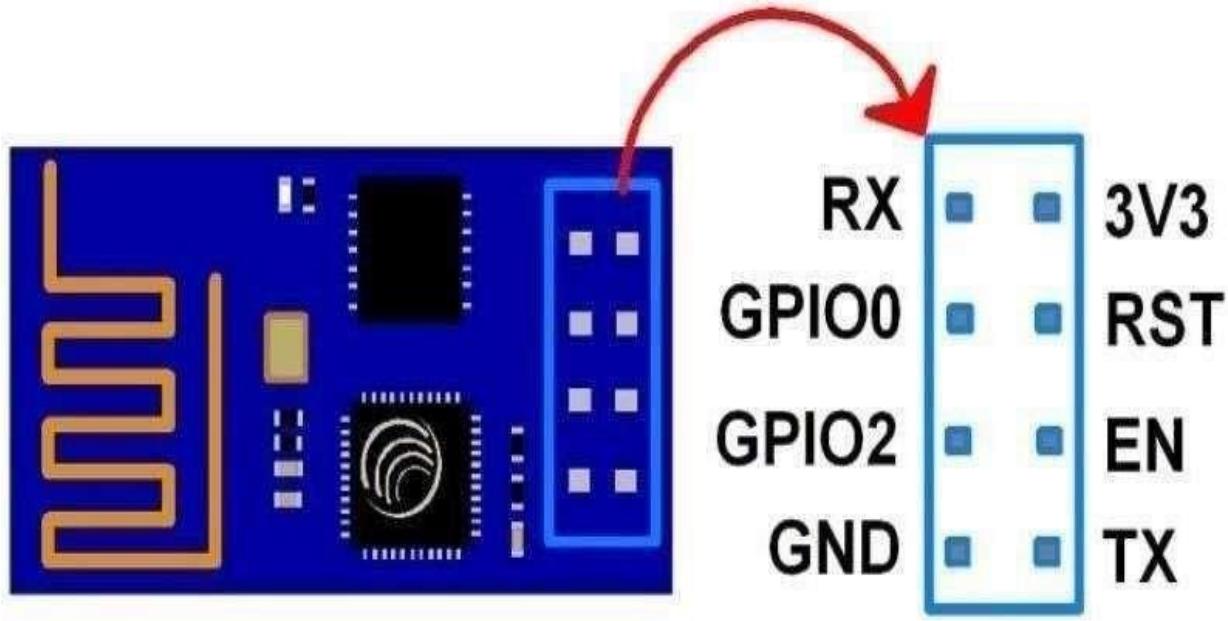

Fig3.10:PinDiagramoftheESP8266Wi-FiModule

3V3:-3.3VPower Pin.

GND:-GroundPin.

RST: -Active Low Reset Pin.

EN:-ActiveHighEnablePin.

TX:-SerialTransmitPinof UART.

RX: -Serial Receive Pin of UART.

GPIO0&GPIO2:-I/OPinsforGeneralPurpose.Thesepinsdecidethemode(bootornormal)in which the module starts up. It also decides whether or not theTX/RX pins are used for serial I/O or module programming.

Connect GPIO0 to ground and GPIO2 to VCC or leave it open to program the module using UART.LeavebothpinsopentouseUARTforstandardSerialI/O.(neitherVCCnorGround).

(d) SERVOMOTOR

Aservo motor is a motor that rotates with a high degree of precision. Servo motors typically the have a control circuit that provides feedback on the current position of that motor shaft, allowing them to rotate with great precision. When you need too rotate an object at a certain angle or size, you'll need a servo motor. It is made up of nothing more than a simple motor and a servo that do mechanism.ADCservomotorrunsonaDCpowersupply,whileanACservomotorrunsonanAC power supply. This tutorial will only cover the operation of a DC servo motor. In addition to these major classifications, there are several other types of servo motors based on gear to do the it operating characteristics.Aservo motor's gear configuration allows us to fit a high torque of the servo motor into a small, lightweight package. They're used in a variety of applications, including toy vehicles, RC helicopters and aircraft, robotics, and so on, because of these characteristics.

Itisdivided intothreesections:

1. Acomputerthatcanberegulated
2. Sensorof output
3. Amethod offeedback

The feedback mechanism produces the third signal by comparing the reference input signal to the reference output signal. This third signal is that is used to monitor the system as an input signal. This signal is present as long as the feedback signal is provided or there is a difference betweenthereferenceinputsignalandthereferenceoutputsignal.Asaresult,theprimarygoaloftheservo mechanism is to keep a system's performance constant in the face of noise.

The length of the applied pulse to a servo motor's Control PIN, which works on the PWM (Pulse width modulation)principle, controls theangleof rotation.Aservomotorconsists ofaDC motor andgearsoperatedbyavariableresistor(potentiometer).GearsconverttheDCmotor'shigh-speed power into torque.

WORK=FORCEXDISTANCE,wheretheforce inaDCmotorislowoftheandthedistance of(speed)ishigh,andtheforceinaservoishighandthedistanceislow.Tomeasuretheangle and stop the DC motor at the appropriate angle, and the potentiometer is attached to the Servo output shaft.

Fig3.11:ServoMotor

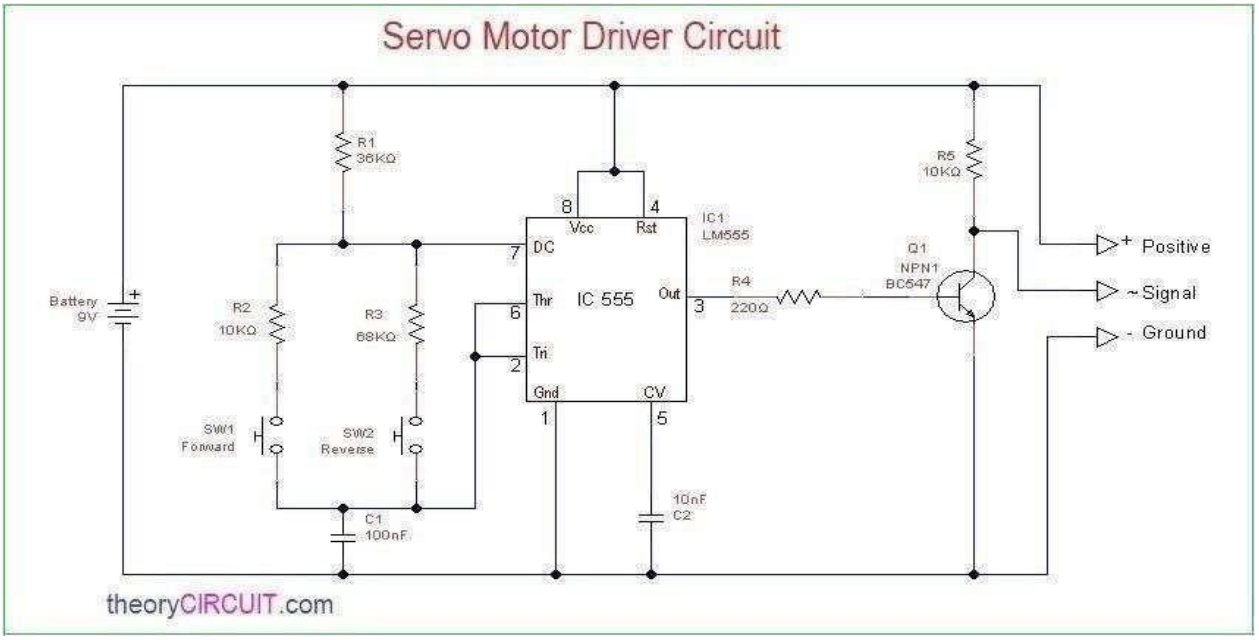

Fig3.12:CircuitDiagramofServoMotor

CHAPTER4

SIMULATION

- UltrasonicSensor:Placeavirtualhandorobjectnearthesensorwithin10cmtotrigger dispensing.
- ServoMovement:Servomotormovesto90°thenbackto0°,simulatingfooddispense. LCD
- Displays: Both LCDs show updated messages and stats after each dispense.
- LEDandBuzzer:GreenLEDisonwhenready,redLEDblinkswhenempty,buzzersounds during dispense and alerts.
- ButtonPress:Simulatebuttonpresstoresetweightandclearstats.

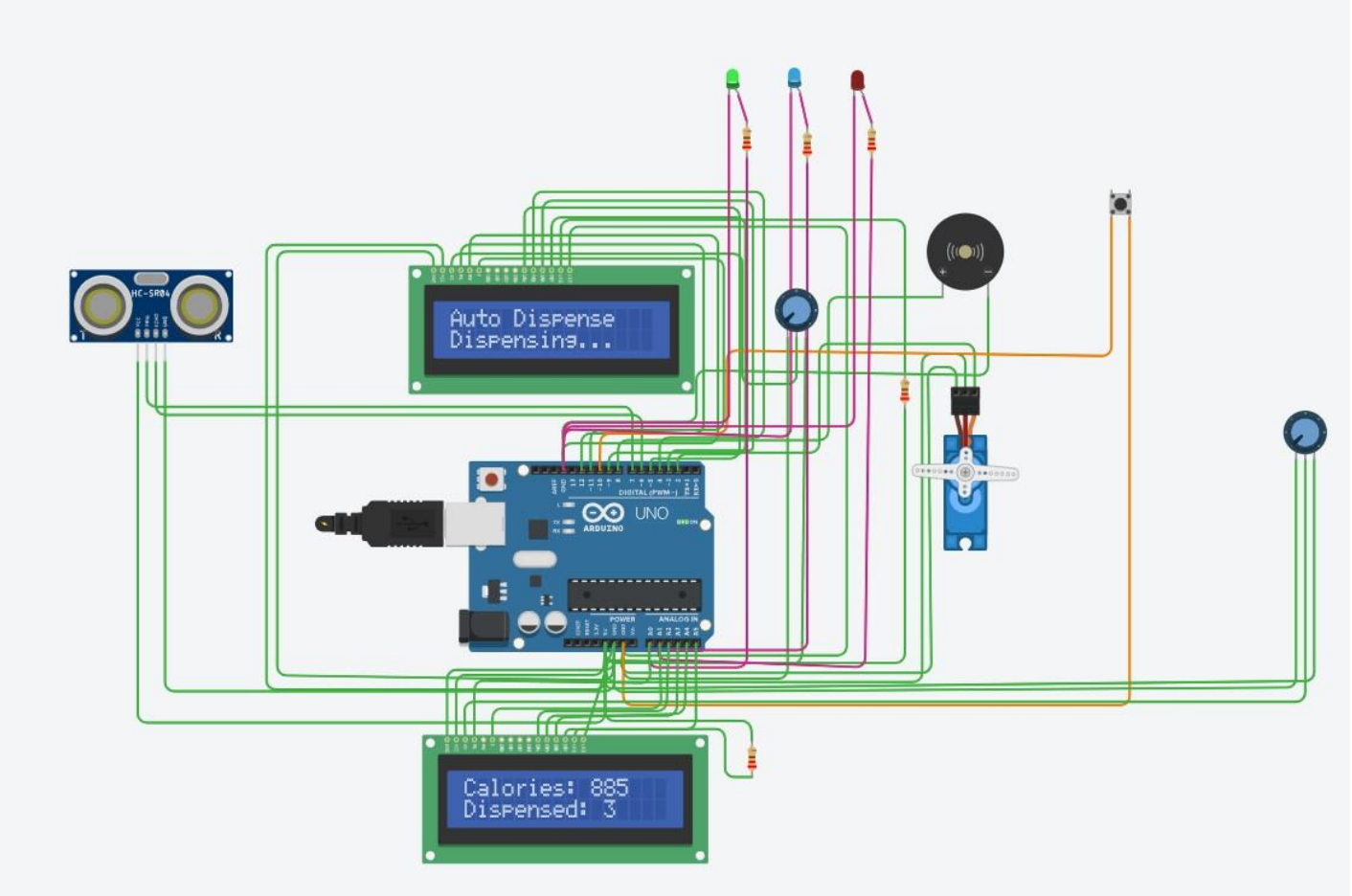

Fig4.1simulationofautomaticpetfeeder

PROGRAM

```
#include<LiquidCrystal.h>
#include <Servo.h>
#include <EEPROM.h>

//LCD1 (Main)
LiquidCrystallcd1(12,11,5,4,3,2);
//LCD2(InfoDisplay)
LiquidCrystallcd2(A0,A1,A2,A3,A4,A5);

//ServoandBuzzer
Servo myServo;
const int servoPin = 9;
constintbuzzerPin=8;

// Ultrasonic Sensor
const int trigPin = 7;
constintechoPin=6;
constint distanceThreshold= 10;// in cm

//Refill Button
constintbuttonPin= 10;

//LEDs
constintgreenLED=13;
constintredLED=A5;// ✔ Movedfrompin 0toA5

//Timing
unsignedlonglastTriggerTime= 0;
constunsignedlongautoInterval=10000;//10sec bool
inSequence = false;

//FoodTracking
float weightRemaining;
constfloatmaxWeight=2.0;
constfloat dispenseAmount= 0.25;// 250gper dispense

//Caloriesperdispense
constintcaloriesPerDispense=295;

// EEPROM Addresses
constintaddrWeight=0;
constintaddrDispenseCount=10;
const int addrCalories = 20;
```

```
//DailyTracking
intdailyDispenseCount=0; int
dailyCalories = 0;
unsignedlonglastDayResetTime=0;
constunsignedlongdayDuration= 86400000UL;

void setup() {
  lcd1.begin(16,2);
  lcd2.begin(16,2);

  myServo.attach(servoPin);
  myServo.write(0);

  pinMode(buzzerPin, OUTPUT);
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  pinMode(buttonPin,INPUT_PULLUP);

  pinMode(greenLED,OUTPUT);
  pinMode(redLED, OUTPUT);

  Serial.begin(9600);

  // Load data from EEPROM
  EEPROM.get(addrWeight, weightRemaining);
  EEPROM.get(addrDispenseCount,dailyDispenseCount);
  EEPROM.get(addrCalories, dailyCalories);

  if(isnan(weightRemaining)||weightRemaining>maxWeight||weightRemaining<0){
    weightRemaining = maxWeight;
  }

  lastDayResetTime=millis();

  updateMainLCD("SystemReady","");
  updateStatsLCD();
}

void loop() {
  checkButton();

  unsignedlongcurrentTime=millis();
  if(currentTime-lastDayResetTime>=dayDuration){
    dailyDispenseCount = 0;
    dailyCalories=0;
```

```
    lastDayResetTime = currentTime;
    EEPROM.put(addrDispenseCount,dailyDispenseCount);
    EEPROM.put(addrCalories, dailyCalories);
   }

   if (weightRemaining <= 0) {
    updateMainLCD("Empty!","RefillRequired");
    digitalWrite(redLED, HIGH);
    digitalWrite(greenLED, LOW);
    alertBeepPattern();
    delay(1000);
    return;
   }

   digitalWrite(redLED,LOW);// ✔ TurnoffredLEDifweight>0
   digitalWrite(greenLED, HIGH);

   if(objectDetected()&&!inSequence){
    runSequence("Object Detected");
    lastTriggerTime = millis();
   }

   if((currentTime-lastTriggerTime>=autoInterval)&&!inSequence){
    runSequence("Auto Dispense");
    lastTriggerTime=millis();
   }

   delay(100);
  }

 voidrunSequence(Stringmsg){
   inSequence = true;

   updateMainLCD(msg,"Dispensing...");
   myServo.write(90);
   digitalWrite(buzzerPin, HIGH);
   delay(10000);

   myServo.write(0);
   digitalWrite(buzzerPin, LOW);
   delay(5000);

   weightRemaining-= dispenseAmount;
   if(weightRemaining<0)weightRemaining=0;
```

```
  dailyDispenseCount++;
  dailyCalories+=caloriesPerDispense;

  EEPROM.put(addrWeight, weightRemaining);
  EEPROM.put(addrDispenseCount,dailyDispenseCount);
  EEPROM.put(addrCalories, dailyCalories);

  updateMainLCD("250gDispensed",String(weightRemaining,2)+"kgLeft"); updateStatsLCD();

  //✅Afterdispense,updateLEDstatus if
  (weightRemaining <= 0) {
  digitalWrite(redLED, HIGH);
  digitalWrite(greenLED, LOW);
  }else {
    digitalWrite(redLED, LOW);
    digitalWrite(greenLED, HIGH);
  }

  inSequence=false;
}

voidcheckButton(){
  staticunsignedlonglastPressTime=0;
  const unsigned long debounce = 300;

  if(digitalRead(buttonPin)==LOW&&millis()-lastPressTime>debounce){ weightRemaining =
    maxWeight;
    EEPROM.put(addrWeight, weightRemaining);
    updateMainLCD("Refilled","2KGRestored");
    updateStatsLCD();

    //✅Afterrefill,updateLEDstatus
    digitalWrite(redLED, LOW);
    digitalWrite(greenLED, HIGH);

    delay(1500);
    lastPressTime=millis();
  }
}

bool objectDetected() {
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin, HIGH);
```

```
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);

  longduration=pulseIn(echoPin,HIGH,30000); int
  distance = duration * 0.034 / 2;
  return(distance>0&&distance<=distanceThreshold);
}

void alertBeepPattern() {
  for(inti=0;i<3;i++){
    digitalWrite(buzzerPin, HIGH);
    delay(200);
    digitalWrite(buzzerPin, LOW);
    delay(200);
  }
}

voidupdateMainLCD(Stringline1,Stringline2){
  lcd1.clear();
  lcd1.setCursor(0,0);
  lcd1.print(line1);
  lcd1.setCursor(0,1);
  lcd1.print(line2);
}

void updateStatsLCD() {
  lcd2.clear();
  lcd2.setCursor(0, 0);
  lcd2.print("Calories: ");
  lcd2.print(dailyCalories);
  lcd2.setCursor(0, 1);
  lcd2.print("Dispensed:");
  lcd2.print(dailyDispenseCount);
}
```

OUTPUT

- System Boot:
  - LCD1shows"SystemReady".
  - LCD2showsCalories:0andDispensed:0(orlastsavedEEPROMvalues). Idle
- State:
  - Theultrasonicsensorcontinuouslymonitorsforobjectswithin10cm.
  - NoactiononLCD1orLCD2changes.
- Object Detected:
  - Whenyourhandorpetapproachesthesensor,LCD1updatesto"ObjectDetected"and "Dispensing...".
  - Theservomotorrotates90degreestodispense~250goffood.
  - Buzzersoundsduringdispensing.
  - LCD1thenshows"250gDispensed"andupdates remainingweight(e.g.,"1.75kgLeft").
  - LCD2updatesthecaloriecountanddispensecountaccordingly(e.g.,Calories:295,Dispensed) Auto
- Dispense:
  - Ifnoobjectdetectedfor10seconds,autodispensetriggersthesamesequenceasabove. Empty
- Warning:
  - Oncethefoodremaininghitszeroorbelow,LCD1shows"Empty!"and"Refill Required".
  - RedLEDlightsupandbuzzerbeepsalertpattern.
- Refill:
  - When refillbutton ispressed, weightresetsto max (2 kg), LCD1 shows"Refilled" and "2 KG Restored".Calories and dispense counts reset to zero, reflected on LCD2.

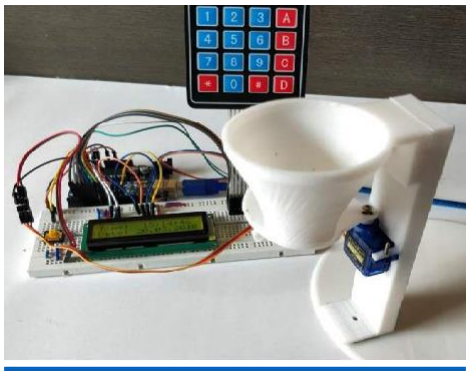

Fig4.2output ofautomaticpet feeder

CONCLUSION

Intoday'sreality,everythingischangingintoasmartframeworkandautomation.Individualsneed that the thing they purchased ought to be cost-productive and shouldn't make any kind of contamination. Ourundertaking SMARTPETFEEDING SYSTEM likewisecenters aroundthat. ltisverycost-proficientanddoesn'tmakeanykindofcontamination.Therearemanyprojectslike these in the market but the problems also stick to them. The problems people face are that the system is quite complex to use or it’s quite costly. But our project solves these things. It is quite cheap as compared to other systems and quite easy to use.Any non-tech person can understand how to use it as it is user-friendly. We have comprised code on Arduino utilizingArduino IDE. This framework essentially will diminish some expense and energy and will be easy to use and won't bring on any kind of contamination.

FUTUREWORK

In the future, we would be working to make this system even more efficient and would try to implementitinabetterwayandwouldtrytoreducethepriceofit.Apartfromthat,wehavegiven a lot of thought to also provide a statistical report through the system itself, through which the owner would be able to track the amount of food and water consumption, along with an increase or decrease in the diet. All of this would be provided on a weekly or monthly basis so that the ownercantrackallofthisinformationandthereafter,makerelevantchangesinthefeedingpattern of the pet.

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