

IOT BASED WEARABLE DEVICE FOR CHILD SAFETY

Submitted in partial fulfillment of the requirements for the award of

Bachelor of Engineering degree in
Electrical and Electronics Engineering

By

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING**

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited with Grade "A" by NAAC

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APRIL 2022



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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **K.JANANI (38140016)** and **RAMYA.R (38140045)** who carried out the Project entitled **“IOT BASED WEARABLE DEVICE FOR CHILD SAFETY”** under our supervision from Dec 2021 to April 2022.

Dr.M.L.BHARATHI

Internal Guide

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Head of the Department

Submitted for Viva voce Examination held on _____

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Signature:

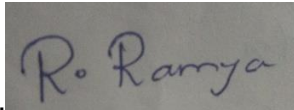
Internal Examiner

External Examiner

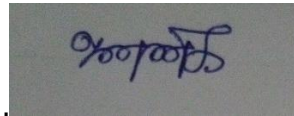
DECLARATION

We **R.RAMYA** (Reg.No. 38140045) and **K. JANANI** (Reg.No.38140016) hereby declare that the Project Report entitled “**IOT BASED WEARABLE DEVICE FOR CHILD SAFETY**” done by us under the guidance of **Dr.M.L.BHARATHI** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering Degree in Electrical and Electronics Engineering.

1.

Handwritten signature of R. Ramya in blue ink on a grey background.

2.

Handwritten signature of K. Janani in blue ink on a grey background.

SIGNATURE OF THE CANDIDATES

DATE :

PLACE : CHENNAI

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We are pleased to acknowledge our sincere thanks to Board of Management of **SATHYABAMA** for their kind encouragement in doing this project and for completing it successfully. We are grateful to them.

We convey our thanks to **Dr.N.M.NANDHITHA**, Dean, School of Electrical and Electronics Engineering and **Dr.V.SIVACHIDAMBARANATHAN**, Head of the Department, Dept. of Electrical and Electronics Engineering and Internal Guide **Dr.M.L.BHARATHI**, for providing us necessary support and details at the right time during the progressive reviews.

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ABSTRACT

Now-a-days attacks on children are increasing at an unprecedented rate and the victims are in dangerous conditions, where they are not allowed to contact the family members. The key idea planned in this research work is an advanced technology that offers “Smart Child Safety” for the children. Therefore, the awareness of this method is to send an SMS from children’s wear tool to their parent or guardian. In the prevailing structure, there is no monitoring method for child, it should create many problems for them and the no protection mechanism to protect the child from the misbehavior. In addition, there is no aware device for the child’s protection, it must be completed by hand only. Thus, the planned method will be highly effective when compared to the other existing techniques in helping the victims. Moreover, it doesn’t need any manual operation. This project recommends a new technology for child protection by using GCM so that the children will not feel abandoned while facing such social problems. The problems overawed here using Wi-Fi device controller, GCM, sensors, MEMS, temperature and panic button by using IOT. Creating virtual boundaries in order to monitor the child. The use of IoT platform improves monitoring. It accounts for fast and accurate sensing of data. In such case, Heartbeat Sensor track the best rate for children and sends the emergency message by using the GCM to save contacts. Such method is actually supportive for children in today’s world. Hence, this provides a security to the children and secures the feeling of parents.

CHAPTER 1

INTRODUCTION

1.1. OVERVIEW

Child safety and rising kid's prosperity are the prime concern during this project. The work of guaranteeing children most routinely falls to gatekeepers and caregivers, and it's up to them to acquaint themselves with security threats in and around their homes and communities. Once you recognize the perils, you'll be ready to take steps to orchestrate for security. The truth is every capable parent is bothered around their children's security. At a similar time, children should socialize at a vernal age and be ready to have a particular level of flexibility to develop and build independence. So, this created America develops a system that offers confidence to the kid and therefore the folks. They'll send their children to the college or playground and parks with friends. This conjointly provides children some motivation from a younger age to not extremely rely upon folks whenever they're going out or college. They'll jubilantly play with friends and neighbor round the park and ground. So this method can facilitate the fogeys once the kid is misplaced or taken the centralization of this project is to possess AN SMS substance secured in correspondence medium between the children wearable and therefore the parent as nature for GCM useful that correspondence is displayed everywhere at {some stage in|at some point of} the place. The child security appliance is ready for going around as AN in a position IOT appliance. The sharp adolescent prosperity wearable will be progressed imposingly a lot of in future by utilizing particularly negligible hardware modules, for illustration, the Wi-Fi

device controller which may be stitched into surfaces. The utilization of IOT platform improves watching. It accounts for quick and correct sensing of knowledge. In such case, Heartbeat detector track the simplest rate for kids and sends the emergency message by exploitation the GCM to avoid wasting contacts. Such methodology is really auxiliary for kids in today's world. Hence, this provides a security to the youngsters and secures the sensation of oldsters.

1.1 OBJECTIVE

- ✧ The aim of this work is to develop a wearable device for child monitoring.
- ✧ This objective is achieved by the tracking of child in the specified location.
- ✧ Keep a track on contact of the device with the child.
- ✧ Create alert when the panic button is pressed and the information send to authorized person.

CHAPTER 2

2. LITERATURE SURVEY

[1] G. Yang, J. Deng, G. Pang, H. Zhang, J. Li, B. Deng, Z. Pang, J. Xu, M. Jiang, P. Liljeberg, H. Xie, and H. Yang, “An IoT-enabled stroke rehabilitation system based on smart wearable armband and machine learning,” IEEE J. Transl. Eng. Health Med., vol. 6, pp. 1–10, 2018.

The wearable system measures the bio-potential signals and the analyzed data is transmitted wirelessly to a robot hand. Then, the received signals are interpreted using a machine learning algorithm to give users insight and feedback about their muscle movements. The robot hand assists the user in adjusting his/her posture and walking pattern in real time.

[2] A. Ghorbel, S. Bouguerra, N. B. Amor, and M. Jallouli, “Cloud based mobile application for remote control of intelligent wheelchair,” in Proc. 14th Int. Wireless Commun. Mobile Comput. Conf. (IWCMC), Limassol, Cyprus, Jun. 2018, pp. 1249–1254

In the researchers have designed a smart wheelchair which allows the disabled person to easily interact with the wheelchair via a mobile application that analyzes the data received from the sensors, and then visualizes the results for caregivers to remotely monitor the patient.

[3] M. O. Agyeman and A. Al-Mahmood, “Design and implementation of a wearable device for motivating patients with upper and/or lower limb

disability via gaming and home rehabilitation,”h upper and/or lower limb disability via gaming and home rehabilitation,” in Proc. 4th Int. Conf. Fog Mobile Edge Comput. (FMEC), Jun. 2019, pp. 247–252.

Introduces A Rehabilitation System Which Is Designed and Implemented to Help Stoke Patients Suffering from Upper Limb Disability. This Rehabilitation System Exploits Iot Through Integrating Gaming and Wearable Technology

[4] A. J. A. Majumder, Y. A. ElSaadany, R. Young, and D. R. Ucci, “An energy efficient wearable smart IoT system to predict cardiac arrest,”Adv. Hum.-Comput. Interact., vol. 2019, pp. 1–21, Feb. 2019

proposed a multisensory wearable system to collect the necessary data in order to warn the user of an impending cardiac arrest in the early stages. A low power communication module uses a smartphone to collect the body temperature and heart rate and then signal processing techniques and machine learning algorithms are used to accurately diagnose and warn sudden cardiac arrests.

[5] A. Brezulianu, O. Geman, M. D. Zbancioc, M. Hagan, C. Aghion, D. J. Hemanth, and L. H. Son, “IoT based heart activity monitoring using inductive sensors,” Sensors, vol. 19, no. 15, p. 3284, 2019.

The work done in presents a system dedicated to monitoring the heart activity parameters using ECG mobile devices and sensors inserted in the fabric of the clothes. The assessed parameters are heart rate and respiration.

[6] Sunil K Punjabi, Suvarna Chaur, Ujwala Ravale, Deepti Reddy,Smart Intelligent System for Women and Child Security 9th Annual Information Technology, Electronics and Mobile Communication Conference (IEMCON), IEEE.

Developed an intelligent system for women and children. In this system they are using a pressure switch. When they feel unsafe, she has to compress the switch, then an intimation will be sent to parents followed by a call. If it is unanswered the call will be redirected to nearby police station.

[7] M. Kavitha, V. Sivachidam baranathan Women Self-Protecting System Using Internet of Things, International Conference on Computational Intelligence and Computing Research (ICCIC), IEEE.

Device for women self-protection using IoT. In this system there are few bio sensors are used to sense the user's bodily changes. If there is any abnormalities detected on women an intimation will be sent to guardian as per preprogram of the device.

[8]Shaista Khanam, Trupti Shah Self Defence Device with GSM Alert and GPS Tracking with Fingerprint Verification for Women Safety International Conference on Electronics Communication and Aerospace Technology [ICECA], IEEE.

Algorithm for women safety using fingerprint module. This paper gives a detailed approach towards women safety. Here fingerprint is required for activation of device, electric shock producing circuit, GSM and GPS module for alerting and location tracking. At the time of emergency, it is hard to place the finger in the fingerprint module and recognition is not possible, if there is any undesired stuff (wet or dust) in the finger. To avoid this problem the fingerprint module will not be used in the proposed system.

CHAPTER 3

EXISTING SYSTEM & PROPOSED SYSTEM

3.1 EXISTING SYSTEM

In this existing system Parents need not have a smartmobile. Set of keywords are used to gain information from the kit. Location keyword is used to obtain the location of the child. UV keyword is used to obtain the temperature of the surroundings. BUZZ keyword is used to turn on the buzzer which is fixed in that device. SOS is used for emergency condition send a signal to the device

DEMERITS

- This project requires manual intervention.
- Privacy is an issue.
- **PROPOSED SYSTEM**

This style is projected to resolve most of the harmful disputes challenged big and can facilitate them to be protected. it's accustomed find the lost kids in any time with the important time location and conjointly send the notification to their parent or guard.

- It is employed by the Wi-Fi module to beat GCM to raised Communication and heartbeat sensing element, temperature sensing element and MEMS accelerator is additionally additional and showed the sensing element information in alphanumeric display display.

- The temperature information and RSSI signal information will be viewed within the on-line webpage.
- The planned mechanism provides a higher methodology to look at & track the situation of the kids in terms of latitude and meridian.
- This method advantages to decrease the misconduct against kid being safe and secure is that the mandate of the day.
- The major work behind this project is to style and formulate a device that is thus condensed in itself that offer the benefits of the own safety methodology specially for the kids.
- Creating virtual boundaries so as to observe the kid supported RSSI if the kid cross the border limit the net notification alert is generated in mobile gadget. the utilization of IOT platform improves observation. It accounts for quick and correct sensing of knowledge.
- If any emergency state of affairs,by clicking the push button the GPS location sends instantly to the registered contacts and conjointly to the closest police stations and rescue the kids.

CHAPTER 4
SYSTEM FUNCTION
4.1 BLOCK DIAGRAM

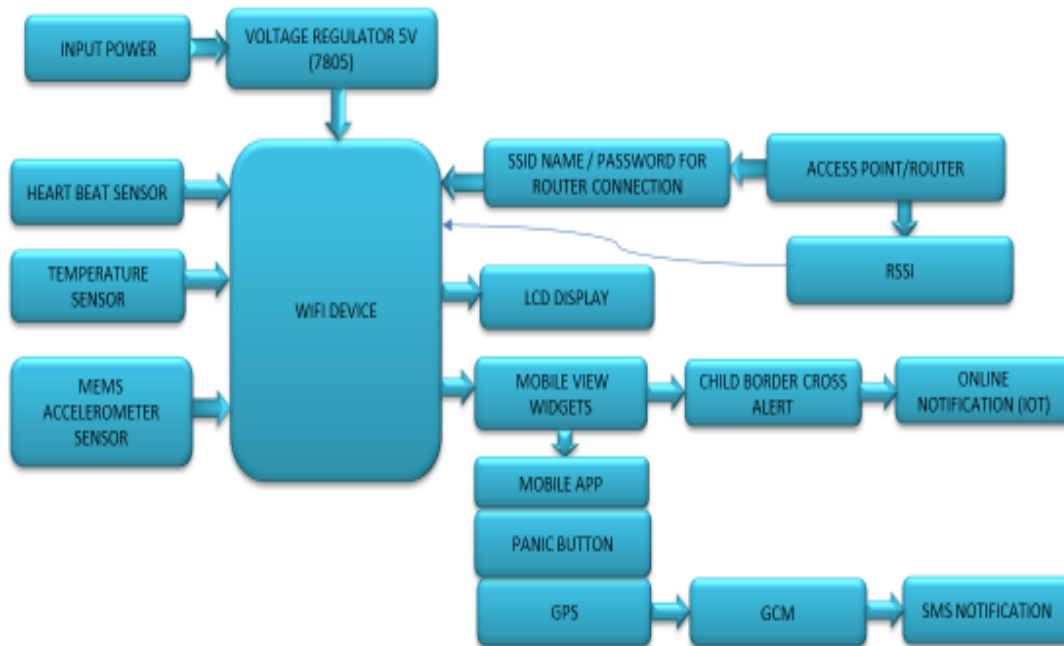


Fig no: Block Diagram for Proposed System

4.1.2 BLOCK DIAGRAM WORKING

The above block diagram proposed for wearable device to child safety. In this block diagram the WIFI device controller is the main part, it controls the whole

process. Input power supply 12v is converted into 5v by using voltage regulator then the 5v supply is used for whole device. Heart beat sensor is used in this device for monitoring the heartbeat of the child and MEMS sensor is used for monitoring the AXIS of the child and the sensor data can be displayed in the LCD display. If any emergency situation by clicking the panic button the GPS location will be send to nearest police station with the help of GCM communication. Temperature sensor is used for monitoring the child body temperature and the data can be viewed in the LCD display and also viewed online webpage. In this project we set the boundary limit to the child, the child can be monitored in the real time based on the RSSI signal strength on IOT, if the child crosses the boundary limit the online notification will notified in mobile widget to rescue the child.

4.2 CIRCUIT DIAGRAM

LCD DISPLAY

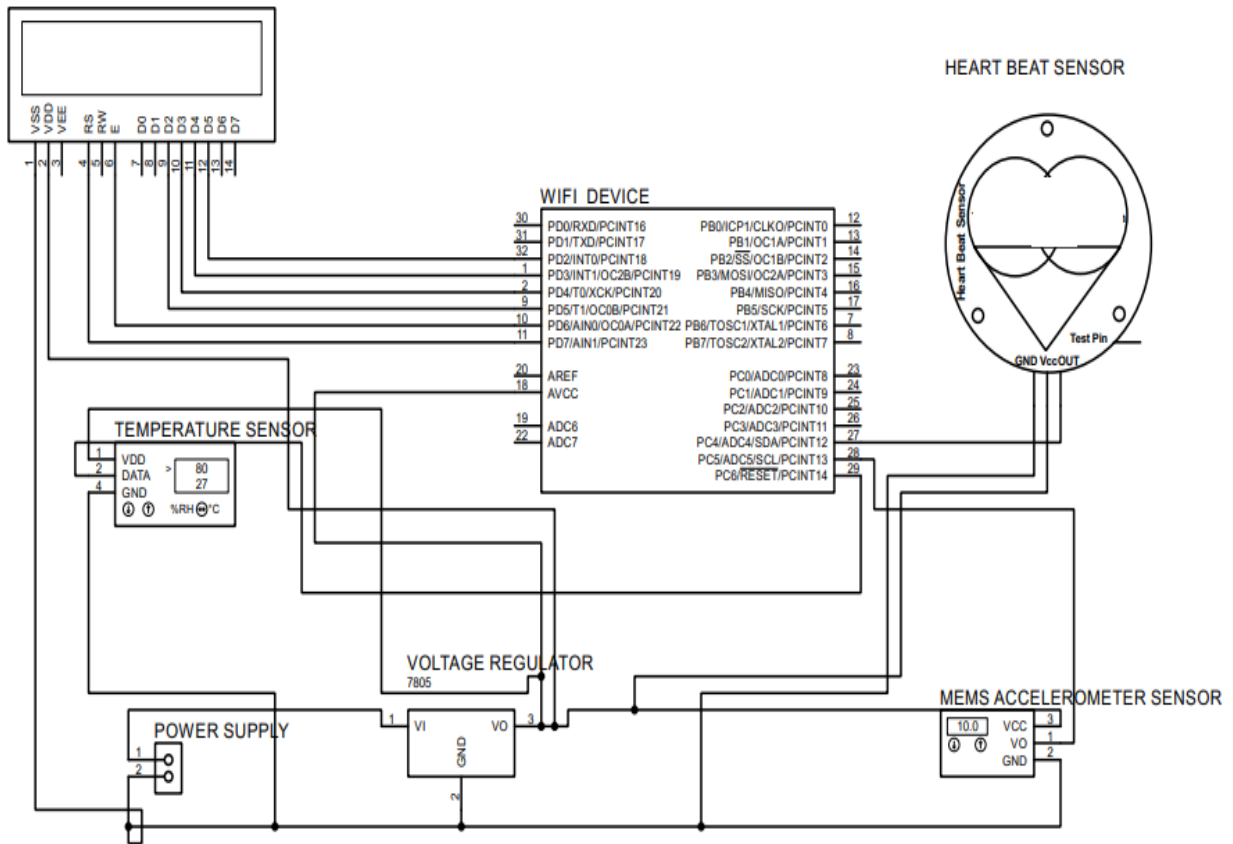


Fig no: circuit diagram for proposed system

4.2.1 CIRCUIT DESCRIPTION

The on top of circuit diagram consists the core elements of WiFi device controller, show|LCD|digital display|alphanumeric display} display, heart beat device, MEMS device, temperature device, power offer, transformer.

The 12v offer from the facility supply is given to transformer for voltage control 12v to 5v. then 5v is given to whole negative feedback circuit.

MEMS device has three pins. VCC pin is connected to produce. GND pin connected to ground. Out pin connected controller analog pin.

Temperature device information pin is connected to controller analog pin VDD pin is connected to produce. GND pin is connected to ground.

Heart beat device has three pins. VCC pin is connected to produce. GND pin connected to ground. Out pin connected controller analog pin.

LCD show digital pins connected to controller digital pins d2, d3, d4, d5, d6, d7.vdd is connected offer pin.VSS pin connected to ground.

CHAPTER 5

HARDWARE REQUIERMENTS & SPECIFICATION

5.1 WI-FI DEVICE (ESP 32 NODE MCU)

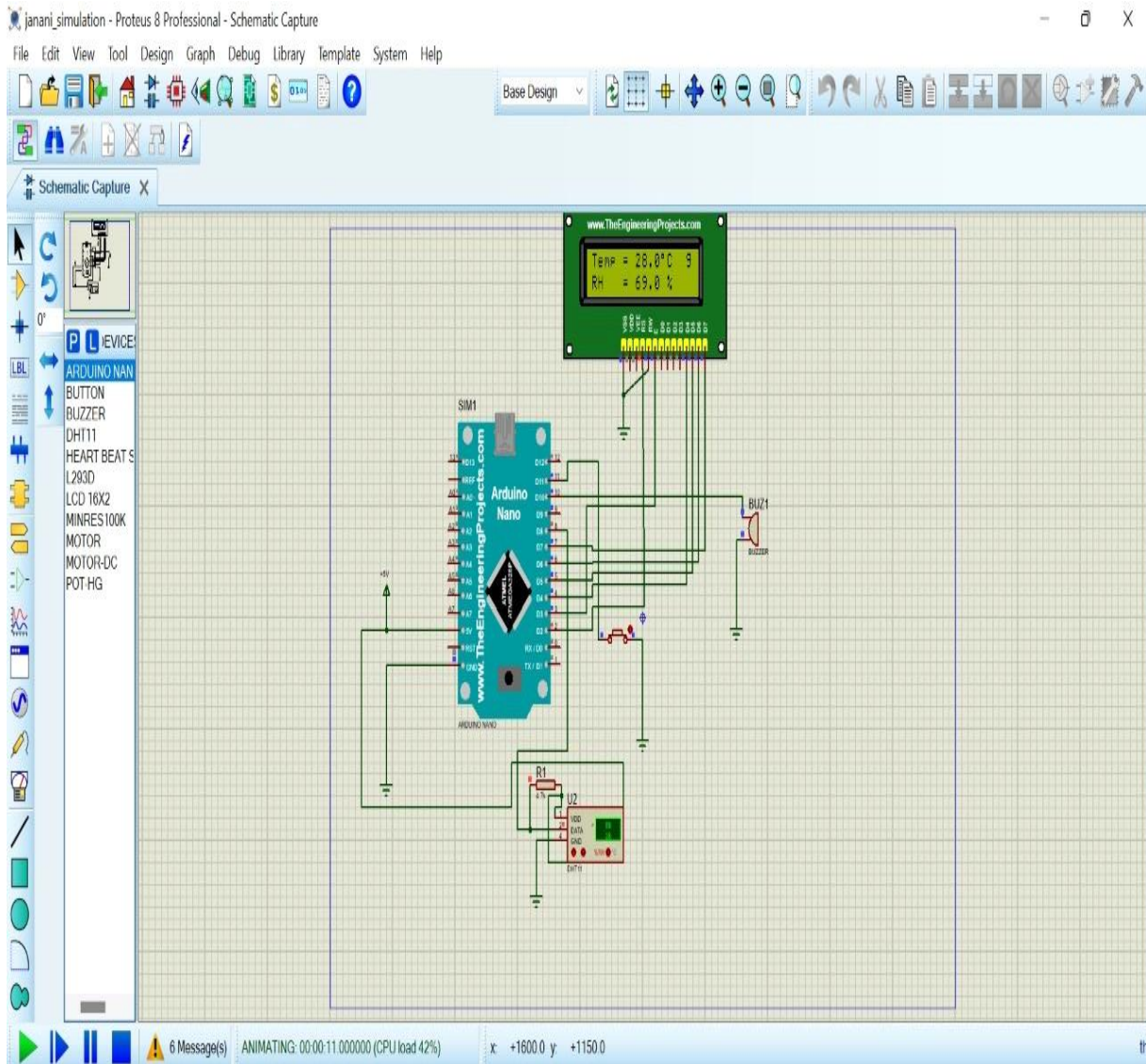
The Node MCU (Node Microcontroller Unit) is open source software and hardware development environment that is built around a very inexpensive System-on-a-Chip (SoC) called the ESP 32. The ESP 32, designed and manufactured by Espressif Systems, contains all crucial elements of the modern computer: CPU, RAM, networking (wifi), and even a modern operating system and SDK.

However, as a chip, the ESP 32 is also hard to access and use. You have to solder wires, with the appropriate analog voltage, to its PINs for the simplest tasks such as powering it on or sending a keystroke to the “computer” on the chip. And, you have to program it in low-level machine instructions that can be interpreted by the chip hardware. While this level of integration is not a problem when the ESP 32 is used as an embedded controller chip in mass-produced electronics, it is a huge burden for hobbyists, hackers, or students who want to experiment with it in their own IoT projects.

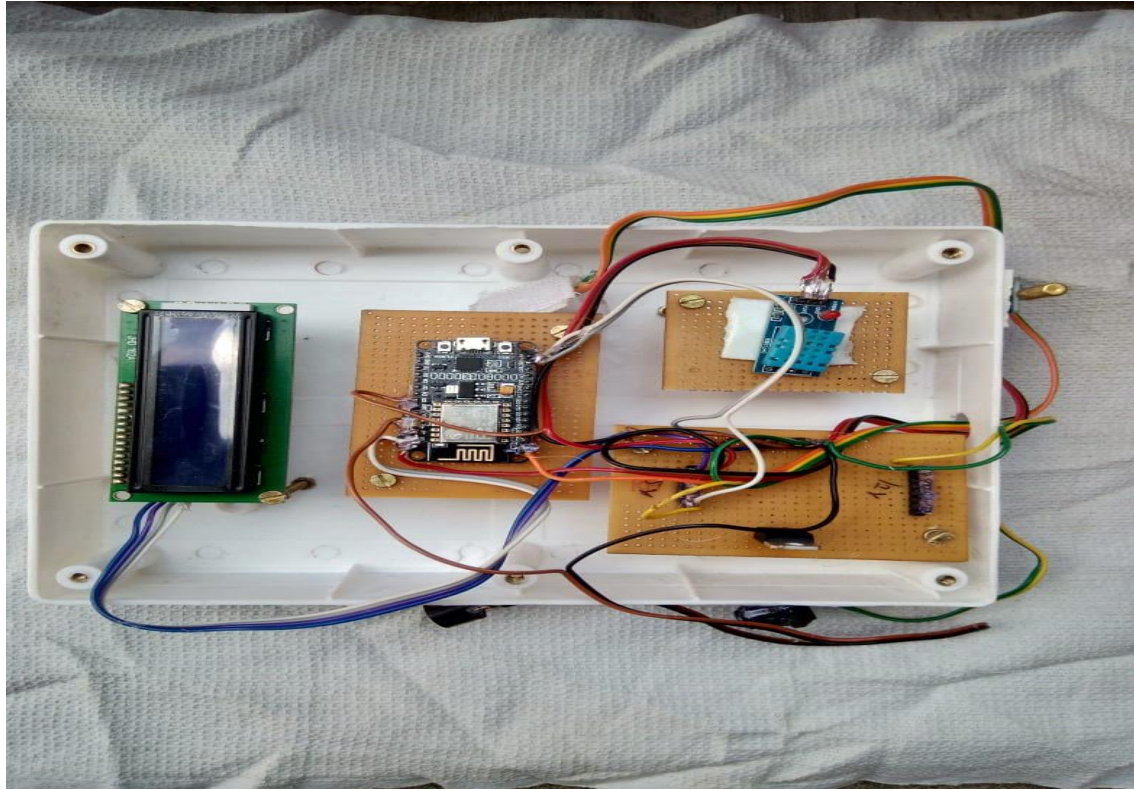
Borrowing a page from the successful playbooks of a Raspberry Pi, the Node MCU project aims to simplify ESP 32 development. It has two key components.

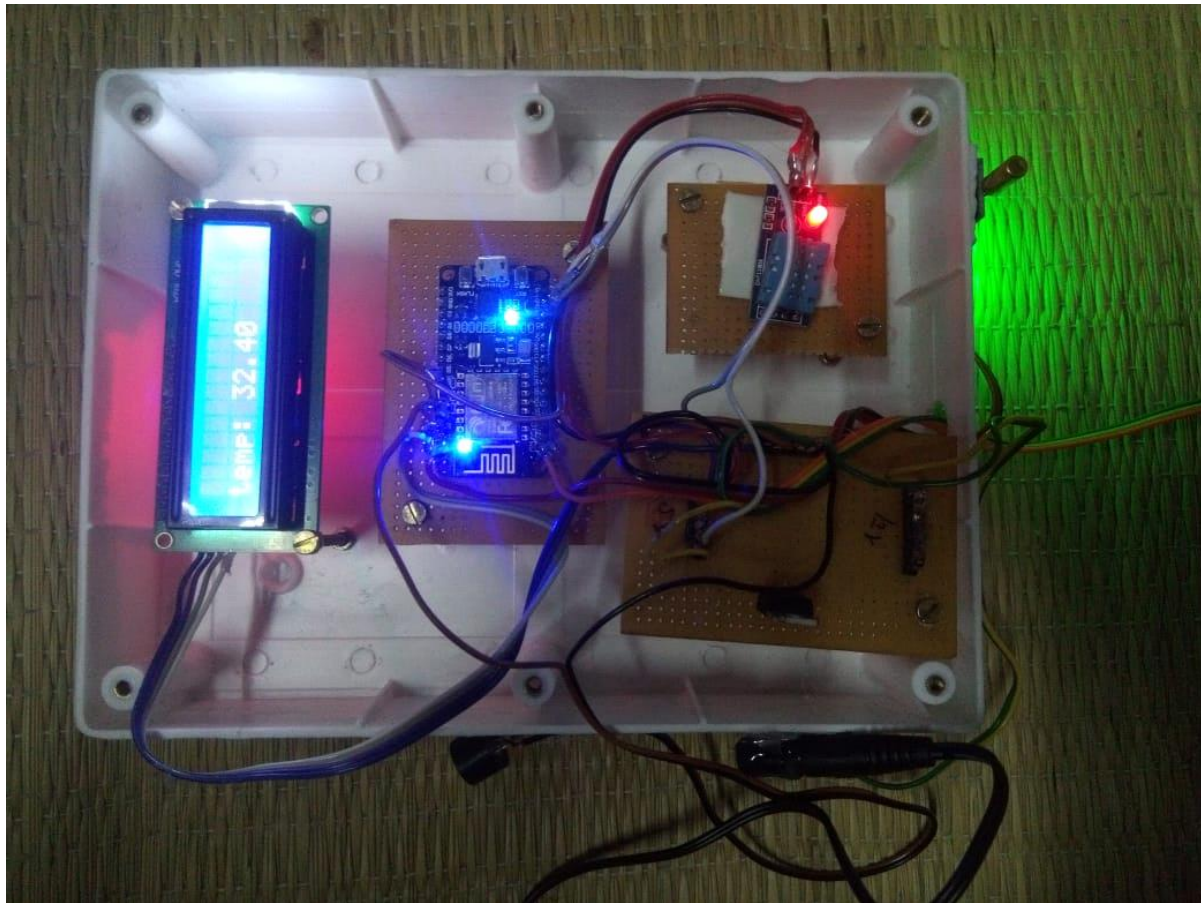
1. An open source ESP 32 firmware that is built on top of the chip manufacturer’s proprietary SDK. The firmware provides a simple programming environment based on (embedded), which is a very simple and fast scripting language with an established developer community. For new comers, the Lua scripting language is easy to learn.
2. A board that incorporates the ESP 32 chip on a standard circuit board. The board has a built-in USB port that is already wired up with the chip, a hardware reset

button, Wi-Fi antenna, LED lights, and standard-sized GPIO (General Purpose Input Output) pins that can plug into a bread board.



HARDWARE OF THE PROJECT





5.1.1 The Node MCU Pin Schema:

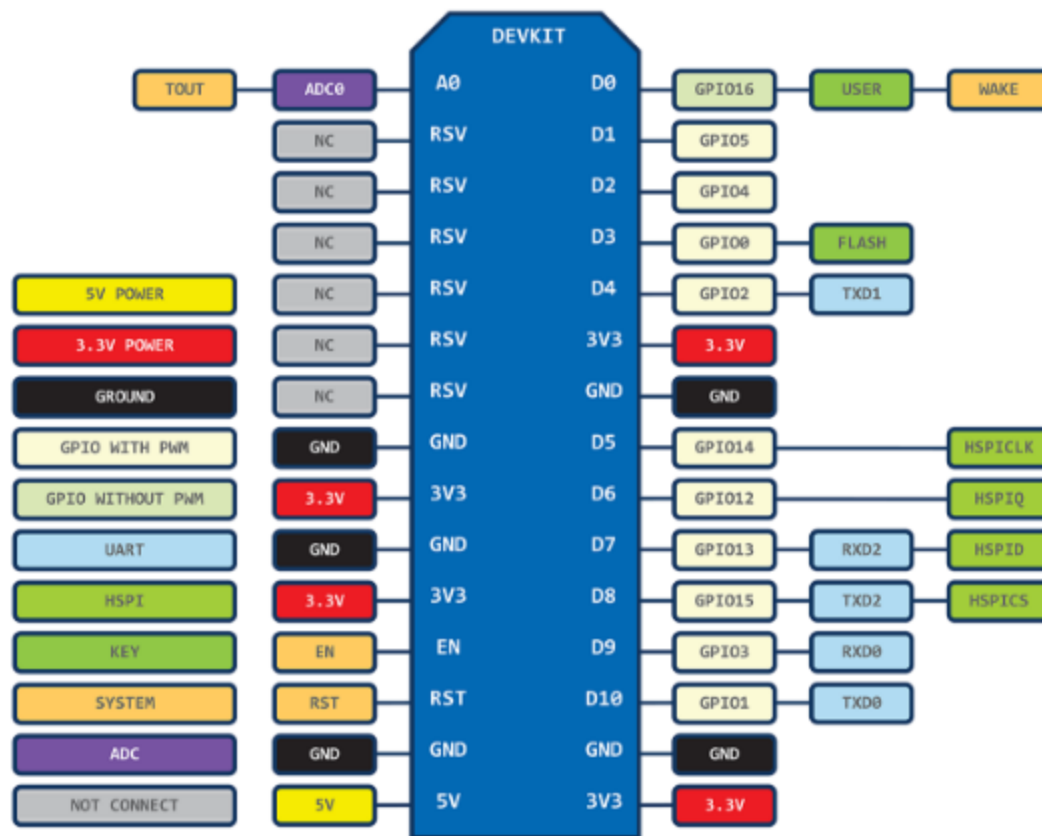


Fig No: Pin Out Diagram

The project creates an open source hardware design and software

SDK for a versatile IoT controller. Similar to Node MCU, the hardware is a microcontroller board with a ready USB connector, LED lights, and standard data pins. It also defines standard interfaces to interact with sensors or other boards. But unlike Node MCU, the board can have different types of CPU chips (typically an ARM or Intel x 86 chips) with memory chips, and a variety of programming environments. In fact, there is a reference design for the ESP 32 chip as well. However, the flexibility of also means significant variations across

different vendors. For example, most boards do not have wifi capabilities and some even have a serial data port instead of a USB port. I feel that Node MCU provides a more consistent and accessible experience for IoT developers.

5.1.2 NodeMCU programming basics

Thus far, you have seen how to load and run Lua applications on NodeMCU. In this section, let's review some basic techniques for running NodeMCU apps.

```
-- setup Wifi
wifi.setmode(wifi.STATION)
wifi.sta.config("SSID","password")
```

Notice that you will need to know the network name and password in order to join. A common technique is to loop through a list of known network name and password pairs if the device might be placed in several different environments.

5.1.3 Connecting to the internet

The Node MCU SDK contains an HTTP module for making HTTP requests over the internet. When you build your Node MCU firmware, you will need to select the HTTP options to include this module. The code snippet below shows how to make an HTTP GET request, and execute some code upon completion of this request. In the callback function, the code argument is the

HTTP return value (for example, 200 indicates success and 404 indicates that the URL is not accessible), and the data argument is the content in the HTTP response message.

```
geturl = "http://www.ibm.com/"
http.get(geturl, nil, function(code, data)
    -- Turn off the red LED on NodeMCU board
end)
```

5.1.4 Accessing the GPIO pins

The General-Purpose Input Output (GPIO) pins are digital pins on the NodeMCU DEVKIT board. Each pin can have only two states: a low voltage state and a high-voltage state, representing 0 and 1 respectively. From the NodeMCU Lua application, you can read the state from each pin, and then set the state.

```
-- Read the state of GPIO PIN #5. The val value is 0 or 1
gpio.mode(5, gpio.INPUT)
val = gpio.read(5)

-- Set the state of GPIO PIN #5 to be HIGH
gpio.mode(5, gpio.OUTPUT)
gpio.write(5, gpio.HIGH)
```

5.1.5 Reading analog signals

While the GPIO pins are digital pins, some IoT sensors send in data as analog signals. That is, the voltage of the input wire represents the data. For example, the actual voltage level from a temperature sensor might indicate the

temperature reading. On the NodeMCU DEVKIT board, the A0 pin can function as an ADC (Analog to Digital Convertor) pin. When an input wire is connected to the A0, its voltage level between 0 to 3.3V will be converted to an integer number between 0 and 1024. The code snippet below shows how to read an analog value from A0 pin.

5.2 POWER SUPPLY

- The only information you need to have in order to find the correct power supply for your device is the Voltage / Volts (V) and Amperage / Amps (A).
- Voltage has to be an exact match. A 12V DC device needs a 12V DC adapter.
- Amperage is the amount of power your device uses. The adapter you order has to be able to supply AT LEAST the amount of Amps your device draws. If your device states it is 12V 3A, a 3A adapter can handle that load, but so can a 4A and 5A. The higher amperage (amp) power supply will not have to work as hard to handle a smaller load, and will run cooler and more stable.
- If the Amperage of your device is uneven, such as 3.13A or 4.16A, always round up. 3.13A rounds up to a 3.5A adapter, a 4.16A device will round up to a 4.5A or a 5A.
- If you match these two specification (V and A), the power supply will work for your device.

Model identifier:	12V/2A/5.5
Input voltage:	100 - 240 V AC
AC input frequency:	50 / 60 Hz
Output voltage:	12.0 V DC
Output current:	2.0 A
Output power:	24.0 W
Average efficiency during work:	86.2 %
Efficiency at low load (10%):	66.8 %
No-load power consumption:	< 0.10 W
Adapter type:	Switching
Output voltage adjustment:	—
Protections:	Overload
Number of outputs:	1 pcs
Power connectors type:	• 230 V CEE 7/16 • 12 V - 2.1/5.5 mm Straight plug
Housing type:	Desktop
Weight:	0.172 kg
Dimensions:	91 x 53 x 31 mm
Guarantee:	2 years

Table no: 5.1 power supply details

5.2.1 Detailed Instructions:

In order to find the correct power supply for your device, you will need two pieces of information. These are Voltage (measured in Volts or V) and Amperage (measured in Amps or A). You can find this information off the back of the old power supply, or off the back of the device itself. If you do not find it on the device, you can check the manufacturer's website, or in the device's manual under "specifications".

Voltage:

All of the facility provides we have a tendency to sell area unit 12V DC. They take any input from 100V up to 220V AC, that is what comes out of your electric outlet,

and output 12V DC. this can be what most digital devices like LCD screens, DVD players, exhausting Drives, Audio Gear, and most different digital devices use. we have a tendency to solely carry 12V DC power provides, therefore if your unit isn't twelve V, you'll not notice the proper adapter here.

Amperage:

Once you have got confirmed that you just want a twelve V power offer, you may got to verify what quantity power your device attracts. this is often known as electrical phenomenon. Next to the 12V within the specifications there'll be another variety followed by a capital "A" for Amps. you may want an influence offer that may offer enough power for your device. If your device says it attracts three Amp (3A), you wish to use an influence offer that may place out a minimum of that several Amps. If your device states it wants 3A, then you'll use a 3A, or 4A, or 5A unit. All can work.

If the electrical phenomenon of your device is uneven, such as 3.13A or 4.16A, forever collect. 3.13A rounds up to a three.5A adapter, a 4.16A device can collect to a four.5A or a 5A.

Connector:

All our power supplies have a connector that is standard for a 12V DC device. Most 12V DC devices use the standard tip. This tip is 5.5mm (outer barrel) by 2.5mm (inner barrel) and is center positive. It is a simple round barrel connector. To repeat, if you match the voltage and amperage, then you should not have to worry about the connector type accept in the rare occasion when your device has an unusual connector such as a double barrel, or a 4-pin, but these are easy to spot as the jack where the adapter plugs in will not be a simple circular barrel with a pin inside.



Fig no: 5.3 power connector

5.3 VOLTAGE REGULATORS

Voltage regulators comprise a category of wide used ICs. Regulator IC units contain the electronic equipment for reference supply, comparator electronic equipment, management device, and overload protection beat one IC. though the inner construction of the IC is somewhat totally different from that delineate for distinct transformer circuits, the external operation is way constant. IC units give regulation of either a hard and fast positive voltage, a hard and fast negative voltage, or AN adjustable set voltage.

A power provide are often engineered employing a electrical device connected to the AC route to step the AC voltage to desired amplitude, then rectifying that AC voltage, filtering with a electrical device and RC filter, if desired, and at last regulation the DC voltage mistreatment AN IC regulator. The regulators are often

elite for operation with load currents from many Milli amperes to tens of amperes, admire power ratings from milli watts to tens of watts.

Pin Details of 7805 IC

Pin. No.	Pin	Function	Description
1	INPUT	Input voltage (7V-35V)	In this pin of the IC positive unregulated voltage is given in regulation.
2	GROUND	Ground (0V)	In this pin where the ground is given. This pin is neutral for equally the input and output.
3	OUTPUT	Regulated output; 5V (4.8V-5.2V)	The output of the regulated 5V volt is taken out at this pin of the IC regulator.

Table no: pin function of 7805

5.3.1 THREE-TERMINAL VOLTAGE REGULATORS

Fig shows the essential association of a three-terminal transformer IC to a load. The mounted transformer has Associate in Nursing unregulated DC input voltage, V_I , applied to 1 input terminal, a regulated output DC voltage, V_o , from a second terminal, with the third terminal connected to ground. For a particular regulator, IC device specifications list a voltage vary over that the input voltage will vary to take care of a regulated output voltage over a variety of load current. The specifications additionally list the quantity of output voltage amendment ensuing from a amendment in load current (load regulation) or in input voltage (line regulation).

5.3.2 FIXED POSITIVE VOLTAGE REGULATORS

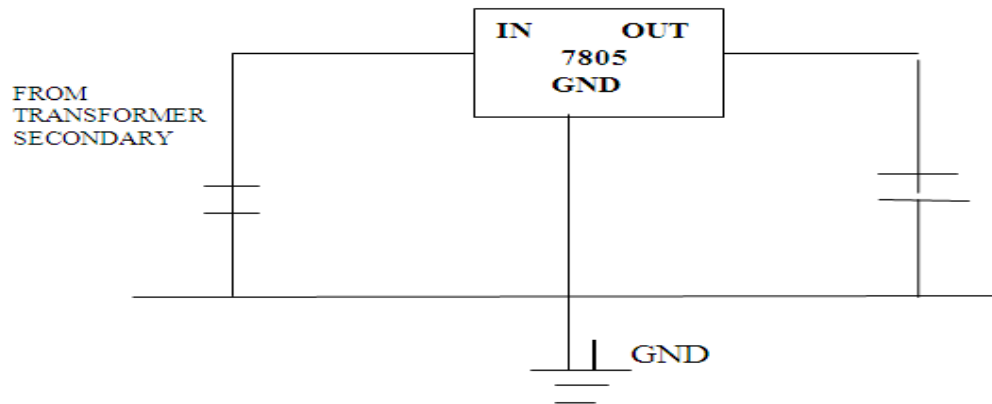


Fig no: Fixed Voltage Regulators

The series seventy eight regulators give fastened regulated voltages from five to twenty four V shows however one such IC, a 7812, is connected to produce voltage regulation with the output from this unit of +12V Dec. Associate in Nursing unregulated input voltage V_i is filtered by capacitance C_1 and connected to the IC's IN terminal. The IC's OUT terminal provides a regulated + 12V that is filtered by the capacitance C_2 (mostly for any high-frequency noise). The third IC terminal is connected to ground (GND).

While the input voltage might vary over some permissible voltage vary, and also the output load might vary over some acceptable vary, the output voltage remains constant among nominal voltage variation limits. These limitations square measure spelled get in the manufacturer's specification sheets.

BLOCK DIAGRAM

The AC voltage, usually 220V RMS, is connected to a electrical device, that steps that AC voltage all the way down to the extent of the required DC output. A

diode rectifier then provides a full-wave corrected voltage that's at first filtered by a straightforward electrical device filter to supply a DC voltage. This ensuing DC voltage sometimes has some ripple or AC voltage variation.

A regulator circuit removes the ripples and conjointly remains a similar DC worth albeit the input DC voltage varies, or the load connected to the output DC voltage changes. This voltage regulation is typically obtained victimization one among the popular transformer IC units.

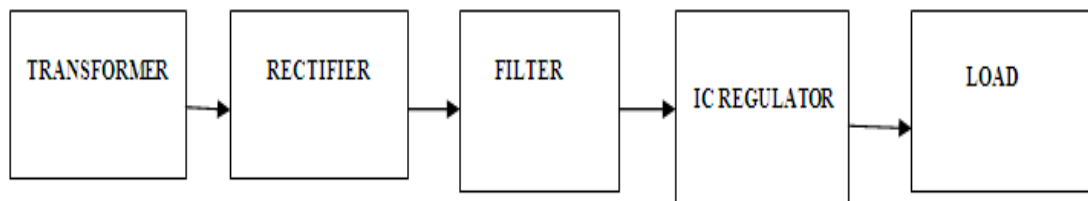


Fig no: Block Diagram of Power Supply

5.4TEMPERATURE SENSOR

For measurement temperature this sensing element uses a Negative Temperature constant semiconductor unit, that causes a decrease in its resistance worth with increase in temperature. to urge larger resistance worth even for the tiniest modification in temperature, this sensing element is sometimes created from semiconductor ceramics or polymers.

The temperature vary of DHT11 is from zero to fifty C with a 2-degree accuracy. wetness vary of this sensing element is from twenty to eightieth with five-hitter accuracy. The rate of this sensing element is 1Hz .i.e. it provides one reading for each second. DHT11 is little in size with in operation voltage from three to five volts. the utmost current used whereas measurement is two.5mA.

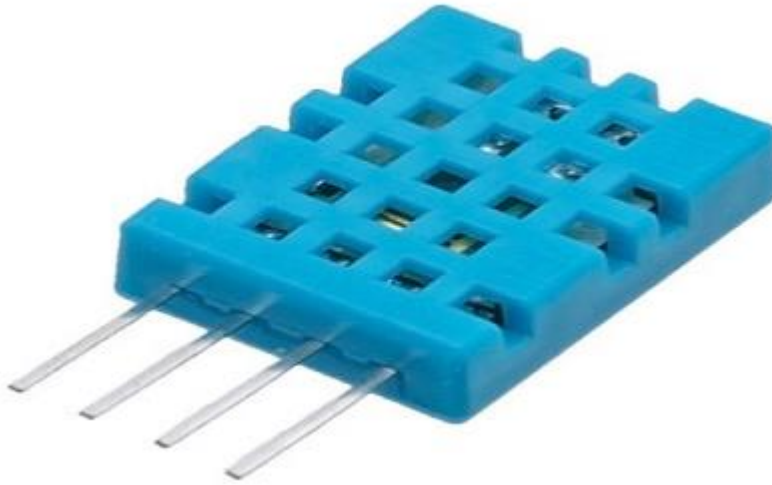


Fig no: temperature sensor

DHT11 sensor has four pins- VCC, GND, Data Pin and a not connected pin. A pull-up resistor of 5k to 10k ohms is provided for communication between sensor and micro-controller.

5.4.1 FEATURES

Standard assembling strut (two 3mm holes with multiple of 5cm as interval).

- User-friendly interfaces ("A" for analog and "D"for digital).
- Icons to simplify illustrate sensor function.
- High quality connector

5.4.2 Applications

This sensor is used in various applications such as measuring humidity and temperature values in heating, ventilation and air conditioning systems. Weather stations also use these sensors to predict weather conditions. The

humidity sensor is used as a preventive measure in homes where people are affected by humidity. Offices, cars, museums, greenhouses and industries use this sensor for measuring humidity values and as a safety measure.

5.5 HEART BEAT SENSOR

Heart beat device is intended to provide digital output of warmth beat once a finger is

Placed on that. once the center beat detector is functioning, the beat crystal rectifier flashes in unison with every heartbeat. This digital output are often connected to microcontroller on to live the Beats per Minute (BPM) rate. It works on the principle of sunshine modulation by blood flow through finger at every pulse. Ji



Fig no: Heart beat sensor

5.5.1 FEATURES:

- Heart beat indication by LED
- Instant output digital signal for directly connecting to microcontroller
- Compact Size
- Working Voltage +5V DC

5.5.2 WORKING:

The device consists of a brilliant bright red crystal rectifier and lightweight detector. The crystal rectifier has to be super bright because the most light-weight should pass unfold in finger and detected by detector. Now, once the center pumps a pulse of blood through the blood vessels, the finger becomes slightly additional opaque so less light-weight reached the detector. With every heart pulse the detector signal varies. This variation is born-again to electrical pulse. This signal is amplified associate degreed triggered through an electronic equipment that outputs +5V logic level signal. The output is additionally indicated by a crystal rectifier that blinks on every heart beat.

Heart rate may be measured in numerous ways that. 2 of the foremost common techniques area unit electrical and optical strategies, the latter is additional price effective and convenient. in essence, the optical technique (known as photoplethysmography) measures the center rate by sensing changes in blood flow through the finger. A plot for this modification recorded against the clock is known as as photoplethysmographic (PPG) wave shape.

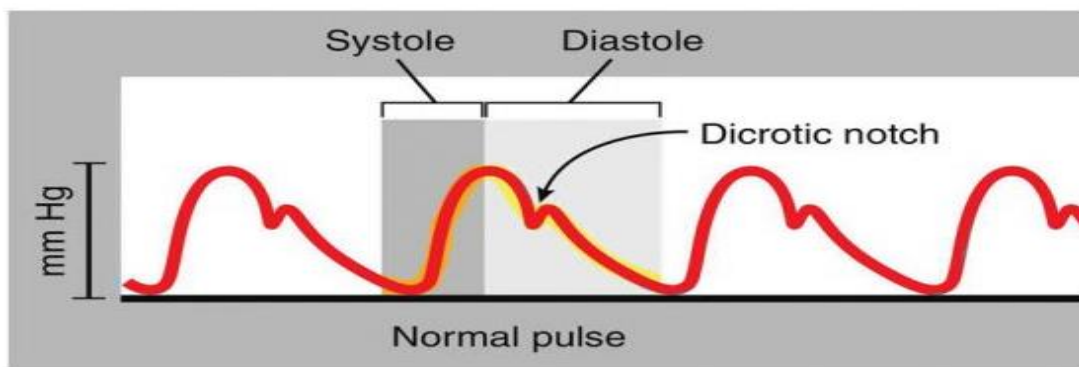


Fig no: pulse sensor working

5.5.3 APPLICATION:

- Digital Heart Rate monitor

- Patient Monitoring System
- Bio-Feedback control of robotics and applications

5.6 LCD DISPLAY

LCD stands for Liquid Crystal Display. LCD is finding wide spread use replacing LED' s (seven segment LED's or other multi segment LED's) because of the following reasons:

The declining prices of LCD's.

1. The ability to display numbers, characters and graphics. This is in contrast to LED's, which are limited to numbers and a few characters.
2. Incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD. In contrast, the LED must be refreshed by the CPU to keep displaying the data.

Ease of programming for characters and graphics.

3. These components are “specialized” for being used with the microcontrollers, which means that they cannot be activated by standard IC circuits. They are used for writing different messages on a miniature LCD.

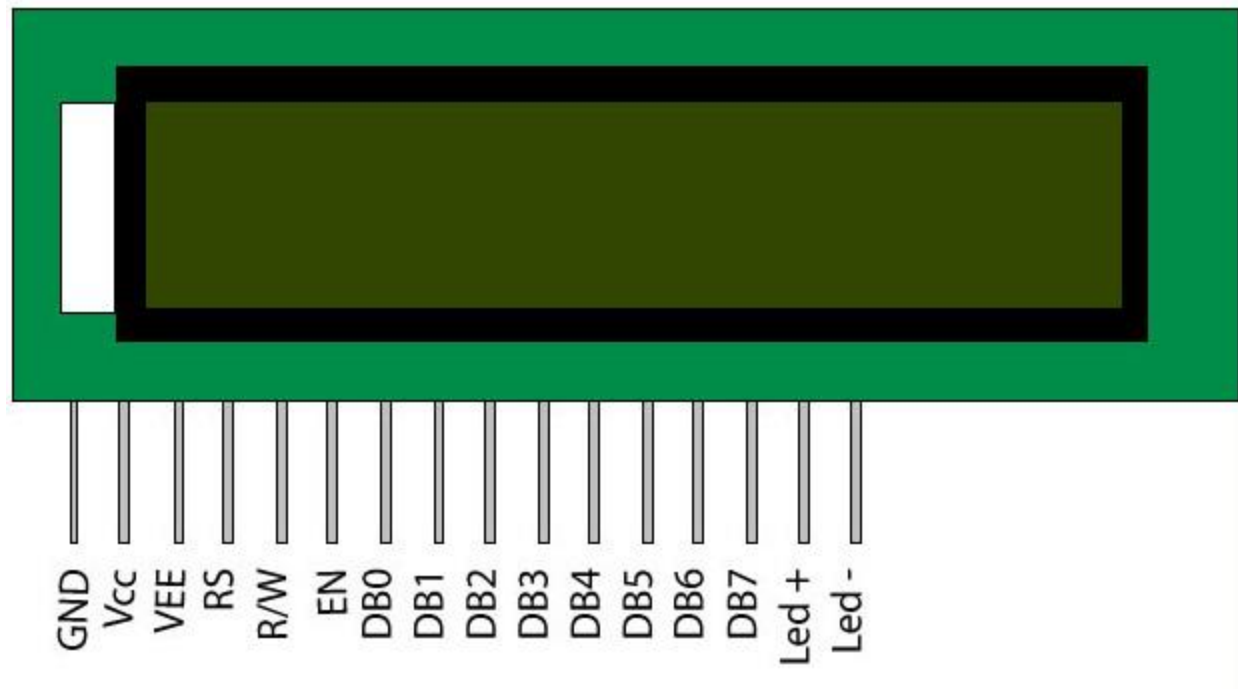


Fig no: pin diagram LCD Display

A model described here is for its low price and great possibilities most frequently used in practice. It is based on the HD44780 microcontroller (*Hitachi*) and can display messages in two lines with 16 characters each. It displays all the alphabets, Greek letters, punctuation marks, mathematical symbols etc. In addition, it is possible to display symbols that user makes up on its own. Automatic shifting message on display (shift left and right), appearance of the pointer, backlight etc. are considered as useful characteristics.

5.6.1 PIN FUNCTIONS:

There are pins along one side of the small printed board used for connection to the microcontroller. There are total of 14 pins marked with numbers (16 in case the background light is built in). Their function is described in the table below:

Pin no.	Symbol	External connection	Function
1	V _{ss}	Power supply	Signal ground for LCM
2	V _{DD}		Power supply for logic for LCM
3	V ₀		Contrast adjust
4	RS	MPU	Register select signal
5	RW	MPU	Read/write select signal
6	E	MPU	Operation (data read/write) enable signal
7~10	DB0~DB3	MPU	Four low order bi-directional three-state data bus lines. Used for data transfer between the MPU and the LCM. These four are not used during 4-bit operation.
11~14	DB4~DB7	MPU	Four high order bi-directional three-state data bus lines. Used for data transfer between the MPU
15	LED+	LED BKL power supply	Power supply for BKL
16	LED-		Power supply for BKL

Table No: pin LCD Function

5.6.2 LCD screen:

LCD screen consists of 2 lines with sixteen characters every. every character consists of 5x7 matrix. distinction on show depends on the facility provide voltage

and whether or not messages are displayed in one or 2 lines. For that reason, variable voltage 0-V_{dd} is applied on pin marked as V_{ee}. Trimmer potentiometer is typically used for that purpose. Some versions of displays have inbuilt backlight (blue or inexperienced diodes). once used throughout operative, a resistance for current limitation ought to be used (like with any diode).

5.6.3 LCD BASIC COMMANDS:

All data transferred to LCD through outputs D0-D7 will be interpreted as commands or as data, which depends on logic state on pin RS:

RS = 1 - Bits D0 - D7 are addresses of characters that should be displayed. Built in processor addresses built in “map of characters” and displays corresponding symbols. Displaying position is determined by DDRAM address. This address is either previously defined or the address of previously transferred character is automatically incremented.

RS = 0 - Bits D0 - D7 are commands which determine display mode. List of commands forced:

5.6.4 LCD Connection:

Depending on what number lines square measure used for association to the microcontroller, there square measure 8-bit and 4-bit LCD modes. the acceptable mode is set at the start of the method during a section known as “initialization”. within the initial case, the info square measure transferred through outputs D0-D7 because it has been already explained. just in case of 4-bit junction rectifier mode,

for the sake of saving valuable I/O pins of the microcontroller, there square measure solely four higher bits (D4-D7) used for communication, whereas different is also left unconnected. Consequently, every knowledge is shipped to LCD in 2 steps: four higher bits square measure sent initial (that usually would be sent through lines D4-D7), four lower bits square measure sent after. With the assistance of formatting, LCD can properly connect and interpret every knowledge received. Besides, with regards to the very fact that knowledge square measure seldom browse.

LCD (data chiefly square measure transferred from microcontroller to LCD) a new I/O pin is also saved by straightforward connecting R/W pin to the bottom. Such saving has its value. despite the fact that message displaying are going to be usually performed, it'll not be doable to browse from busy flag since it's unimaginable to browse from show.

5.6.5 LCD Initialization:

Once the power supply is turned on, LCD is automatically cleared. This process lasts for approximately 15mS. After that, display is ready to operate. The mode of operating is set by default. This means that:

1. Display is cleared

2. Mode

DL = 1 Communication through 8-bit interface

N = 0 Messages are displayed in one line

F = 0 Character font 5 x 8 dots

3. Display/Cursor on/off

D = 0 Display off

U = 0 Cursor off

B = 0 Cursor blink off

4. Character entry

ID = 1 Addresses on display are automatically incremented by 1

S = 0 Display shift off

Automatic reset is principally performed with none issues. chiefly however not always! If for any reason power provide voltage doesn't reach full price within the course of 10mS, show can begin performs fully unpredictably? If voltage provide unit cannot meet this condition or if it's required to produce fully safe operational, the method of format by that a brand new reset enabling show to work usually should be applied. formula consistent with the format is being performed depends on whether or not association to the microcontroller is thru 4- or 8-bit interface. All left over to be done then is to grant basic commands and of course- to show messages.

5.7 MEMS ACCELEROMETER SENSOR

MEMS accelerometers square measure used where there's a desire to live linear motion, either movement, shock or vibration however while not a hard and fast reference. They measure the linear acceleration of no matter they're hooked up to.

The detector in MEMS VC accelerometers is comprised of a micro-machined proof mass that's suspended between 2 parallel plates. because the proof mass moves once acceleration is applied, one air gap decreases and also the alternative gap will increase making a modification in capacitance proportional to acceleration.

MEMS sensors is used to measure physical parameters like acceleration, temperature and pressure. Electronic elements is created on a similar chip to live the output of the sensors, perform signal process and supply wireless communication.

A MEMS (micro-electromechanical system) is a miniature machine that has each mechanical and electronic elements. The physical dimension of a MEMS will vary from many millimeters to but one micrometer, a dimension repeatedly smaller than the breadth of an individual's.

There square measure 3 differing types of accelerometers, and that they square measure every designed to with efficiency operate in their meant environments. The 3 sorts are: piezoelectric, piezo resistance and electrical phenomenon.

Accelerometers generally be 2 classes - manufacturing either 10 mV/g or a hundred mV/g. The frequency of the AC output voltage can match the frequency of the vibrations. The output level are proportional to the amplitude of the vibrations.

Accelerometers in mobile phones are used to sight the orientation of the phone. AN measuring instrument measures linear acceleration of movement, whereas a gyro on the opposite hand measures the angular motility rate. each sensors live rate of modification; they simply live the speed of change for various things.

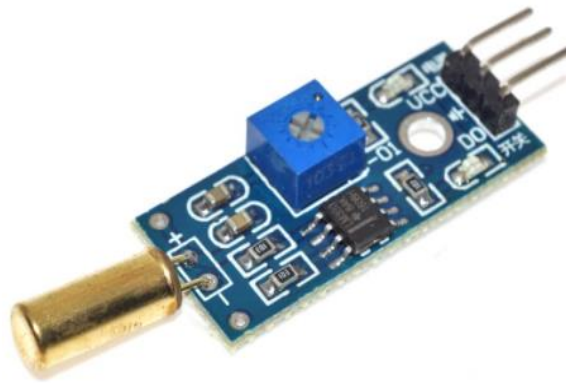


Fig No: Mems Accelerometer Sensor

5.7.1 Accelerometer Sensor Circuit

Required components for accelerometer sensor circuit

- Accelerometer Sensor

- 470 Ohms Resistor
- Led or Load
- DC Voltage Source

A basic circuit that uses an accelerometer sensor is shown below.

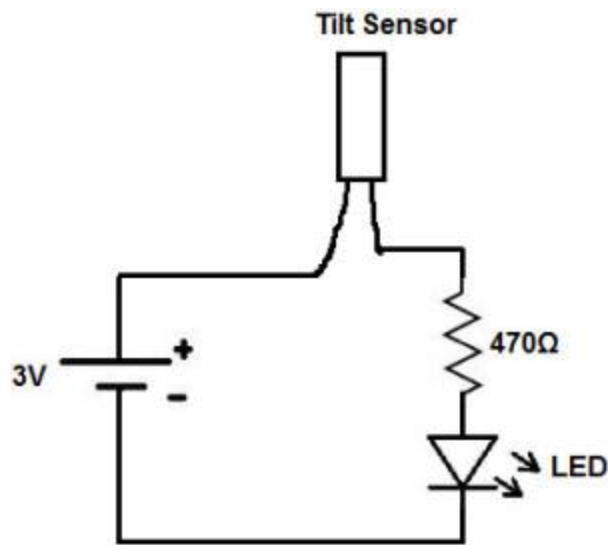


Fig no: Accelerometer Sensor Circuit

5.8 RSSI

Received Signal Strength Indicator (RSSI) is Associate in Nursing calculable measuring of however sensible a tool will hear, discover and receive signals from any access purpose or from a specific router. a proof is indicated through RSSI. Most of the time, it measures however sensible a specific radio will hear different connected client's radios. the great issue regarding RSSI is that it helps you establish and grasp if a proof is sufficient to ascertain a wireless affiliation. When broadcasting to a bigger distance, the signal becomes weaker and the bandwidth of the wireless knowledge affiliation becomes slower. This results in a weaker overall knowledge output. This RSSI is typically invisible to the user of a receiving device however since the signal strength varies greatly and affects the perform of a

wireless affiliation, the devices typically create the measuring on the market to users. in an exceedingly shell, RSSI is that the commonest name for a proof worth, it refers to the strength that one device is hearing from another device.

5.7.1 FUNCTIONALITY

RSSI or this signal price is measured in decibels from zero (zero) to -120 (minus 120). The nearer the worth to zero (zero), the stronger the signal are. With this, the common spot for neighboring nodes is between -55 (minus 55) and -65 (minus 65). AN RSSI of -55 (minus 55) may be a stronger signal than -70 (minus 70). This RSSI will be found between the APs by clicking them within the map read and hunting the neighbor's tab. If measured in negative numbers, variety that's nearer to zero sometimes suggests that a far better signal, variety that's -50 (minus 50) may be a pretty smart signal, variety of -70 (minus 70) is affordable whereas variety that's -100 (minus 100) has no signal in the least.

The number of neighbors should even be restricted to a most of five as a result of going on the far side this vary would cause issues with performance, most frequently caused by signal interferences. RSSI may be used internally in a very wireless networking card. this can be to work out once the quantity of radio energy within the channel is below a particular threshold. At that purpose, the network card is obvious to send. If the cardboard is already cleared to send, there's a packet of data that may be sent. the tip user are ready to observe the RSSI price in mensuration the signal strength of a wireless network through the employment of a wireless observation tool like Wireshark, fate or business executive. so as to live the received signal strength at a particular location and time, you'll be able to use a Wi-Fi scanner application. If you're employing a laptop that's mackintosh OS X, you'll be able to get the RSSI even while not putting in any applications through the following:

1. Press and hold the angular position key whereas clicking the Wi-Fi icon on the standing menu.

2. the list of obtainable networks, notice the name of the network you're connected to and also the association info as well as RSSI are displayed straightaway below.

If you would like to map the signal strength for the whole place, you'll be able to use the warmth mapping tool rather than a Wi-Fi scanner. This tool helps you visualize the wireless coverage in numerous areas of your house.

Signal Strength

The measurement of RSSI represents the relative quality of a signal that will be received on a device. RSSI indicates the power level that is being received after any possible loss at the antenna and cable level. Hence, the higher the value of RSSI, the stronger the signal is.

Signal Quality

This higher the number, the better the quality is. These are only theoretical numbers for ideal conditions but it also depends on the system and the device used which can be determined differently.

Channel Width

If the channel is wider, normally it has a lower value of RSSI. With this, it is recommended to have the smaller channel widths in all but some special circumstances.

dBm

RSSI and dBm may have different units of measurement but both of them represent the same thing. They both represent the signal strength of a network. The

difference between the two is that RSSI is a relative index while dBm is considered as an absolute number representing power levels in mW (milliwatts). Hence, the closer to 0dBm, the better the signal is.

Acceptable Signal Strengths

Signal Strength (dBm)	Rating
-30 dBm	Amazing
-67 dBm	Very Good
-70 dBm	Okay
-80 dBm	Not Good
-90 dBm	Unusable

Table no: signal strength of RSSI

CHAPTER 6

6. SYSTEM SPECIFICATION

6.1 Hardware specification

- WIFI device controller
- Power supply
- Voltage regulator
- LCD display
- Heart beat sensor
- MEMS accelerometer sensor

- Temperature sensor

6.2 software specification

- IOT (internet of things)
- Android studio
- Embedded c program

6.3Internet of Things (IoT):

The Internet of Things(IoT) is a system of ‘connected things’. The things generally comprise of an embedded operating system and an ability to communicate with the internet or with the neighboring things. One of the key elements of a generic IoT system that bridges the various ‘things’ is an IoT service. An interesting implication from the ‘things’ comprising the IoT systems is that the things by themselves cannot do anything. At a bare minimum, they should have an ability to connect to other ‘things’. But the real power of IoT is harnessed when the things connect to a ‘service’ either directly or via other ‘things’. In such systems, the service plays the role of an invisible manager by providing capabilities ranging from simple data collection and monitoring to complex data analytics. The below diagram illustrates where an IoT service fits in an IoT ecosystem:

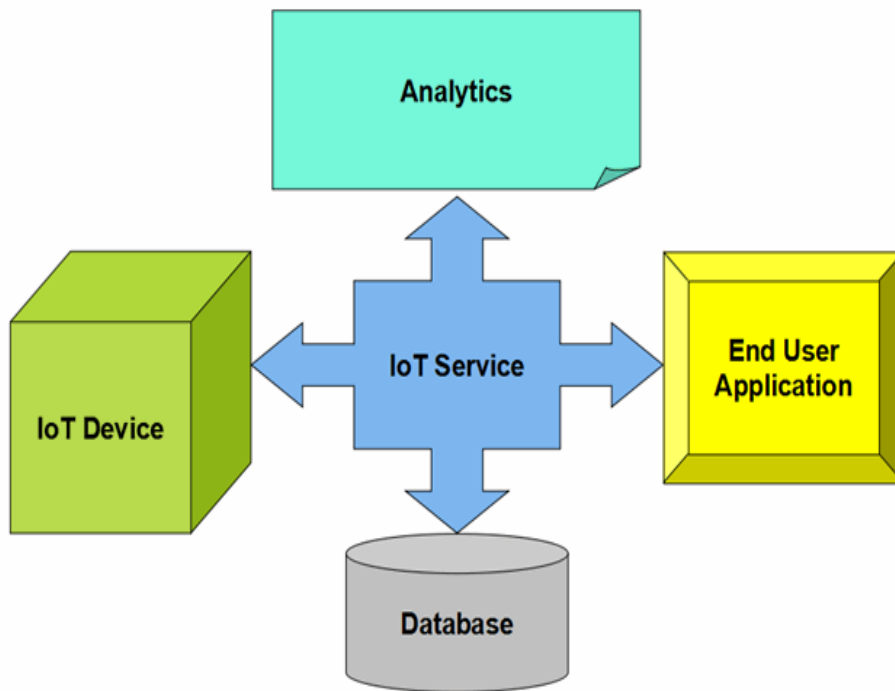


Fig no: IOT service

One such IoT application platform that offers a wide variety of analysis, monitoring and counter-action capabilities is 'ThingSpeak'. Let us consider ThingSpeak in detail.

6.3.1 THINGSPEAK WEBPAGE:

ThingSpeak is a platform providing various services exclusively targeted for building IoT applications. It offers the capabilities of real-time data collection, visualizing the collected data in the form of charts, ability to create plugins and apps for collaborating with web services, social network and other APIs. We will consider each of these features in detail below.

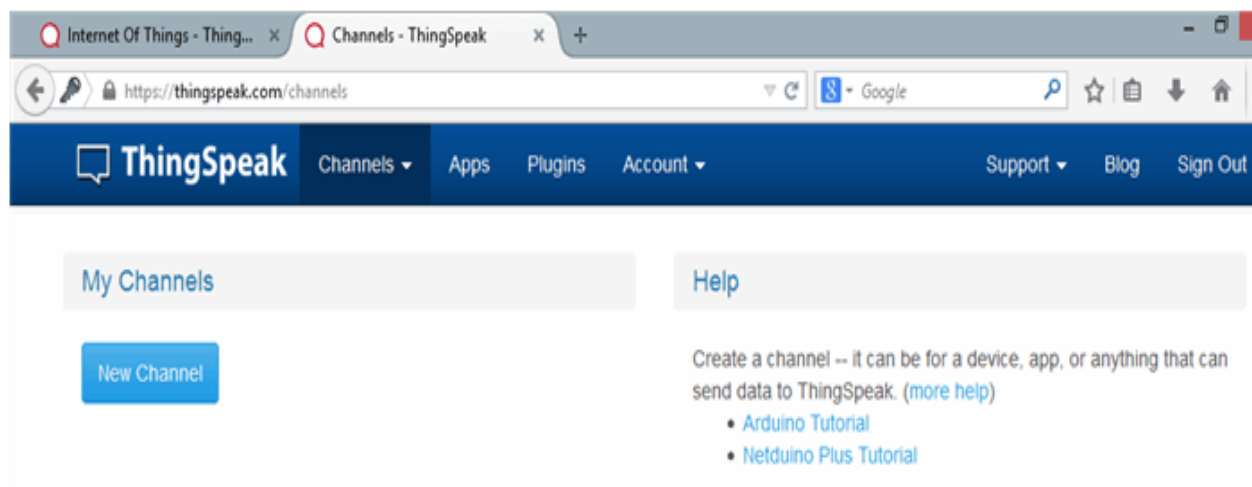
The core element of ThingSpeak is a 'ThingSpeak Channel'. A channel stores the data that we send to ThingSpeak and comprises of the below elements:

8 fields for storing data of any type - These can be used to store the data from a sensor or from an embedded device.

3 location fields - Can be used to store the latitude, longitude and the elevation. These are very useful for tracking a moving device.

1 status field - A short message to describe the data stored in the channel.

To use ThingSpeak, we need to signup and create a channel. Once we have a channel, we can send the data, allow ThingSpeak to process it and also retrieve the same. Let us start exploring ThingSpeak by signing up and setting up a channel.



Go ahead and click on 'New Channel'. You should see a page like the below:

Fig no: thingspeak page

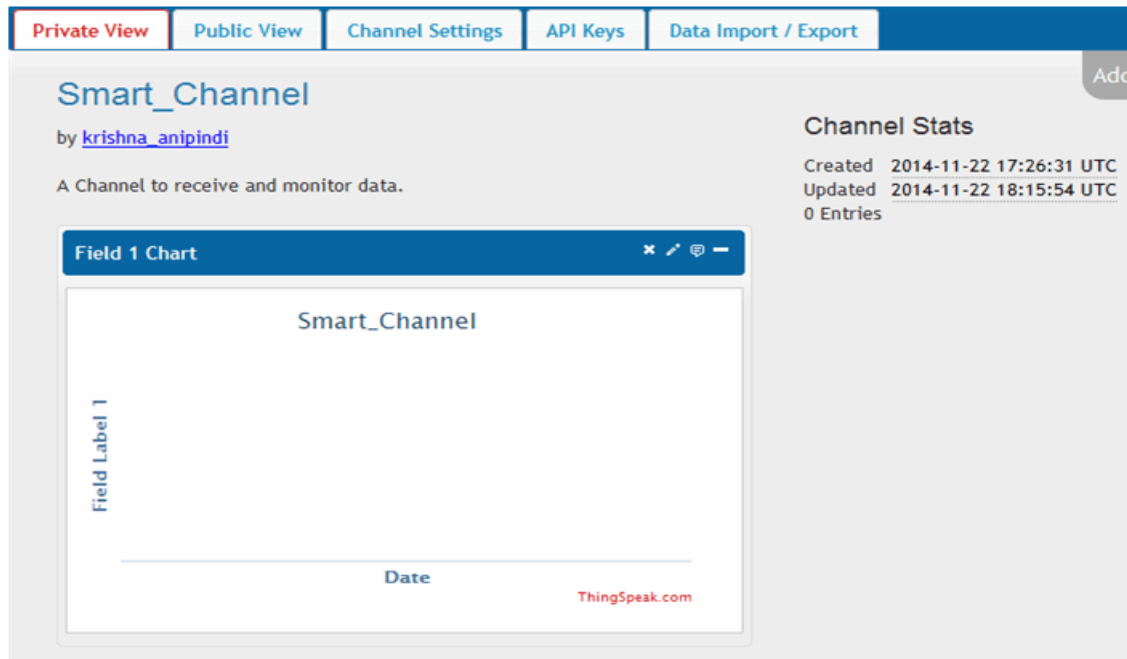


Fig no: thingspeak smart channel page

The Private View shows a chart corresponding to each of the fields that we have added. Now click on the 'Public View' tab. This should look exactly similar to the what we see in the 'Private View' tab since our channel is public. In case your channel is not public ('make public' check box not checked in the 'channel settings' tab), the public view tab shows a message that 'This channel is not public'.

Now click on the 'API Keys' tab. You should see a screen similar to the below. The write API key is used for sending data to the channel and the read API key(s) is used to read the channel data. When we create a channel, by default, a write API key is generated. We generate read API keys by clicking the 'Generate New Read API Key' button under this tab. You can also add a note corresponding to each of the read API keys.

Private View Public View Channel Settings **API Keys** Data

Write API Key

M! .A

Generate New Write API Key

Read API Keys

Generate New Read API Key

Fig no: API key

6.3.2 IP ADDRESSES

An scientific discipline address could be a variety that unambiguously identifies each host on associate scientific discipline network. scientific discipline addresses operate at the Network layer of the TCP/IP protocol stack, so that they square measure freelance of lower-level electrical circuit layer mackintosh addresses, like local area network mackintosh addresses.

IP addresses square measure 32-bit binary numbers, which suggests that on paper, a most of one thing within the neighborhood of four billion distinctive host addresses will exist throughout the web. You'd suppose that may be enough, however TCP/IP places bound restrictions on however scientific discipline addresses square measure allotted. These restrictions severely limit the entire variety of usable scientific discipline addresses. several specialists predict that we'll run out of scientific discipline addresses as presently as next year. However, new

techniques for operating with scientific discipline addresses have helped to alleviate this downside, and a typical for 128-bit scientific discipline addresses has been adopted, although it still isn't nonetheless in widespread use.

Networks and hosts

IP stands for web protocol, and its primary purpose is to alter communications between networks. As a result, a 32-bit information science address really consists of 2 parts:

The network ID (or network address): Identifies the network on that a bunch laptop may be found

The host ID (or host address): Identifies a selected device on the network indicated by the network ID

Most of the complexness of operating with information science addresses has got to do with determining that half of} the entire 32-bit information science address is that the network ID and that part is that the host ID, as delineate within the following sections.

As describe the main points of however host IDs ar allotted, you will notice that 2 host addresses appear to be unaccounted for. for instance, the category C addressing theme, that uses eight bits for the host ID, permits solely 254 hosts - not the 256 hosts you'd expect. that is as a result of host zero (the host ID is all zeros) is often reserved to represent the network itself. The host ID cannot be 255 (the host ID is all ones) as a result of that host ID is reserved to be used as a broadcast request that is meant for all hosts on the network.

IP addresses are usually represented in a format known as dotted-decimal notation. In dotted-decimal notation, each group of eight bits - an octet - is

represented by its decimal equivalent. For example, consider the following binary IP address:

11000000101010001000100000011100

To convert this value to dotted-decimal notation, first divide it into four octets, as follows:

11000000 10101000 10001000 00011100

Then, convert each of the octets to its decimal equivalent:

11000000 10101000 10001000 00011100

192 168 136 28

11000000101010001000100000011100

To convert this value to dotted-decimal notation, first divide it into four octets, as follows:

11000000 10101000 10001000 00011100

Then, convert each of the octets to its decimal equivalent:

11000000 10101000 10001000 00011100

192 168 136 28

Classifying scientific discipline Addresses once the first designers of the scientific discipline protocol created the scientific discipline addressing theme, they may have assigned Associate in Nursing arbitrary range of scientific discipline address bits for the network ID. The remaining bits would then be used for the host ID. as an example, suppose that the designers set that 1/2 the address (16 bits) would be

used for the network, and therefore the remaining sixteen bits would be used for the host ID. The results of that theme would be that the net may have a complete of sixty five,536 networks, and every of these networks may have sixty five,536 hosts.

In the youth of the net, this theme in all probability gave the impression of many orders of magnitude quite would ever be required. However, the scientific discipline designers accomplished from the beginning that few networks would even have tens of thousands of hosts. Suppose that a network of one,000 computers joins the net and is assigned one in every of these theoretical network IDs. as a result of that network can use just one,000 of its sixty five,536 host addresses, quite sixty four,000 scientific discipline addresses would be wasted.

As an answer to the current drawback, the thought of scientific discipline address categories was introduced. The scientific discipline protocol defines 5 completely different address classes: A, B, C, D, and E. every of the primary 3 categories, A-C, uses a unique size for the network ID and host ID portion of the address. category D is for a special form of address known as a multicast address. category E is Associate in Nursing experimental address category that won't used.

The first four bits of the scientific discipline address square measure accustomed confirm into that category a specific address fits, as follows:

If the primary bit is zero, the address could be a category A address.

If the primary bit is one and if the second bit is zero, the address could be a category B address.

If the primary 2 bits square measure each one and if the third bit is zero, the address could be a category C address.

If the primary 3 bits square measure all one and if the fourth bit is zero, the address could be a category D address.

If the primary four bits square measure all one, the address could be a category E address.

Because category D and E addresses square measure reserved for special functions, focus the remainder of the discussion here on category A, B, and C addresses. Table-3 summarizes the small print of every address category.

6.4 ANDROID STUDIO

It's Associate in Nursing golem targeted IDE, designed particularly for golem development. it had been launched on sixteenth could 2013, throughout Google's I/O 2013 event. golem studio contains all the golem SDK tools to style, test, right and profile your app. By staring at the event tools and atmosphere, we are able to see it's almost like Eclipse with the ADT plug-in, however as I even have mentioned higher than, it's Associate in Nursing golem targeted IDE, and there area unit several cool options on the market in golem Studio which will foster and increase your development productivity.

One good thing is that it depends on the IntelliJ plan IDE, that has proved itself to be an excellent IDE and has been in use by several golem engineers.

6.4.1 Introduction to android studio:

The trend is dynamic . folks don't simply need to put in apps any longer, however additionally need to feature them on the Play Store and build profits.

Which leads USA to the question – a way to produce automaton apps

Before responsive this question, we'd like to know technical things like what day area unit and the way several of them area unit on the market for automaton app development.

IDE stands for Integrated Development setting, that is software package or application that has all the tools that area unit needed for the applying development. they supply USA with the platform to develop apps. There area unit several day within the market. a number of the known day used for automaton app development area unit Eclipse, Bintelli JIDEA, and automaton Studio. automaton Studio is that the official IDE for automaton App Development and it's supported IntelliJ plan. automaton studio contains all the tools that area unit needed to create associate degree application. it's associate degree Intelligent IDE, that notifies you concerning updates that area unit simply put in with a click. Let's see what automaton Studio appears like.

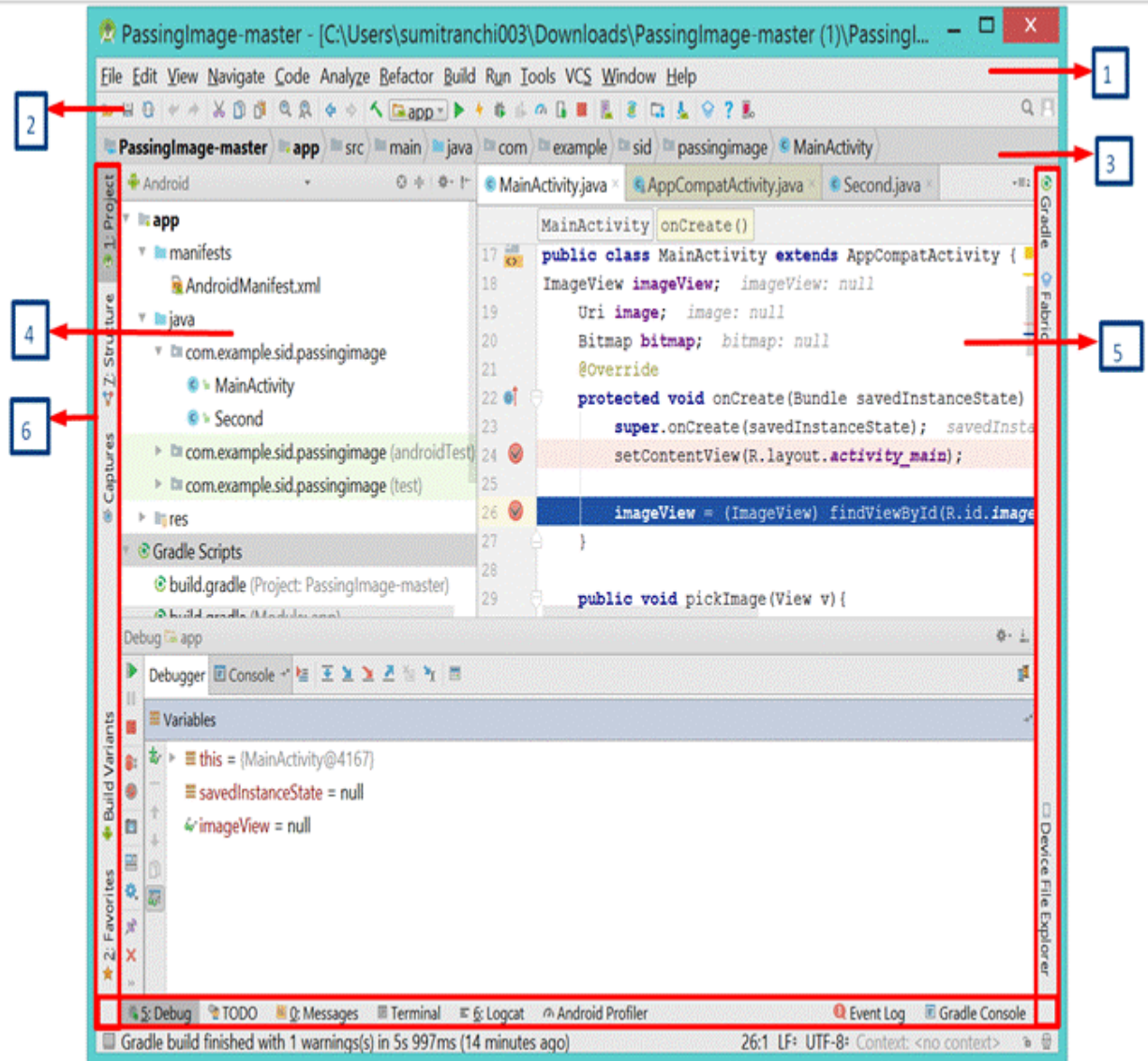


Fig no: android studio window page

Let's understand what each of the numbers in the above image represents:

1. The first bar has features like VCS that allows you to push your code into GitHub. Refactor lets you change the name of your application. "VCS" stands for Version Control System. It records changes to a file or set of files over time so that you can recall specific versions later. Suppose you make your application in Android version 6.0. When you are done, you push the code into a cloud like GitHub. When

a new version of Android releases, the VCS will record the changes you make to your app for the new version.

2. The second toolbar contains all the editor's tool. It allows you to perform actions like running the application, debugging the code, opening SDK manager, etc.
3. This is the navigation bar which helps users navigate throughout the project and open any file for editing at any time.
4. This is your project structure. It contains all files – the java file, manifest file, resource folder, layout file and the Gradle. We will talk about them later.
5. This is the editor's window – the place where you write and modify code.
6. This is the tool window bar. It borders the studio and contains various tools, which can be expanded or collapsed.

6.4.2 Android Features

1. Emulators – to run and take a look at application.
2. A platform to develop golem application for all golem devices.
3. It additionally provides LINT tools so we will check issues like version compatibility, performance, etc. (LINT may be a special tool provided by golem Studio to visualize your project for various quite bugs).
4. It additionally supports C++ and NDK. “NDK” stands for Native Development Kit, that consists of a collection of tools that enables you to use C and C++ to form native applications.
5. You can push your code directly into crumb hub because the studio is integrated with it.
6. Various code templates also are given to line the atmosphere and create it easier for user to code.

Instant Run choice to apply changes within the application that you simply area unit running while not making new APK.

7. APK is what you employ to feature your app on Google Play Store. you can not place the entire code within Play store – some specific format of file must be placed, that contains all the knowledge of your application. This file is merely .apk file.

These options become additional acquainted once you're employed with them.

In each embedded system-based comes, Embedded C programming plays a key role to create the microcontroller run & perform the popular actions. At present, we have a tendency to ordinarily utilize many electronic devices like mobile phones, laundry machines, security systems, refrigerators, digital cameras, etc. The dominant of those embedded devices is finished the assistance of associate degree embedded program. as an example, in an exceedingly camera, if we have a tendency to press a camera button to capture a photograph then the microcontroller can execute the desired operate to click the image moreover on store it.



Embedded C Programming

Embedded C programming builds with a set of functions where every function is a set of statements that are utilized to execute some particular tasks. Both the embedded C and C languages are the same and implemented through some fundamental elements like a variable, character set, keywords, data types, declaration of variables, expressions, statements. All these elements play a key role while writing an embedded C program.

The embedded system designers must know about the hardware architecture to write programs. These programs play a prominent role in monitoring and controlling external devices. They also directly operate and use the internal architecture of the microcontroller, such as interrupt handling, timers, serial communication, and other available features.

6.5.1 Embedded systems are programmed using different type of languages:

- Machine Code
- Low level language, i.e., assembly
- High level language like C, C++, Java, Ada, etc.
- Application level language like Visual Basic, scripts, Access, etc.

Assembly language maps mnemonic words with the binary machine codes that the processor uses to code the instructions. Assembly language seems to be an obvious choice for programming embedded devices. However, use of assembly language is restricted to developing efficient codes in terms of size and speed. Also, assembly codes lead to higher software development costs and code portability is not there. Developing small codes are not much of a problem, but large programs/projects

become increasingly difficult to manage in assembly language. Finding good assembly programmers has also become difficult nowadays. Hence high-level languages are preferred for embedded systems programming.

Use of C in embedded systems is driven by following advantages

- It is small and reasonably simpler to learn, understand, program and debug.
- C Compilers are available for almost all embedded devices in use today, and there is a large pool of experienced C programmers.
- Unlike assembly, C has advantage of processor-independence and is not specific to any particular microprocessor/ microcontroller or any system. This makes it convenient for a user to develop programs that can run on most of the systems.
- As C combines functionality of assembly language and features of high level languages, C is treated as a ‘middle-level computer language’ or ‘high level assembly language’
- It is fairly efficient
- It supports access to I/O and provides ease of management of large embedded projects.

Many of these advantages are offered by other languages also, but what sets C apart from others like Pascal, FORTRAN, etc. is the fact that it is a middle level language; it provides direct hardware control without sacrificing benefits of high level languages.

Compared to other high-level languages, C offers more flexibility because C is relatively small, structured language; it supports low-level bit-wise data manipulation.

Compared to assembly language, C Code written is more reliable and scalable, more portable between different platforms (with some changes). Moreover, programs developed in C are much easier to understand, maintain and debug. Also, as they can be developed more quickly, codes written in C offers better productivity. C is based on the philosophy ‘programmers know what they are doing’; only the intentions are to be stated explicitly. It is easier to write good code in C & convert it to an efficient assembly code (using high quality compilers) rather than writing an efficient code in assembly itself. Benefits of assembly language programming over C are negligible when we compare the ease with which C programs are developed by programmers.

Objected oriented language, C++ is not apt for developing efficient programs in resource constrained environments like embedded devices. Virtual functions & exception handling of C++ are some specific features that are not efficient in terms of space and speed in embedded systems. Sometimes C++ is used only with very few features, very much as C.

Ada, also an object-oriented language, is different than C++. Originally designed by the U.S. DOD, it didn’t gain popularity despite being accepted as an international standard twice (Ada83 and Ada95). However, Ada language has many features that would simplify embedded software development.

Java is another language used for embedded systems programming. It primarily finds usage in high-end mobile phones as it offers portability across systems and is also useful for browsing applications. Java programs require Java Virtual Machine

(JVM), which consume lot of resources. Hence it is not used for smaller embedded devices.

Dynamic C and B# are some proprietary languages which are also being used in embedded applications.

Efficient embedded C programs must be kept small and efficient; they must be optimized for code speed and code size. Good understanding of processor architecture embedded C programming and debugging tools facilitate this.

CHAPTER 7

RESULTS

CHAPTER 8

CONCLUSION

The project enterprise would facilitate in up the upbeat and security of youngsters. this may facilitate the authorities to resolve the kid missing cases simply. it'll improve social insurance similarly as parents' insecurities. This project can cut back crime rates in society. This takes low price whereas implementing and building so everybody will afford this. everybody during this era victimisation good devices and mobile app which is able to be useful for the fogeys to use IOT

based mostly device. This IoT based mostly device brings a revolutionary modification within the current issues concerning kid issues of safety. kid safety is that the commonest drawback within the world. By this project, the kid missing and abduct problems is brought down and facilitate the society.

CHAPTER 9

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Program for smart chid safety :

```
#define D4 eS_PORTD4
#define D5 eS_PORTD5
#define D6 eS_PORTD6
#define D7 eS_PORTD7
#define RS eS_PORTC6
#define EN eS_PORTC7
```

```
void lcd_init() // function for initialize
{
dis_cmd(0x02); // to initialize LCD in 4-bit mode.
dis_cmd(0x28); //to initialize LCD in 2 lines, 5X7 dots and 4bit mode.
dis_cmd(0x0C);
```

```
dis_cmd(0x06);  
dis_cmd(0x83);  
}
```

```
#include <ESP8266WiFi.h>
```

```
const char*ssid= "user";  
const char* password="78275935";
```

```
WiFiClient client;  
unsigned long myChannelNumber =1214647;  
const char * myWriteAPIKey = "QA4Z5R8I9VU7ZZZZU";  
const char* server= "api.thingspeak.com";
```

```
WiFiClient client;
```

```
int WiFiStrength = 0;
```

```
void setup()  
{
```

