

IOT BASED HOME LOAD ON/OFF SWITCH WITH FAN SPEED CONTROLLER

**A Project and Thesis submitted in partial fulfillment of the
requirements for the Award of Degree of
Bachelor of Science in Electrical and Electronic Engineering**

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Certification

This is certify that this project and thesis titled “**IOT Based Home Load ON/OFF Switch with Fan Speed Controller**” is done by the following students under my direct supervision and this work has been carried out by them in the laboratories of the Department of Electrical and Electronic Engineering under the Faculty of Engineering of Daffodil International University in partial fulfillment of the requirements for the degree of Bachelor of Science in Electrical and Electronic Engineering. The presentation of the work was held on 29 November 2017.

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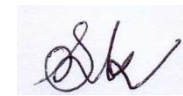
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Dedicated to
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List of Abbreviations

LED	Light Emitting Diodes
LCD	Liquid Crystal Display
IR	Infrared
IC	Integrated circuit
DC	Direct Current
OP-Amp	Operational Amplifier
CMOS	Complementary Metal Oxide Semiconductor
MIPS	Microprocessor without Interlocked Pipeline Stages
PWM	Pulse wide Modulation
ADC	Analog to Digital Converter
USART	Universal Synchronous/Asynchronous Receiver/Transmitter
ALU	Arithmetic logic Unit
TTL	Transistor transistor Logic
USB	Universal Serial Bus
VCC	Voltage Common Collector
EEPROM	Electrically Erasable Programmable Read-Only Memory

List of Symbols

R	Resistance
C	Capacitance
V	Voltage
Y	Admittance
L	Inductance
f	Fundamental Frequency
T	Fundamental Time Period

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ABSTRACT

With headway of Automation innovation, life is getting more straightforward and less demanding in all viewpoints. In this day and age Automatic frameworks are being favored over manual framework. With the quick increment in the quantity of clients of web over the previous decade has made Internet an integral part of life, and IOT is the most recent and developing web innovation. Web of things is a developing system of regular article from mechanical machine to buyer products that can share data and finish assignments while you are occupied with different exercises. Remote Home Automation system(WHAS) utilizing IOT is a framework that utilizes PCs or cell phones to control fundamental home capacities and highlights consequently through web from anyplace around the globe, computerized home is once in a while called a keen home. It is intended to spare the electric power and human vitality. The home robotization framework contrasts from other framework by enabling the client to work the framework from anyplace around the globe through web association.

CHAPTER-1

INTRODUCTION

1.1 Introduction

In a day's, advancement and changes of innovations is happens every day and in addition consistent enhancement of individuals' expectations for everyday comforts are expanding. The cell phone is the most essential piece of mankind's lives nowadays. The cell phones made are the inspirable piece of mankind's lives nowadays. With the assistance of this brilliant device individual can do numerous works with or without web like here we can make our home and in addition association more astute or progressively rich. The telephone dependent on Android framework is quickly grown, so at its I/O engineer's gathering, Google demonstrated a sneak see of its Android Home Project, which will expand the Android stage into family unit objects. Here we proposed another innovation, so cell phones can be utilized to speak with and control electrical switches like Fans, A.C, Lights and so forth utilizing Android App Wi-Fi module. The transmitter of Wi-Fi transmits the information given by the application utilizing radio waves innovation.

The Wi-Fi takes a shot at radio waves innovation, as the information to be gone through Wi-Fi is changed over into the electromagnetic flag which is then sent utilizing the receiving wire. This flag is passed to the controller. This controller can be associated with the Relays of various changes to pass the current in the wake of producing the attractive field. In future, we can utilize switch for a wide range get to like for the Smart City ventures. The MC further works the got data and performs tasks. New apparatuses can be added whenever to the framework, which accommodates the unwavering quality of the framework.

1.2 Problem Statement

As of late, the headways in Information and Communication Technology (ICT) are for the most part centered around the Internet of Things (IOT). In a genuine situation,

IOT based administrations enhance the residential condition and are utilized in different applications. Home mechanization IOT based is flexible and well known applications. In home computerization, every single home apparatus are arranged together and ready to work without human contribution. Home mechanization gives a huge change in people life which gives shrewd working of home apparatuses. This spurred us to build up another arrangement which controls some home machines like light, fan, entryway containers, vitality utilization, and dimension of the Gas chamber utilizing different sensors like LM35, IR sensors, LDR module, Node MCU ESP8266, and Arduino UNO. The proposed arrangement utilizes the sensor and recognizes the nearness or nonattendance of a human item in the housework likewise. Our answer likewise gives data about the vitality devoured by the house proprietor frequently as message.

1.3 Objectives

- The accomplishment of this undertaking are to build up a home mechanization framework that gives the client finish command over all remotely controllable parts of his home.
- The mobilization framework will have the competent to be controlled from a focal host PC, the Internet, and furthermore remotely got to by means of a Pocket PC with a Windows Mobile based application.

1.4 Methodology

- Creating an idea for IOT Based Home Automation System.
- Designing a block Diagram to know which components need to construct it.
- Designing a schematic for creating the circuit board.
- Collecting the all components.
- Programming for the microcontroller to controlled the system.
- Setting all components on a PCB Board & soldering.
- Assembling the all block in a board.

1.5 System Overview

In this section we elaborates the conceptual design of a flexible Smart Home infrastructure and system components are introduced detailers.

1.6 Summary

This thinking make our regular life is more comfortable. By the help of this system we can control our home system network easily. In the modern age the most applicable of IoT system.

CHAPTER-2

LITERATURE REVIEWS

2.1 Introduction

The Fig. 2.1 demonstrates the primary engineering of the proposed keen home framework. The home neighborhood arrange is sorted out by the focal switch by which the WLAN can get to the web. Customary home apparatuses are anything but difficult to be furnished with the Wi-Fi module which makes them having the remote association capacity. Shrewd units, (for example, brilliant switch, keen light, savvy sensors and so on.) furnished with extraordinary Wi-Fi module can be designed to join the given home remote system.

There are no mind boggling designed plans to assemble this framework. The framework backings to progressively include or expel the shrewd units by client control stage. All the brilliant units are associated together in the home neighborhood organize working helpfully. The home intermediary is an inserted control board with custom working framework. It can look through the online savvy units and speak with them. The telephones or tablets participating in the neighborhood work can control the keen units and get the input with the explicit application. A home intermediary is utilized in the nearby remote system to deal with the associated brilliant units. The correspondence convention is structured and connected to this framework.

The other vital capacity of the home intermediary is that it can actualize the remote correspondence with remote clients outside the nearby system. Here remote server is arranged and XMPP convention is utilized for the remote correspondence. At that point remote client can utilize the telephone or tablets with explicit application to login into the server to send control message to the home intermediary or get criticism from the home intermediary. The remote server not just serves the correspondence between one remote client and one home intermediary, it is multi-frameworks situated. Home intermediary can login into the server when home switch has the web get to in this manner being able to push condition message or gain remote power from

remote clients. The remote server need to supply an administration for the tremendous data for the clients and a protected database the board framework is utilized. One client can enlist for various home intermediary and a home intermediary can be related with multi-clients which imply that the server is an open specialist co-op and can give this sort of administration to a great many homes and workplaces.

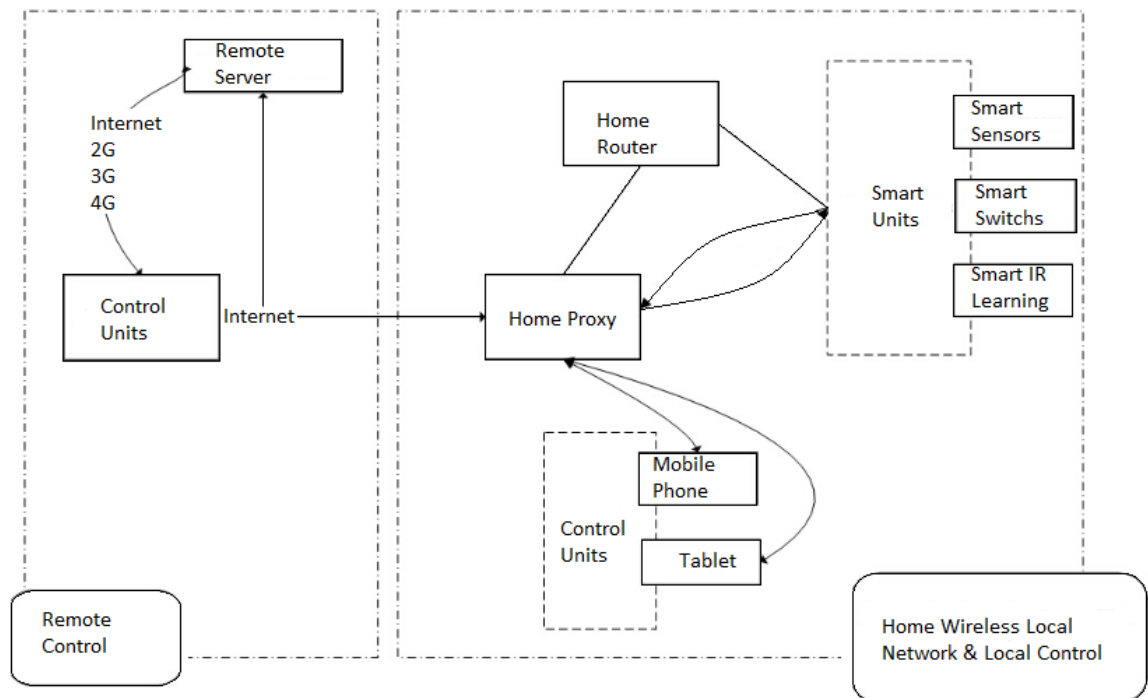


Fig. 2.1: System Architecture

2.2 System components

2.2.1 Home Router

Home switch builds up the home remote condition. These days remote switches are regular gadgets for most families so this prerequisite for the framework is anything but difficult to be fulfilled. Standard home remote system can be utilized to develop the savvy home framework which is free of setting up another explicit remote system. Regular remote switches give elective security instruments which are develop and solid. Then again, home switch is in charge of the web get to which can be executed by various routes, for example, ADSL, VSDL. The brilliant home framework can be viewed as an assessment of our old WLAN.

2.2.2 Smart Units

These days UART-WiFi module has been broadly used to help conventional industry adjusted to IOT. It is a minimal effort module to make conventional apparatuses remote empower. With the assistance of this sort of module we propose our savvy units, for example, brilliant sensors, keen switch, shrewd IR (Infrared Radiation) learning module and so forth. Fig. 2.2 is a conventional case of uart-wifi module.

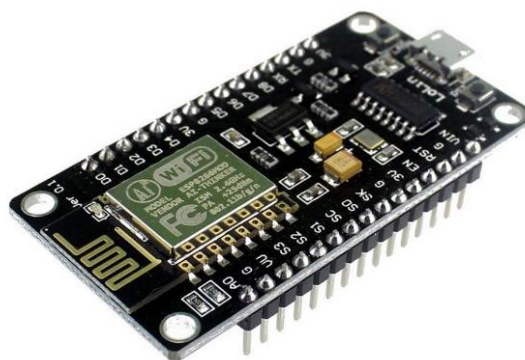


Fig. 2.2: UART-WiFi Module Example

Fig. 3 demonstrates the fundamental structure of the shrewd units. We utilize this module to influence these units to have the remote capacity. Shrewd units can report their states and get directions remotely. To show the keen framework, we take brilliant sensors, shrewd switch, savvy IR learning module for instance. The sorts of brilliant units are not constrain to the precedents.

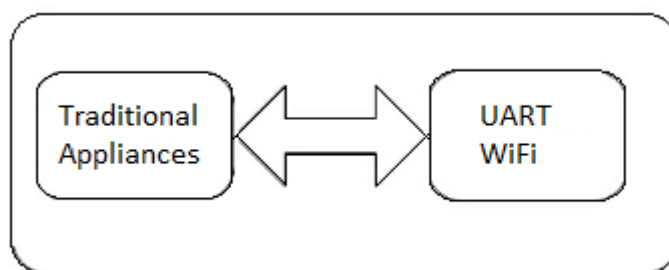


Fig. 2.3: Smart Units Structure

Shrewd sensors can detect the relative parameters, for example, temperature, mugginess, light, commotion, dust, air-quality and so forth. It is simple for the framework to extend the kinds of the sensors. Shrewd sensors report the information to the Home Proxy and can act adhering to the directions from the Home Proxy.

Brilliant switches can be controlled remotely by remote directions. Home intermediary or telephones in a similar home nearby system can without much of a stretch control the switch (On/Off/timing). Savvy IR learning module can be controlled remotely by remote directions to store explicit IR guidelines and send explicit IR directions. This makes it conceivable that all the IR guidelines for IR-controlled apparatuses can be incorporated into one module and clients can simply utilize their telephone to control these appliances(such as TV, DVD, climate control system and so forth.) by speaking with this module.

2.2.3 Home proxy

Home intermediary is in charge of the administration of the majority of Smart Units. It gathers and stores the data including states and designs. For the nearby system control, home intermediary is a director transmitting the message between client control finishes and brilliant units. For the remote control, home intermediary can interface with the remote server so it can speak with the remote control closes that can get to the web. In this circumstance it works similarly as an intermediary in home getting and examining the message between home remote system and the outside Internet. Home intermediary will report the condition of brilliant units to the remote server and the server will advise every one of the clients who are bound with this home intermediary. The plan of programming is the piece of XAMPP. That do facilitating any gadget. For this we can utilize applications by cell phone or tablets. The directions of the gadget are appear by applications. At that point the framework is work by the applications. For remote control usage, XMPP is utilized.

2.2.4 Remote server

The design of Remote server organization is appeared in Fig. 4. Remote server can be a windows server furnished with relative programming. Remote server is a basic factor to execute remote control. The fundamental elements of the remote server are as per the following: Device enrollment, Remote Message Transmission, Data Management. After enrollment the control units can be bound with indicated home intermediaries. We utilize Open fire to help XMPP

convention and My SQL to supply DBMS. The control units, (for example, clients telephone, tablets) and home intermediary should enroll on the server first before they can utilize the remote message transmission utility. At that point home intermediary can discuss remotely with bound telephones or tablets.

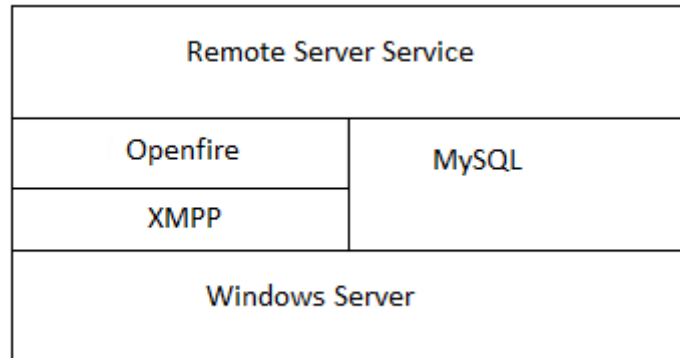


Fig. 2. 4: Remote Server Architecture

A telephone can be bound with more than one home intermediary which implies that client utilize a telephone to control various brilliant home frameworks is conceivable. The MAC address of the control unit is utilized for enrolling server. Dependable information the board is provided for enrollment data and brilliant home framework information. The remote server likewise can be sent on groups which supply all the more amazing administration capacity. Not at all like the customary trial frameworks in which a home server is provided to execute the remote access, our arrangement is more market situated and is increasingly plausible to be advanced.

2.2.5 Control units

Control units can be use by cell phones or tablets. In light of the engineering and correspondence convention we created android programming which makes client simple to control the framework. This additionally can be executed on different stages. Versatile applications control for the framework actualizes neighborhood control and remote control. The control stream will be introduced in framework execution.

2.3 System Implementation

This segment will present the usage of the proposed framework including equipment plan for savvy units, programming structure for home intermediary and control units. The structure of programming is the piece of XAMPP. That do facilitating any gadget. For this we can utilize applications by cell phone or tablets. The directions of the gadget are appear by applications. At that point the framework is work by the applications.

2.4 Block Diagram

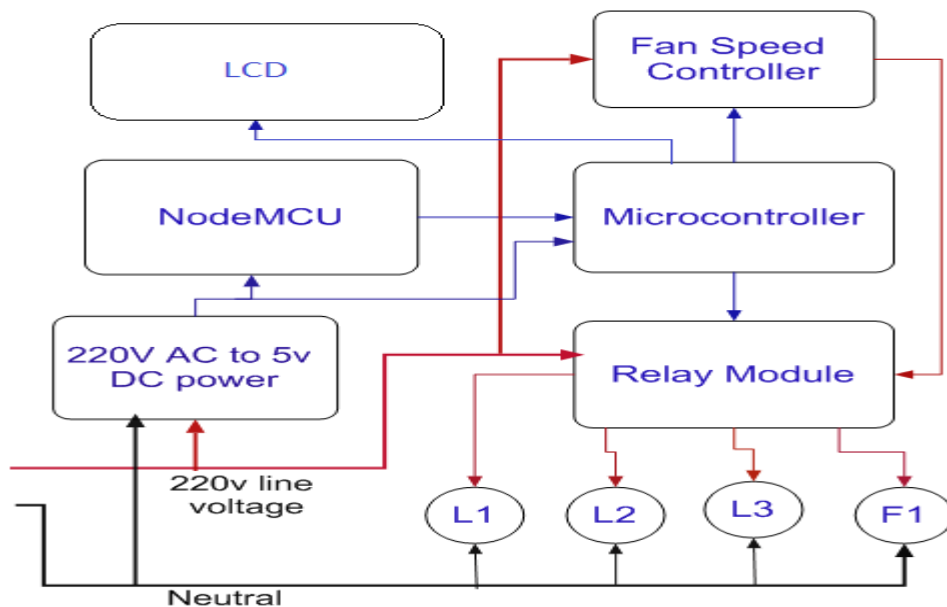


Fig: 2.5 Block Diagram of IOT Based Home Load ON/OFF Switch with Fan Speed Controller

2.5 Schematic Design

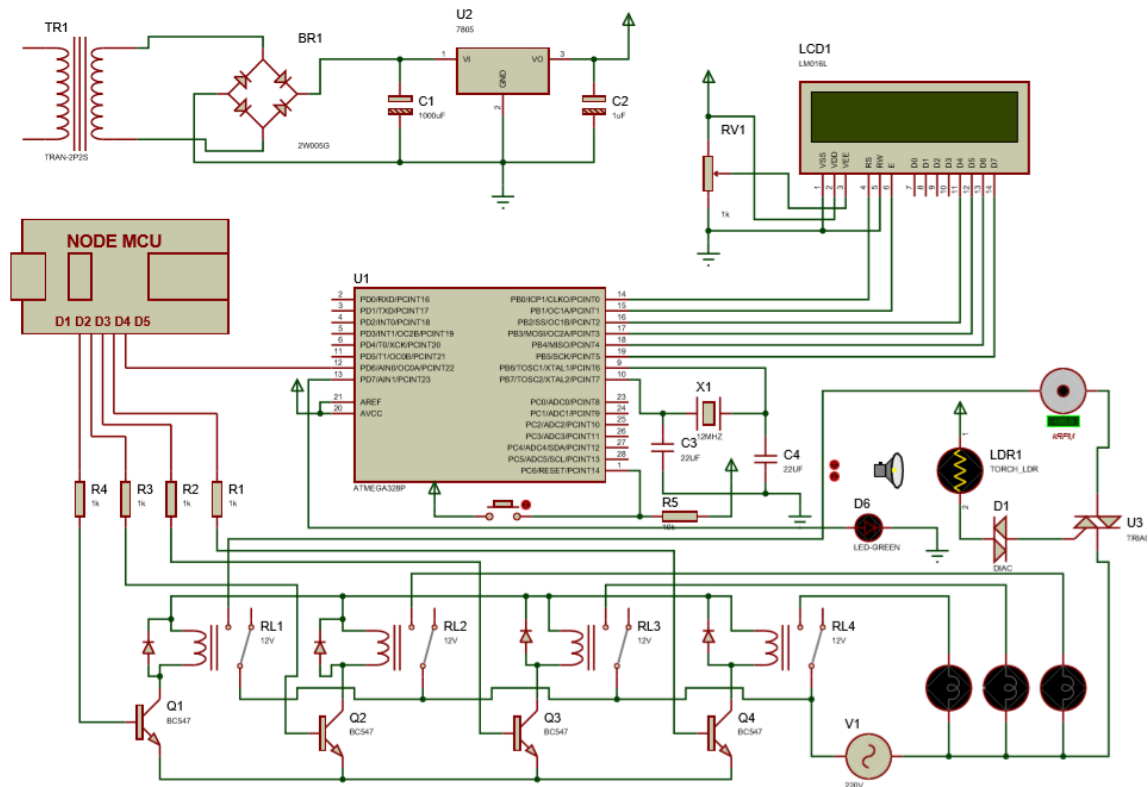


Fig: 2.6 Circuit Diagram of IOT Based Home Load ON/OFF Switch with Fan Speed Controller

2.6 Hardware Design

Here is a circuit containing Atmega328 miniaturized scale controller with its everything fundamental parts as appeared. For power supply to give 5V, the circuit comprises of venture down transformer of 230/12V. This transformer ventures down 230V AC from fundamental supply to 12V AC. At that point that 12V AC is changed over into 12V DC with the assistance of extension rectifier. After that a 1000/25V capacitor is utilized to channel the swells and after that it goes through voltage controller 7805 which directs it to 5V. There is ULN 2003 IC driver is associated with the port D of microcontroller. So every one of the heaps which are exclusively associated with this ULN 2003 IC driver through a different hand-off.

There is Fan associated at stick 12 of small scale controller through MOC3021 and Triac BT136 for controlling the speed of Fan. There is Ethernet shield module with its everything fundamental is associated with the port B of Atmega328 small scale –

controller. The ATMEGA8 makes a HTML page on WLAN arrange through which it is associated for controlling the heaps and Fan speed.



Fig: 2.7 IOT Based Home Load ON/OFF Switch with Fan Speed Controller

2.7 Summary

The proposed system of displaying the arranging machine in this work can be received and stretched out to assess and show different kinds of sensors that could be relevant for manageable arranging of various articles. This work is a central way to deal with displaying an assembling and computerized machines. It is seen that independent of the kind of sensors utilized, the vicinity separations of the arranging sensors assumes an imperative job in deciding the time it takes for arranging. As a rule, it is suggested that capacitive sensors be utilized for arranging of complex assembling of items with various substance properties.

CHAPTER-3

MICROCONTROLLER

3.1 Introduction

The microcontroller is a decompress coordinated circuit intended to control an explicit task in an interlaced framework. A run of the mill microcontroller incorporates a processor, memory and info/yield (I/O) peripherals on a solitary chip. Now and again alluded to as microcontroller unit (MCU), microcontrollers are found in vehicles, restorative gadgets, portable radio handsets, robots, office machines, candy machines and home apparatuses among other gadget.

3.2 Atmega8 Microcontroller

The Atmel Pico Power ATmega8 is a low-control CMOS 8-bit microcontroller dependent on the AVR upgraded RISC engineering. By executing amazing guidelines in a solitary clock cycle, the ATmega8 accomplishes throughputs near 1MIPS per MHz. This enables framework intended to streamline the gadget for power utilization as opposed to preparing speed.

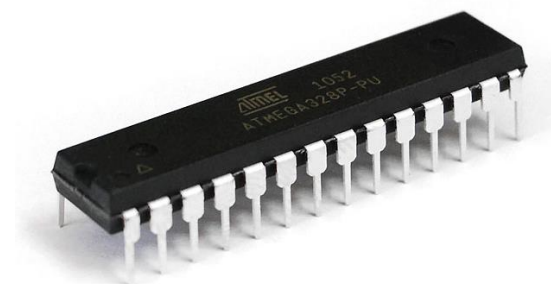


Fig 3.2.1: Atmega8 Microcontroller

The ATmega8 gives the going with features: 32Kbytes of In-System Programmable Flash with Read-While-Write limits, 1Kbytes EEPROM, 2Kbytes SRAM, 23 comprehensively helpful I/O lines, 32 generally valuable working registers, Real Time Counter (RTC), three versatile Timer/Counters with take a gander at modes and PWM, 1 consecutive programmable USARTs , 1 byte-arranged 2-wire Serial

Interface (I2C), a 6-channel 10-bit ADC (8 coordinates in TQFP and QFN/MLF packs) , a programmable Watchdog Timer with inside Oscillator, a SPI successive port, and six programming selectable power saving modes. The Idle mode stops the CPU while allowing the SRAM, Timer/Counters, SPI port, and barge in on system to continue working.

The Power-down mode saves the select substance yet cements the Oscillator, debilitating all other chip limits until the point that the accompanying frustrate or gear reset. In Power-save mode, the strange clock continues running, empowering the customer to keep up a clock base while the stragglng leftovers of the device is napping. The ADC Noise Reduction mode stops the CPU and all I/O modules except for strange clock and ADC to restrict trading disturbance in the midst of ADC changes. In Standby mode, the valuable stone/resonator oscillator is running while the stragglng leftovers of the device is napping. This licenses brisk start-up joined with low power use. In Extended Standby mode, both the standard oscillator and the unique clock continue running.

The device is delivered using Atmel's high thickness non-precarious memory advancement. The On-chip ISP Flash empowers the program memory to be reevaluated In-System through a SPI successive interface, by a standard nonvolatile memory programming engineer, or by an On-chip Boot program running on the AVR focus. The Boot program can use any interface to download the application program in the Application Flash memory. Programming in the Boot Flash fragment will continue running while the Application Flash zone is revived, giving certifiable Read-While-Write movement. By merging a 8-bit RISC CPU with In-System Self-Programmable Flash on a strong chip, the Atmel ATmega328/P is a momentous microcontroller that gives a significantly versatile and useful response for some introduced control applications.

The ATmega328/P is maintained with a full suite of program and system enhancement gadgets including: C Compilers, Macro Assemblers, Program Debugger/Simulators, In-Circuit Emulators, and Evaluation units.

3.2.1 Technical Specifications

1. Microcontroller - ATmega8
2. Working Voltage - 3.3V or 5V (contingent upon model)
3. Input Voltage - 3.35 - 12 V (3.3V model) or 5 - 12 V (5V demonstrate)
4. Advanced I/O Pins - 14 (of which 6 give PWM yield)
5. Simple Input Pins - 6
6. DC Current per I/O Pin - 40 mA
7. Streak Memory - 32 kB (of which 0.5 kB utilized by bootloader) 8. SRAM - 2 kB
9. EEPROM - 1 kB
10. Clock Speed - 8 MHz (3.3V model) or 16 MHz (5V demonstrate)

3.2.2 ATmega8 Block Diagram

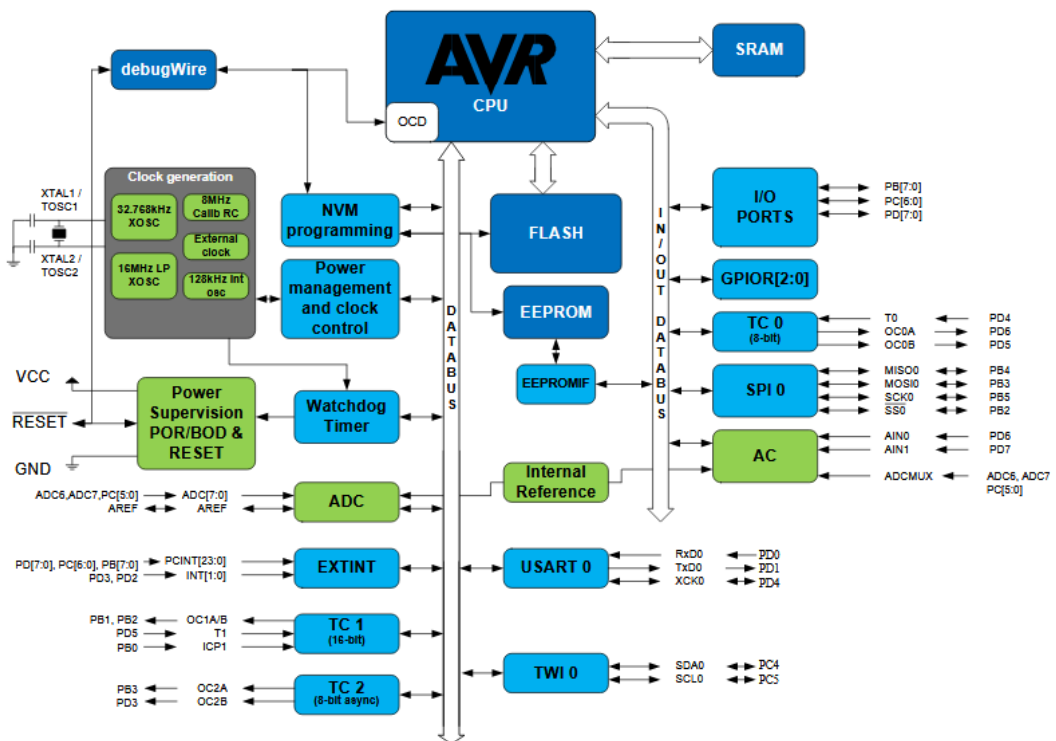


Fig 3.2.2: Block Diagram of Atmega8 Microcontroller

3.2.3 ATmega8 Pin outs

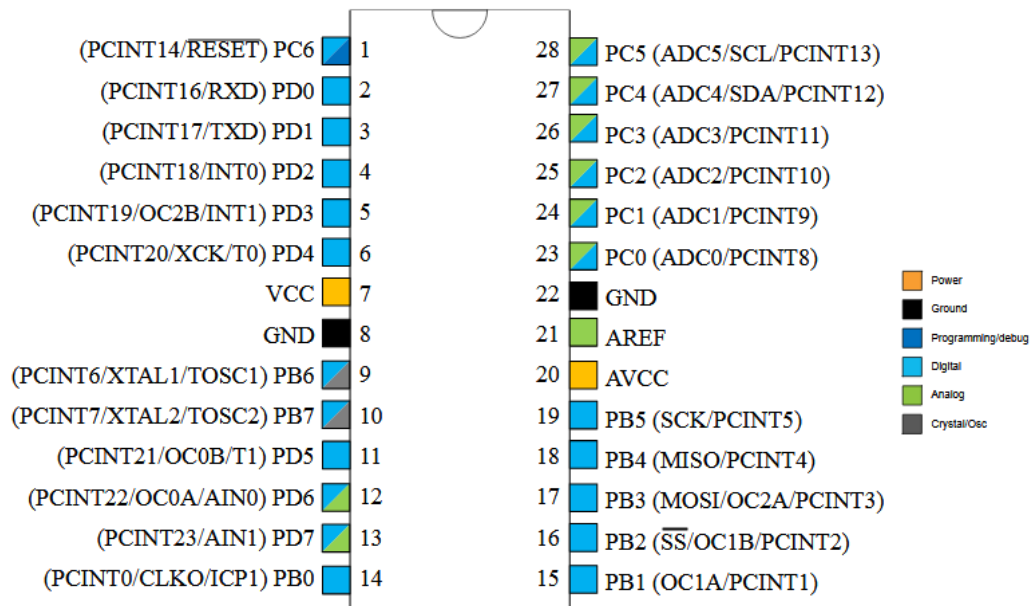


Fig 3.2.3: Pin Diagram of ATmega8 Microcontroller

- RAW: For supplying a raw (regulated) voltage to the board
- VCC: The regulated 3.3 or 5 volt supply
- GND: Ground pins
- RX: Used to receive TTL serial data
- TX: Used to transmit TTL serial data
- Digital I/O pins(2 and 3): These pins can also be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value
- Digital I/O pins(3, 5, 6, 9, 10, and 11): They can also be configured to provide 8-bit PWM output
- Digital I/O pins(10, 11, 12 and 13): They can also be configured as SPI pins- 10 – (SS), 11 – (MOSI), 12 – (MISO) and 13 – (SCK)
- Analog input pins: A0 to A7 in which A4 and A5 can also be used as IIC pins where A4 – (SDA) and A5 – (SCL).
- Reset: The microcontroller can be reset by bringing this pin low

3.2.4 Power

The power pins are as follows:

- RAW. For supplying a raw (unregulated) voltage to the board.
- VCC. The regulated 3.3 or 5 volt supply.
- GND. Ground pins.

3.2.5 Memory

The ATmega8 has 16 KB of flash memory for storing code (of which 2 KB is used for the bootloader). It has 1 KB of SRAM and 512 bytes of EEPROM.

3.2.6 Input and Output

Every one of the 14 computerized sticks on the Pro Mini can be utilized as an information or yield, utilizing `pinMode()`, `digitalWrite()`, and `digitalRead()` capacities. They work at 3.3 or 5 volts (dependent upon the model). Each stick can give or get a biggest of 40 mA and has an internal draw up resistor (isolates as per normal procedure) of 20-50 k ohms. Besides, a couple of pins have specific limits:

- Serial: 0 (RX) and 1 (TX). Used to get (RX) and transmit (TX) TTL sequential information. These pins are associated with the TX-0 and RX-1 pins of the six stick header.
- External Interrupts: 2 and 3. These pins can be arranged to trigger a hinder on a low esteem, a rising or falling edge, or an adjustment in esteem. See the attach Interrupt (Zwork for subtleties.
- PWM: 3, 5, 6, 9, 10, and 11. Furnish 8-bit PWM yield with the analog Write work.
- SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins bolster SPI correspondence, which, despite the fact that given by the basic equipment, isn't as of now incorporated into the Arduino dialect.
- LED: 13. There is a worked in LED associated with advanced stick 13. At the point when the stick is HIGH esteem, the LED is on, when the stick is LOW, it's off.

The Pro Mini has 6 simple sources of info, every one of which gives 10 bits of goals (i.e. 1024 unique qualities). Four of them are on the headers on the edge of the board; two (inputs 4 and 5) on gaps in the inside of the board. The simple data sources measure from ground to VCC. Furthermore, a few pins have particular usefulness:

- I2C: 4 (SDA) and 5 (SCL). Support I2C (TWI) communication using the Wire library. There is another pin on the board:
- Reset. Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

3.2.7 Communication

The Atmega8 has various offices for speaking with a PC, another different microcontrollers. The ATmega8 gives UART TTL sequential correspondence, which is accessible on advanced pins 0 (RX) and 1 (TX). The Atmega8 programming incorporates a sequential screen which enables basic literary information to be sent to and from the Atmega8 board through a USB association.

3.2.8 Programming

The Atmega8 has various offices for speaking with a PC, another different microcontrollers. The ATmega8 gives UART TTL sequential correspondence, which is accessible on advanced pins 0 (RX) and 1 (TX). The Atmega8 programming incorporates a sequential screen which enables basic literary information to be sent to and from the Atmega8 board through a USB association.

3.2.9 Automatic (Software) Reset

As opposed to requiring a physical press of the reset catch before a transfer, the Atmega8 is structured in a way that enables it to be reset by programming running on an associated PC. One of the pins on the six-stick header is associated with the reset line of the ATmega8 by means of a 100 microfarad capacitor. This stick interfaces with one of the equipment stream control lines of the USB-to-sequential convertor associated with the header: RTS when utilizing a FTDI link, DTR when utilizing the Spark fun breakout board. At the point when this line is stated (taken low), the reset line drops sufficiently long to reset the chip.

The Atmega8 programming utilizes this ability to permit and transfer code by essentially squeezing the transfer catch in the Atmega8 condition. This implies the bootloader can have a shorter timeout, as the bringing down of the reset line can be all around composed with the beginning of the transfer.

This setup has different ramifications. At the point when the Pro Mini is associated with either a PC running windows, it resets each time an association is made to it from programming (by means of USB). For the accompanying half-second or somewhere in the vicinity, the bootloader is running on the Pro. While it is customized to disregard deformed information (i.e. anything but a transfer of new code), it will catch the initial couple of bytes of information sent to the board after an association is opened. On the off chance that a draw running on the load up gets one-time setup or other information when it first begins, ensure that the product with which it conveys holds up a second in the wake of opening the association and before sending this information.

3.2.10 Physical Characteristics

The elements of the Pro Mini PCB are roughly 0.7" x 1.3".ATMEGA328P. The ATmega8 is a solitary chip small scale controller made by Atmega8 and has a place with the mega AVR arrangement. The ATmega328 likewise bolsters I2C (TWI) and SPI correspondence.

3.2.11 Specifications

The Atmel 8-bitAVRRISC-based microcontroller joins 32 kBISPflash memory with read-while-make limits, 1 kBEEPROM, 2 kB SRAM, 23 comprehensively valuable I/O lines, 32 all around helpful working registers, three versatile clock/counters with take a gander at modes, internal and external meddles with, successive programmable USART, a byte-arranged 2-wire consecutive interface, SPI consecutive port, 6-channel 10-bit A/D converter (8-coordinates in TQFP and QFN/MLF packs), programmable monitor hound clock with inward oscillator, and five programming selectable power saving modes. The device works between 1.8-5.5 volts. The device achieves throughput advancing toward 1 MIPS for every MHz.

3.2.12 Key parameters

Table 3.2.1: Parameter of internal parts

Parameter	Value
CPU type	8-bit AVR
Performance	20 MIPS at 20 MHz
Flash memory	32 kB
SRAM	2 kB
EEPROM	1 kB
Pin count	28-pin PDIP, MLF, 32-pin TQFP, MLF
Maximum operating frequency	20 MHz
Number of touch channels	16
Hardware QTouch Acquisition	0
Maximum I/O pins	26
External interrupts	2
USB Interface	0

3.2.13 Pin description

VCC: Digital supply voltage

GND: Ground

The Atmega8 chip has a simple to-computerized converter (ADC) within it. This must be or else the Atmega8 wouldn't be fit for translating simple signs. Since there is an ADC, the chip can translate simple info, which is the reason the chip has 6 pins for simple information. The ADC has 3 pins put aside for it to work AVCC, AREF, and GND. AVCC is the power supply, positive voltage, that for the ADC. The ADC needs its very own capacity supply so as to work. GND is the power supply ground. AREF is the reference voltage that the ADC uses to change over a simple flag to its relating advanced esteem. Simple voltages higher than the reference voltage will be doled out to a computerized estimation of 1, while simple voltages underneath the reference voltage will be allotted the advanced estimation of 0. Since the ADC for the Atmega8 is a 10-bit ADC, which means it creates a 10-bit computerized esteem, it changes over a simple flag to its advanced esteem, with the AREF esteem being a reference for

which advanced qualities are high or low. Subsequently, a picture of a simple flag is appeared by this advanced esteem; accordingly, it is its computerized reporter esteem.

RESET: A low dimension on this stick for longer than the base heartbeat length will create a reset, regardless of whether the clock isn't running. Shorter heartbeats are not ensured to produce a reset.

XTAL1: Contribution to the transforming Oscillator speaker and contribution to the inside clock working circuit.

XTAL2: Yield from the modifying Oscillator speaker.

AVCC: It is the supply voltage stick for Port An and the A/D Converter. It ought to be remotely associated with VCC, regardless of whether the ADC isn't utilized. On the off chance that the ADC is utilized, it ought to be associated with VCC through a low-pass channel.

AREF: It is the simple reference stick for the A/D Converter.

3.2.14 Applications

Starting at two thousand thirteen the ATmega8 is normally realized in numerous undertakings and self-ruling frameworks where a basic, low-fueled, ease smaller scale controller is required Perhaps the most widely recognized usage of this chip is on the famous Atmega8 headway organize.

3.2.15 Summary

The Atmel ATmega8 usually has the same microcontroller (MCU) as the Atmel ATmega328. Because it is the same MCU, the speed and memory size are the same. The Atmel ATmega8 also has the same I/O pins as the ATmega328. The 5 V versions can run at 16 MHz while the 3.3 V versions only run at 8 MHz. There is also a version with an adjustable regulator that support 3.3 V and 5 V via a jumper setting.

CHAPTER 4

NODE MCU

4.1 Introduction

The ESP8266 is the name of a little scale controller organized by Espresso Systems. The ESP8266 itself is a free WiFi sorting out plan offering as an augmentation from existing scaled down scale controller to WiFi and is similarly prepared for running autonomous applications. This module goes with an intrinsic USB connector and a rich assortment of stick outs. With a little scale USB connect, you can interface NodeMCU davit to your workstation and burst it with no bother, much equivalent to Arduino. It is also speedily breadboard friendly.

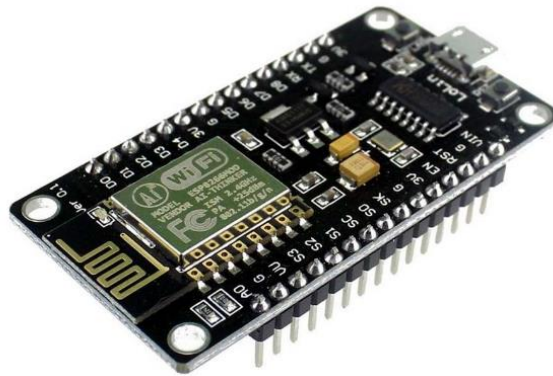


Fig.4.1: Node MCU (ESP8266)

4.2 Specification

- Voltage:3.3V.
- Wi-Fi Direct (P2P), delicate AP
- Current utilization: 10uA~170mA.
- Flash memory connectable: 16M B max (512K typical).
- Integrated TCP/IP convention stack
- Processor: Tensilica L106 32-bit.
- Processor speed: 80~160MHz.
- RAM: 32K + 80K.
- GPIOs: 17 (multiplexed with different capacities).
- Analog to Digital: 1 contribution with 1024 stage goals.
- +19.5dBm yield control in 802.11b mode
- 802.11 bolster: b/g/n.
- Maximum simultaneous TCP associations: 5.

4.3 ESP8266 ESP-12Q Node MCU Schematic

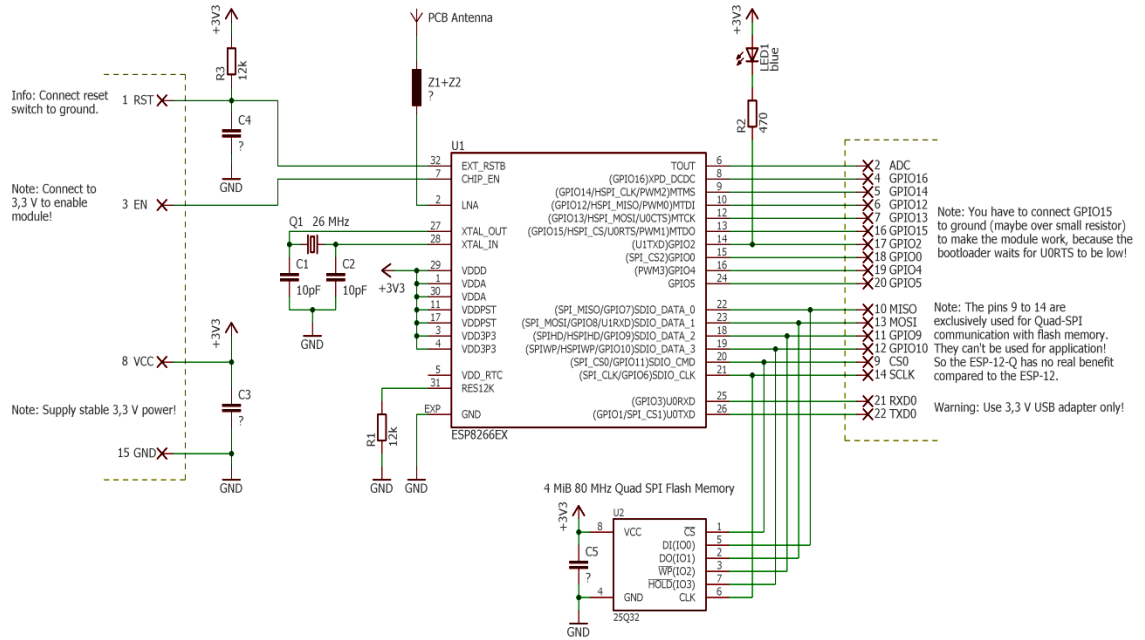
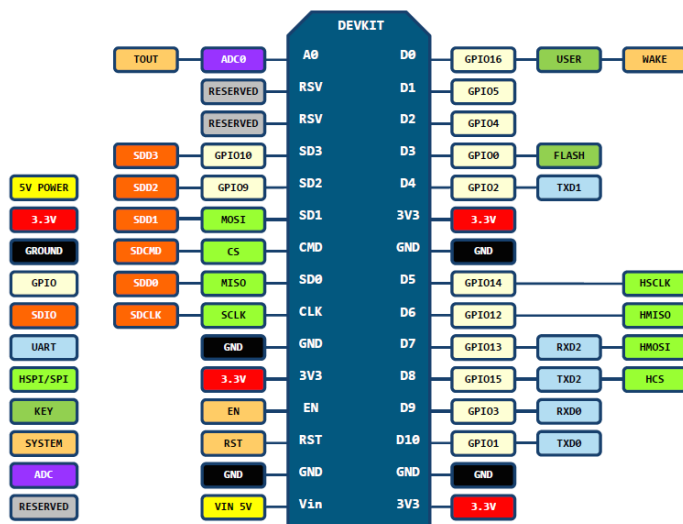


Fig.4.2: Circuit Diagram of ESP8266 ESP-12Q Node MCU

4.4 Pin Configuration



4.5 Pin Definition

Table4.1: Pin Definition of ESP8266 ESP-12Q Node MCU

Pin Name	Normally used	Interchange reason
Ground	Associated with the ground of the circuit	—
TX	Connected to Rx pin of programmer/uC to upload program	Can go about as a General reason Input/yield stick when not utilized as TX
GPIO-2	Broadly useful Input/output stick	
CH_EN	Chip Enable – Active high	—
RX	Broadly useful Input/output stick	Can go about as a General reason Input/yield stick when not utilized as TX

4.6 Where to use ESP8266

The ESP8266 is a to a great degree straightforward and ease contraption to give web system to your endeavors. The module can work both as a Passage (can make hotspot) and as a station (can connect with Wi-Fi), from this time forward it can without quite a bit of a stretch get data and exchange it to the web making Web of Things as straightforward as could be normal in light of the current situation. It can similarly bring data from web using Programming interface's subsequently your endeavor could get to any information that is open in the web, as such making it increasingly splendid. Another invigorating component of this module is that it will in general be changed using the Arduino IDE which makes it significantly more simple to utilize. In any case this type of the module has only 2 GPIO pins (you can hack it to use around 4) so you have to use it close by another microcontroller like Arduino, else you can look onto the more autonomous ESP-12 or ESP-32 adjustments. So in case you are

hunting down a module regardless IOT or to give web accessibility to your assignment then this module is the right choice for you.

4.7 How to use the ESP8266 Module

There are such a significant number of techniques and IDEs accessible to with ESP modules, yet the most usually utilized on is the Arduino IDE. So given us a chance to talk about just about that further beneath. The ESP8266 module works with 3.3V just, anything over 3.7V would slaughter the module subsequently be alerts with your circuits. The most ideal approach to program an ESP-01 is by utilizing the FTDI board that bolsters 3.3V programming. On the off chance that you don't have one it is prescribed to get one or for time being you can likewise utilize an Arduino load up. One usually issue that each one appearances with ESP-01 is the fueling up issue. The module is a bit control hungry while programming and henceforth you can control it with a 3.3V stick on Arduino or simply utilize a potential divider. So it is critical to make a little voltage controller for 3.31v that could supply at least 500mA. One prescribed controller is the LM317 which could deal with the activity effectively. A streamlined circuit graph for utilizing the ESP8266-01 module is given underneath

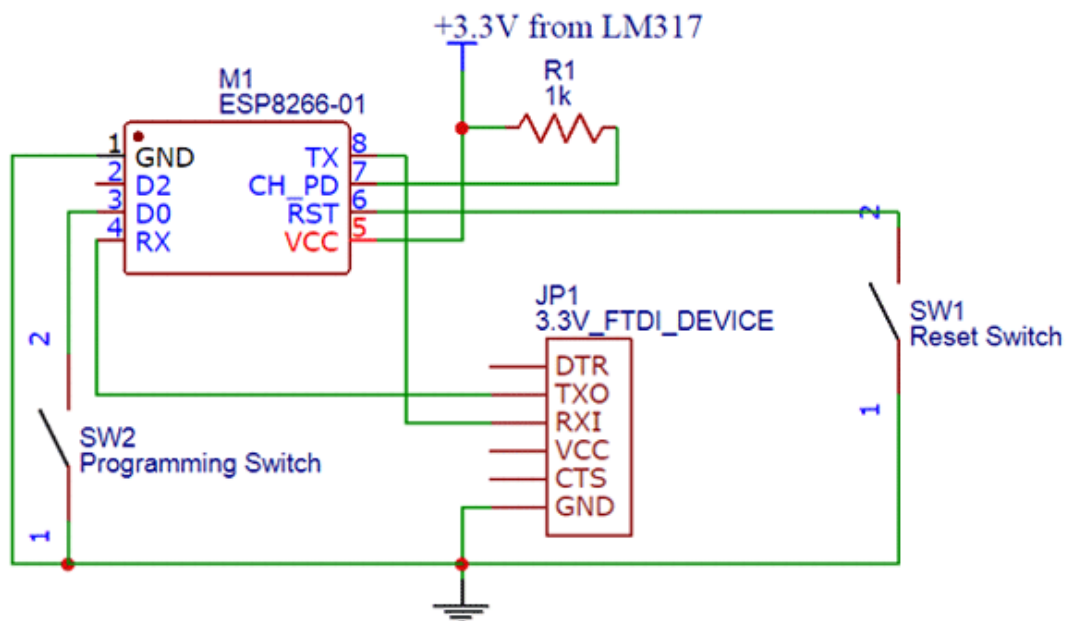


Fig.4.4: ESP8266 Serial Configuration

The switch SW2 (Programming Switch) ought to be held squeezed to hold the GPIO-0 stick to ground. Along these lines we can go into the programming mode and transfer the code. When the code is discharged the switch can be discharged.

4.8 Applications

- IOT Projects
- Access Point Portals
- Wireless Data logging
- Smart Home Automation
- Learn essentials of systems administration
- Portable Electronics
- Smart globules and Sockets

4.9 Summary

NodeMCU resembles as microcontroller. The additional component of this gadget can associate with Wi-Fi. Simple contribution of this gadget is one for this leave we utilize an additional microcontroller (ATMEGA8) for fan speed control. For that we can tell this program is IOT base controller. That why, Hub MCU is mane part of this venture.

CHAPTER-5

LIQUID CRYSTAL DISPLAY

5.1 Introduction

Alphanumeric presentations are utilized in a wide scope of usages, including palmtop PCs, word processors, scanners, reason for offer terminals, therapeutic instruments, cell phones, etc. The 16 x 2 sharp alphanumeric spot grid demonstrate is fit for appearing novel characters and pictures. A full rundown of the characters and pictures is engraved on pages 7/8 or observe these pictures can change between brand of LCD used. This booklet gives all the particular subtleties to partner the unit, which requires a singular power supply (+5V).

A 16x2 LCD infers it can demonstrate 16 characters for each line and there are 2 such lines. In this LCD each character is appeared 5x7 pixel cross section. This LCD has two registers, specifically, Direction and Information. The bearing enlist stores the request rules given to the LCD. A bearing is a direction given to LCD to finish a predefined undertaking like presenting it, clearing its screen, setting the cursor position, controlling introduction, etc. The data select stores the data to be appeared on the LCD. The data is the ASCII estimation of the character to be appeared on the LCD. Snap to take in increasingly about internal structure of a LCD.[11]



Fig 5.1: LCD (1602A)

5.2 Feature

- i. 5 x 8 spots with cursor .
- ii. Built-in controller (KS 0066 or Equivalent) .
- iii. + 5V control supply (Also accessible for + 3V) .
- iv. 1/16 obligation cycle .
- v. B/L to be driven by stick 1, stick 2 or stick 15, stick 16 or A.K (LED).
- vi. N.V. discretionary for + 3V control supply.

5.3 Mechanical Data

Table: 5.1 Mechanical Data

ITEM	STANDARD VALUE	UNIT
Module Dimension	80.0 x 36.0	Mm
Viewing Area	66.0 x 16.0	Mm
Dot Size	0.56 x 0.66	Mm
Character Size	2.96 x 5.56	Mm

5.4 Absolute Maximum Rating

Table: 5.2 Absolute Maximum Rating

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

5.5 Electrical Specifications

Table: 5.3 Electrical Specifications

ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
Input Voltage	VDD	VDD = + 5V	4.7	5.0	5.3	V
		VDD = + 3V	2.7	3.0	5.3	V
Supply Current	IDD	VDD = 5V	-	1.2	3.0	mA

Recommended LC Driving Voltage for Normal Temp. Version Module	VDD-V ₀	- 20 °C		-	-	-	V
		0°C		4.2	4.8	5.1	
		25°C		3.8	4.2	4.6	
		50°C		3.6	4.0	4.4	
		70°C		-	-	-	
LED Forward Voltage	VF	25°C		-	4.2	4.6	V
LED Forward Current	IF	25°C	Array	-	130	260	mA
			Edge	-	20	40	
EL Power Supply Current	IEL	Vel = 110VAC: 400Hz		-	-	5.0	Ma

5.6 116 x 2 Character LCD Pin Connection

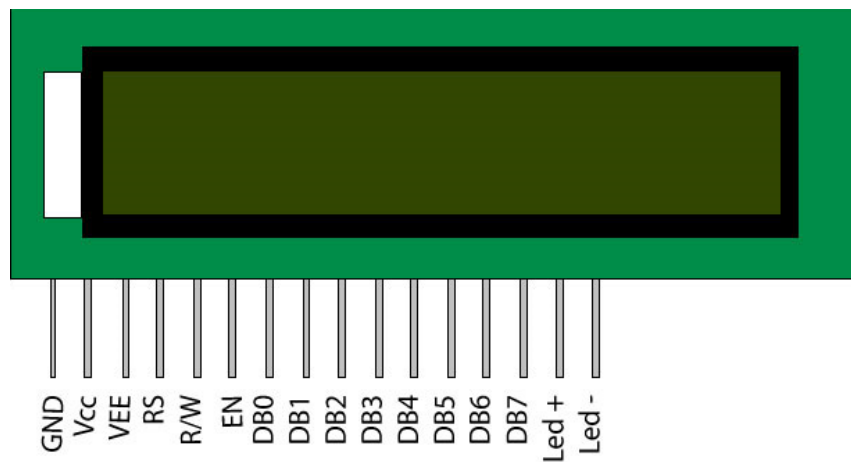


Fig 5.2: LCD Pin Connection

5.7 116 x 2 Character LCD Pin Configuration

Table: 5.4 116 x 2 Character LCD Pin Configuration

PIN NUMBER	SYMBOL	FUNCTION
1	V _{ss}	GND
2	V _{dd}	+ 3V or + 5V
3	V ₀	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/ <u>W</u>	H/L Read/Write Signal
6	E	H-L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A/V _{ee}	+ 4.2V for LED/Negative Voltage Output
16	K	Power Supply for B/L (OV)

5.8 Summary

Available as an optional extra is the Sequential LCD Firmware, which licenses successive control of the introduction. This decision gives significantly less difficult affiliation and use of the LCD module. The firmware enables microcontrollers and microcontroller based structures, for instance, the PICAXE to apparently yield customer rules or readings onto a LCD module. All LCD bearings are transmitted consecutively by methods for a single microcontroller stick. The firmware can in like manner be related with the consecutive port of a PC.

CHAPTER-6

POWER SUPPLY

6.1 Introduction

A power supply is an electrical contraption that courses of action electric capacity to an electrical load. The essential furthest reaches of a power supply is to change over electric spill out of a source to the right voltage, stream, and rehash to control the store. Thusly, control supplies are a segment of the time hinted as electric power converters. Some power supplies are independent bits of contraption, while others are joined with the heap machines that they control. Events of the last wire control supplies found in work stations and customer contraptions. Unmistakable limits that control supplies may perform combine binding the stream pulled in by the stack to safe estimations, stopping the stream if there ought to emerge an event of an electrical blame, control trim to divert electronic hullabaloo or voltage floods on the dedication from achieving the store, control factor change, and anchoring importance so it can keep controlling the heap in case of a brief check in the source control (uninterruptible power supply).[12]

6.2 5V Power Supply using 7805 Voltage Regulator

In the dominant part of our electronic things or adventures we require a power supply for changing over mains cooling voltage to a coordinated DC voltage. For making a power supply arranging of each and every part is essential. Here I will discuss the organizing of controlled 5V Power Supply.[13]

6.3 Component List

- Voltage regulator IC (MC7805)
- Capacitors
- DC12V Power Adapter

- Resistor (330R)

6.4 Circuit Diagram

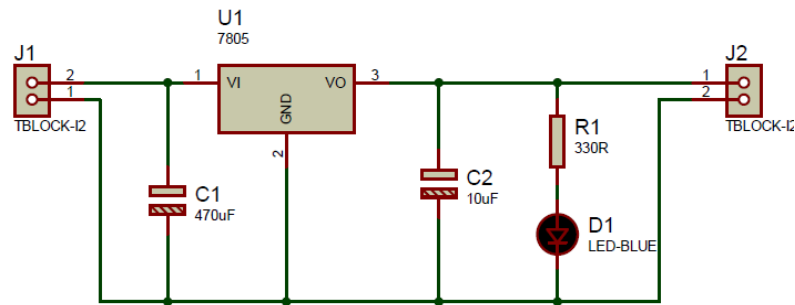


Fig 6.1: Circuit Diagram of 5v Regulated power supply

6.5 MC7805 Regulator IC

The MC7805 of three terminal positive controllers are accessible in the TO-220/D-PAK bundle and with two or three settled yield voltages, making them obliging in a wide degree of businesses. Each sort utilizes inside current restricting, warm closed down and safe working zone confirmation, making it in a general sense indestructible. In the event that satisfactory warmth sinking is given, they can ignore on 1A yield current. Yet, organized basically as settled voltage controllers, these contraptions can be utilized with outside parts to get flexible voltages and streams.

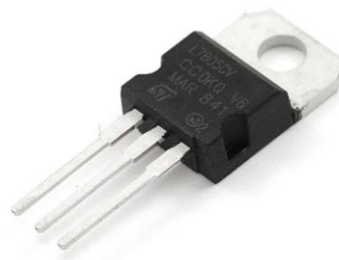


Fig 6.4: MC 7805 Voltage Regulator IC

6.5.1 Features

- Output Current up to 1A
- Output Voltages of 5, 6, 8, 9, 10, 12, 15, 18, 24V
- Thermal Overload Protection
- Short Circuit Protection

- Output Transistor Safe Operating Area Protection

6.5.2 Absolute Maximum Ratings

Table: 6.1 Absolute Maximum Ratings of mc7805

Parameter	Symbol	Value	Unit
Input Voltage (for $V_O = 5V$ to $18V$)	V_I	35	V
(for $V_O = 24V$)	V_I	40	V
Thermal Resistance Junction-Cases (TO-220)	$R_{\theta JC}$	5	$^{\circ}C/W$
Thermal Resistance Junction-Air (TO-220)	$R_{\theta JA}$	65	$^{\circ}C/W$
Operating Temperature Range	TOPR	$0 \sim +125$	$^{\circ}C$
Storage Temperature Range	TSTG	$-65 \sim +150$	$^{\circ}C$

6.5.3 Typical Performance Characteristics

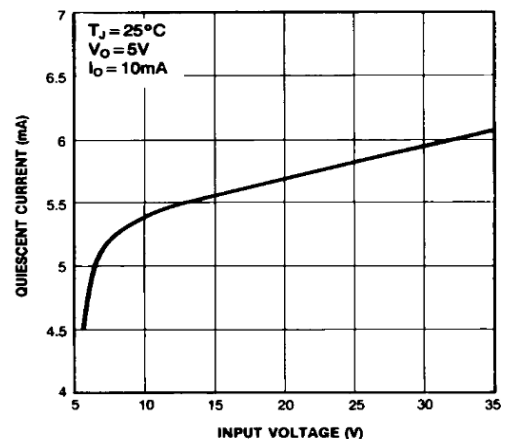
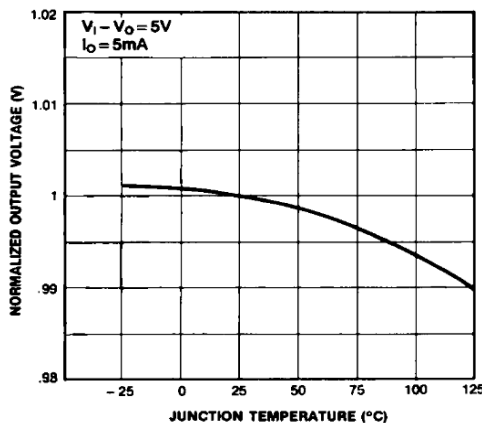
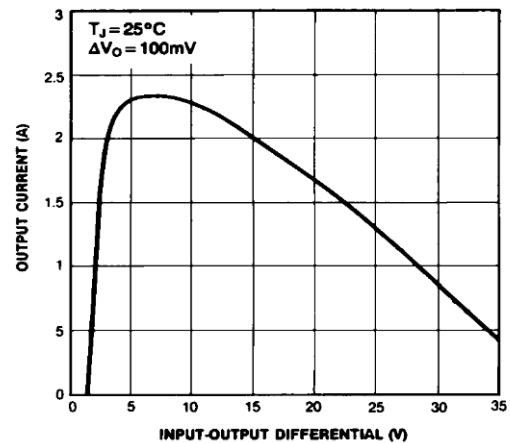
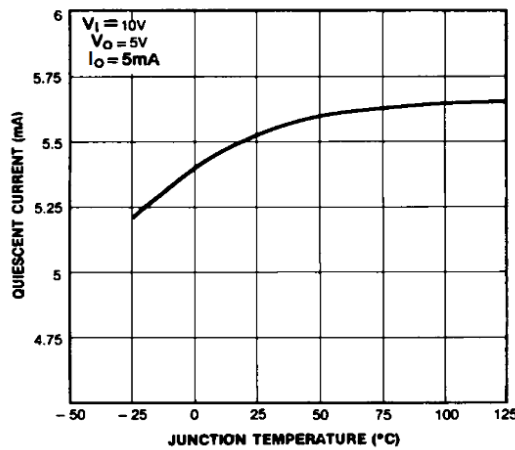


Fig 6.5: Quiescent Current, Peak Output Current, Output Voltage and Quiescent Current curve

6.6 Summary

Facilitated control supply is one that keeps up steady yield voltage or current despite varieties in load current or data voltage. On the other hand, the yield of an unregulated power supply can change essentially when its information voltage or load current changes. Versatile power supplies permit the yield voltage or current to be balanced by mechanical controls (e.g., handles on the power supply front board), or by systems for a control input, or both. A flexible administered control supply is one that is both portable and composed.

CHAPTER-7

HARDWARE DEVELOPMENT

7.1 Introduction

Our task can be considered as stage to create in the field of IoT on the wellbeing division. In creating nations like our own, this sort of imaginative and financially savvy task can enhance the eventual fate of innovation. Along these lines, we are anticipating actualize the venture so as to have an effect in the new time of innovation.

7.2 Capacitors

At the point when there is a potential contrast over the conveyors (e.g., when a capacitor is appended over a battery), an electric field creates over the dielectric, causing positive charge (+Q) to gather on one plate and negative charge (- Q) to gather on the other plate. In the event that a battery has been connected to a capacitor for an adequate measure of time, no current can course through the capacitor. Be that as it may, if a quickening or rotating voltage is connected over the leads of the capacitor, an uprooting current can stream.



Fig. 7.1: Capacitor

An ideal capacitor is depicted by a lone enduring a motivating force for its capacitance. Capacitance is imparted as the extent of the electric charge (Q) on each

transport to the potential differentiation (V). The SI unit of capacitance is the farad (F), which is proportionate to one coulomb for each volt (1 C/V). Ordinary capacitance regards keep running from around 1 pF (10⁻¹² F) to around 1 mF (10⁻³ F). The capacitance is progressively imperative when there is a littler separation among conductors and when the conductors have a greater surface region. For all intents and purposes, the dielectric between the plates passes a little proportion of spillage stream and moreover has an electric field quality limit, known as the breakdown voltage. The conductors and leads present an undesired inductance and restriction. Capacitors are extensively used in electronic circuits for blocking direct present while empowering turning current to pass. In basic channel frameworks, they smooth the yield of force supplies. In resonating circuits they tune radios to explicit frequencies. In electric power transmission systems they settle voltage and power stream.

7.3 Resistor

A resistor is an inactive two-terminal electrical part that executes electrical obstruction as a circuit component. Resistors act to diminish current stream, and, at the at some point, demonstration to bring down voltage levels inside circuits. Resistors may have settled protections or variable protections, for example, those establishing indoor regulators, guests, trimmers, photograph resistors, hamsters and potentiometers. The current through a resistor is in direct extent to the voltage over the resistor's terminals. This relationship is spoken to by Ohm's law.



Fig. 7.2: Resistor

7.3.1 Theory of operation

The conduct of a perfect resistor is directed by the relationship determined by Ohm's law:

$$V = I.R$$

Ohm's law expresses that the voltage (V) over a resistor is corresponding to the current (I), where the constant of proportionality is the opposition (R).

Comparably, Ohm's law can be expressed:

$$I = V/R$$

This plan expresses that the current (I) is corresponding to the voltage (V) and contrarily relative to the opposition (R). This is straightforwardly utilized in commonsense calculations. For instance, if a 300 ohm resistor is joined over the terminals of a 12 volt battery, at that point a current of $12/300 = 0.04$ amperes moves through that resistor.

7.4 Crystal

A crystal oscillator is an electronic oscillator circuit which is used for the mechanical resonance of a vibrating crystal of piezoelectric material. It will create an electrical signal with a given frequency. This frequency is commonly used to keep track of time for example: wrist watches are used in digital integrated circuits to provide a stable clock signal and also used to stabilize frequencies for radio transmitters and receivers. Quartz crystal is mainly used in radio-frequency (RF) oscillators. Quartz crystal is the most common type of piezoelectric resonator; in oscillator circuits we are using them so it became known as crystal oscillators. Crystal oscillators must be designed to provide a load capacitance.



Fig. 7.3: Crystal (16.00 MHz)

7.4.1 Quartz Crystal

A quartz precious stone displays a critical property known as the piezoelectric impact. At the point when a mechanical weight is connected over the essences of the gem, a voltage which is corresponding to mechanical weight shows up over the precious stone. That voltage causes contortion in the precious stone. Misshaped sum will be relative to the connected voltage and furthermore a substitute voltage connected to a precious stone it causes to vibrate at its characteristic recurrence.

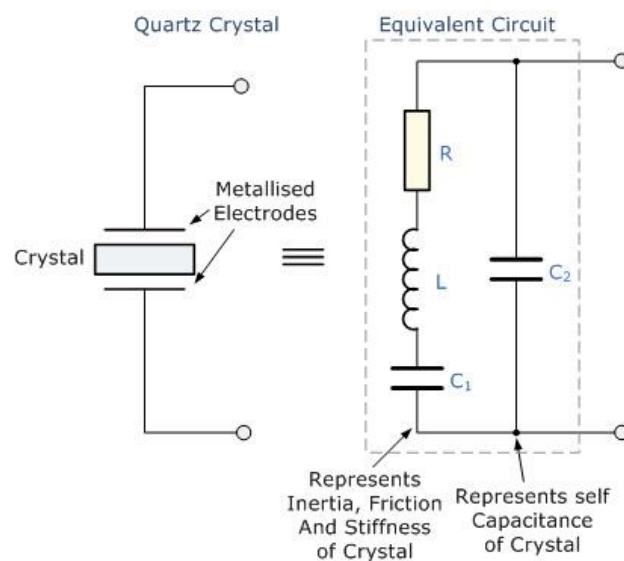


Fig. 7.4.1: Quartz Crystal Circuit

7.4.2 Crystal Oscillator Working

Precious stone oscillator circuit as a rule chips away at the standard of the backwards piezoelectric impact. The connected electric field will deliver a mechanical disfigurement over a few materials. Along these lines, it uses the vibrating gem's mechanical reverberation that is made with a piezoelectric material for producing an electrical flag of a specific recurrence.

Generally quartz precious stone oscillators are profoundly steady, comprises of good quality factor(Q), they are little in size, and are financially related. Subsequently, quartz precious stone oscillator circuits are increasingly better analyzed than different

resonators like LC circuits, turning forks. For the most part in Microprocessors and Micro controllers we are utilizing a 8MHz precious stone oscillator.

The proportionate electrical circuit is likewise depicts the precious stone activity of the gem. Simply take a gander at the identical electrical circuit graph appeared in the abovementioned. The fundamental segments utilized in the circuit, inductance L speaks to gem mass, capacitance C2 speaks to consistence, and C1 is utilized to speak to the capacitance that is shaped in view of precious stone's mechanical embellishment, opposition R speaks to the gem's inside structure grinding, The quartz gem oscillator circuit graph comprises of two resonances, for example, arrangement and parallel reverberation, i.e., two resounding frequencies.

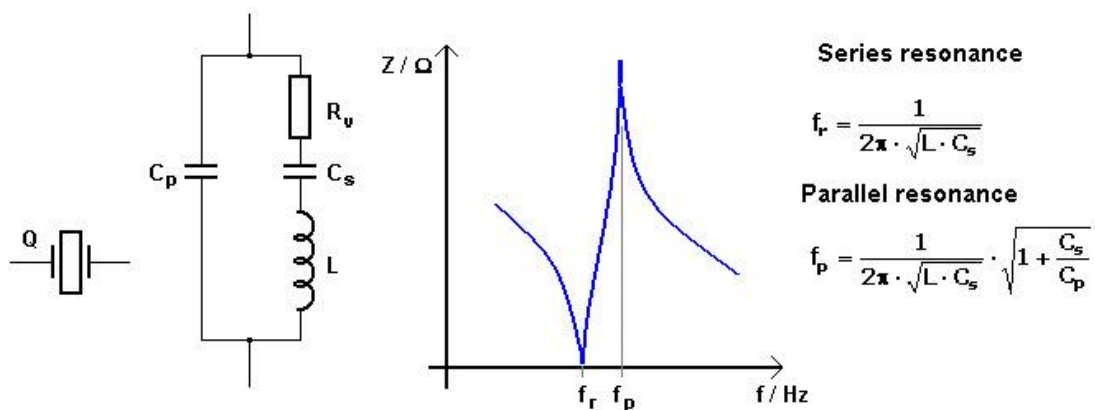


Fig. 7.3.2: Crystal Oscillator Working

7.5 Diode (1N4007)

A diode is an electrical gadget enabling flow to travel through it one way effortlessly than in the other. The most well-known sort of diode in present day circuit configuration is the semiconductor diode, albeit other diode advances exist. Semiconductor diodes are symbolized in schematic charts, for example, Figure underneath. The expression "diode" is usually held for little flag gadgets, $I \leq 1$ A. The term rectifier is utilized for power gadgets, $I > 1$ A.



Fig7.5: Diode (1N4007)

At the point when set in a straightforward battery-light circuit, the diode will either permit or avoid current through the light, contingent upon the extremity of the connected voltage. (Figure beneath)

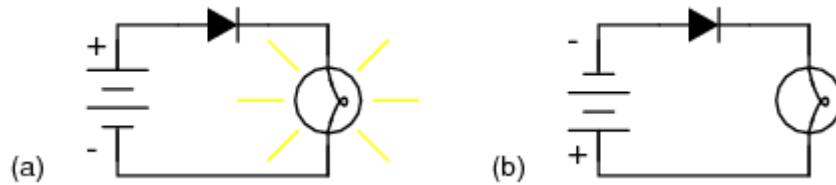


Fig 7.5.2: (a) Current flow is permitted; the diode is forward biased. (b) Current flow is prohibited; the diode is reversed biased.

At the point when the extremity of the battery is to such an extent that electrons are permitted to move through the diode, the diode is said to be forward-one-sided. On the other hand, when the battery is "in reverse" and the diode squares current, the diode is said to be invert one-sided. A diode might be thought of as like a switch: "shut" when forward-one-sided and "open" when turn around one-sided.

7.6 Relay

A strong state hand-off (SSR) is an electronic exchanging gadget that switches states when an outer voltage is connected along its n-type and p-type intersections. SSR has a little control flag that controls a bigger load current or voltage. It comprises of a sensor which reacts to a fitting information (control flag), a strong state electronic exchanging gadget which changes capacity to the heap hardware, and some coupling instrument to empower the control flag to enact this switch without mechanical parts. The hand-off might be intended to switch either AC or DC to the heap. It serves indistinguishable capacity from an electromechanical hand-off, yet has no moving parts.



Fig. 7.6.1: Relay (10 Amp)

7.6.1 Features of 5-Pin 5V Relay

- Trigger (Voltage crosswise over loop) : 5V DC
- Trigger Current (Nominal current) : 70mA
- Maximum AC stack current: 10A @ 250/125V AC
- Maximum DC stack current: 10A @ 30/28V DC
- Compact 5-stick arrangement with plastic embellishment
- Operating time: 10msec Release time: 5msec
- Maximum exchanging: 300 working/minute (mechanically)

7.6. 2 Relay Pin Configuration

Table 7.6: Relay pin configuration

Pin Number	Pin Name	Description
1	Coil End 1	Used to trigger(On/Off) the Relay, Normally one end is associated with 5V and the opposite end to ground.
2	Coil End 2	Used to trigger(On/Off) the Relay, Normally one end is associated with 5V and the opposite end to ground.
3	Common (COM)	Common is connected to one End of the Load that is to be controlled.
4	Normally Close (NC)	The opposite end of the heap is either associated with NO or NC. Whenever associated with NO the heap stays detached before trigger.
5	Normally Open (NO)	The opposite end of the heap is either associated with NO or NC. Whenever associated with NO the heap stays detached before trigger.

7.6.3 How to use a Relay

Transfers are most normally utilized exchanging gadget in hardware. Give us a chance to figure out how to utilize one in our circuits dependent on the prerequisite of our task. Before we continue with the circuit to drive the transfer we need to think about two vital parameter of the hand-off. Once is the Trigger Voltage, this is the voltage required to turn on the transfer that is to change the contact from Common->NC to Common->NO. Our hand-off here has 5V trigger voltage, however you can likewise discover transfers of qualities 3V, 6V and even 12V so select one dependent on the accessible voltage in your venture. The other parameter is your Load Voltage and Current, this is the measure of voltage or current that the NC,NO or Common terminal of the hand-off could withstand, for our situation for DC it is most extreme of 30V and 10A. Ensure the heap you are utilizing falls into this range.

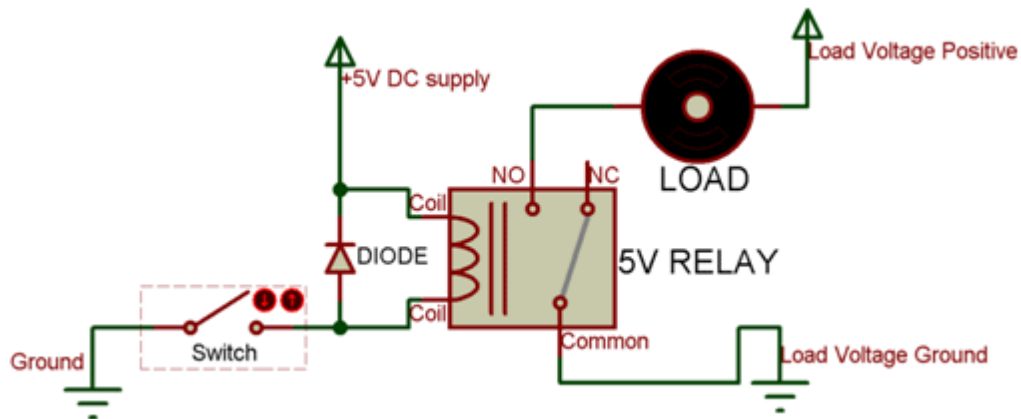


Fig.7.6.2: Relay Circuit

The above circuit demonstrates an absolute minimum idea for a hand-off to work. Since the transfer has 5V trigger voltage we have utilized a +5V DC supply to one end of the loop and the opposite end to ground through a switch. This switch can be anything from a little transistor to a microcontroller or a chip which can perform exchanging working. You can likewise see a diode associated over the curl of the hand-off, this diode is known as the Fly back Diode. The motivation behind the diode is to shield the change from high voltage spike that can delivered by the hand-off loop. As demonstrated one end of the heap can be associated with the Common stick and the opposite end is either associated with NO or NC. Whenever associated with NO the heap stays separated before trigger and whenever associated with NC the heap stays associated before trigger.

7.6.4 Applications of Relay

- Commonly utilized in utilized in exchanging circuits.
- For Home Automation activities to switch AC loads
- To Control (On/Off) Heavy loads at a pre-decided time/condition
- Used in wellbeing circuits to separate the heap from supply in occasion of disappointment
- Used in Automobiles hardware for controlling markers glass engines and so forth.

7.7 Transformer

A transformer is an electrical gadget that exchanges electrical vitality between at least two circuits through electromagnetic enlistment. Electromagnetic acceptance creates an electromotive power inside a conductor which is presented to time changing attractive fields. Transformers are utilized to increment or decline the substituting voltages in electric power applications. It is a stage down transformer in which the optional winding is more than essential winding. Because of this windings it can ready to venture down the voltage. A Transformer changes power from high to low voltage or low to high voltage utilizing two properties of power.

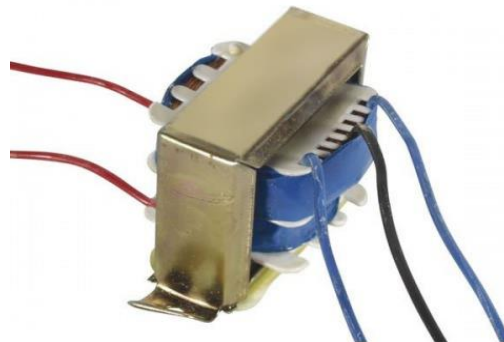


Fig. 7.7: 12-0-12v step down transformer

It is a universally useful case mounting mains transformer. Transformer has 240V essential windings and focus tapped optional winding. The transformer has flying hued protected interfacing drives (Approx 100 mm long). The Transformer go about as venture down transformer that lessening AC - 220V to AC - 12V. Power supplies for a wide range of venture and circuit sheets. Venture down 230 V AC to 12V with a greatest of 1Amp current. In AC circuits, AC voltage, current and waveform can be changed with the assistance of Transformers. Transformer assumes an essential job in electronic gear. Air conditioning and DC voltage in Power supply hardware are nearly accomplished by transformer's change and recompense.

7.7.1 Transformer Power Rating

Voltage is estimated in volts, current is estimated in amps, and the unit of measure for power is watts. Watts is equivalent to the volts times the amps. There is a little loss of intensity in a transformer because of the mix of obstruction and reactance. Reactance is like opposition aside from it is the protection from an AC present or all the more in fact, the protection from change in an adjustment in current because of the adjustment in the field made. This warmth is the thing that constrains the measure of current or power a transformer can deal with. The higher the current, the more warmth is delivered. At the point when the wires get excessively hot, the protection separates and shorts with nearby wires which cause more warmth which in the end liquefies wires and demolishes the transformer.

A fundamental transformer has no extra segments thus nothing to shield it from over-burdening. If you somehow managed to associate the two yield wires specifically together, that will comprise a short out and cause a great deal excessively current to stream in both the essential and optional and you will wear out the transformer. Similarly, on the off chance that you utilize the transformer to control a hot wire froth shaper and you are utilizing a wire with too little opposition for your froth shaper, you will wear out your transformer on the off chance that you don't have it secured by an appropriate esteem wire or breaker. You need to ensure that the wire opposition, as it were, the gage or distance across, and the length is right to restrict the measure of current to under the rating of the transformer.

The higher the current, the bigger the wires should be that convey that current. At the point when the wires are bigger, there is less opposition thus less warmth. The power that is changed to warmth and lost can be determined as $P=I^2R$. That implies that in the event that you twofold the current, the power lost to warm increments by multiple times. In the event that the transformer is a stage down transformer, there will be progressively present on the yield thus the wire in the optional windings will be heavier than the essential. The switch is valid for a stage up transformer.

A transformer might be appraised in Amps, Volt-Amps (VA), or Watts (W). For little transformers, VA and Watts is a similar thing for every viable reason. In substantial mechanical transformers, control factors get included and the two can

be unique. On the off chance that the transformer is evaluated in amps, it normally says X amps at X volts and is appraised on the yield or optional side. A 120V transformer with 24V out appraised at 2 amps implies that you can just securely pull 2 amps from the optional side. You can discover the power rating of the transformer by increasing the appraised amps times the yield voltage so $2 \times 24 = 48$ watts.

On the off chance that the transformer is appraised in VA or watts, you can compute the most extreme reasonable yield current by isolating the VA or watts by the yield voltage. So if the transformer is evaluated at 48 VA with 24 volts yield, the admissible yield current is $48/24 = 2$ amps.

7.7.2 Transformer Configurations

A typical setup is a middle tap or CT. The auxiliary side has three wires out. The center wire on the yield side is appended to the optional curl, as a rule at the center. In the event that the winding proportion is 5 to 1, with 120V information, you get 24 volts yield on the two outside wires however on the off chance that it associates an outside wire and the middle wire, it get 12 volts since it is utilizing just a large portion of the optional winding making the association a 10 to 1 proportion.

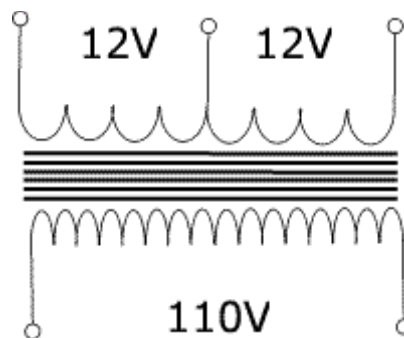


Fig. 7.7.1: Transformer Configurations

On the off chance that the transformer is evaluated at 2 amps, despite everything it can just utilize 2 amps yield whether it use 12 volts or 24 volts. Frequently the middle tap is grounded so it at that point have two 12 volt sources that can be utilized to make + and - 12V DC in the wake of going through a converter (rectifier and channel).

7.7.3 Features

- Output current: 1Amp
- Supply voltage: 220-230Volt AC
- Output voltage: 12Volt AC
- Iron Core
- 1Amp Current Flow To Drain

7.7.4 Applications

- Using for AC/AC converter.
- Using for battery Charger.
- Using for any Electronic applications.
- Step down applications (Power transmission)

7.8 Triac

Planar passivity touchy door four quadrant triac in a SOT78 plastic bundle proposed for use as a rule reason bidirectional exchanging and stage control applications. This delicate entryway "arrangement E" triac is proposed to be interfaced straightforwardly to microcontrollers, rationale coordinated circuits and other low power door trigger circuits.

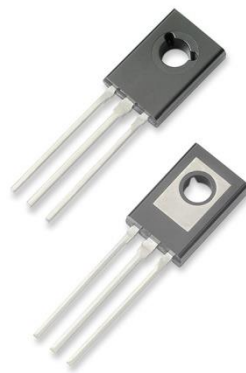


Fig 7.8: Triac.

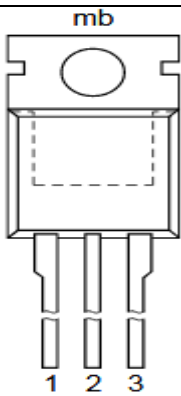
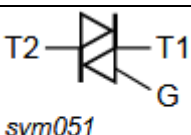
7.8.1 Features and benefits

- Direct activating from low power drivers and rationale ICs
- High blocking voltage capacity

- Low holding current for low current burdens and most reduced EMI at replacement
- Planar passivity for voltage roughness and unwavering quality
- Sensitive entryway
- Triggering in each of the four quadrants

7.8.2 Pin information

Table 7.7: Pin Information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1		
2	T2	main terminal 2		
3	G	Gate		
MB	T2	mounting base; main terminal 2		

7.8.3 Applications

- General purpose motor control
- General purpose switching

7.9 Cost Analysis

Name	Quantity	Unit Price
Microcontroller Atmega8	1	300
Atmega328p IC based	1	20
Node MCU	1	2000
LCD	1	300
Relay Module	1	500
Light holder, light	4	400

Transformer	1	200
Traic	1	120
Cable, Socket, screw, Super glue	--	500
Switch	4	200
Optocoupler	1	100
Regulator IC, Resistor, Capacitor	--	300
Partex board, Color Pattern	--	500
Others	--	500
Total		~6000

7.10 Summary

This machine is a portable machine. When will Implementation the machine in an industry its hardware part will be change.

CHAPTER-8

SOFTWARE

8.1 Introduction

PC programming, or basically writing computer programs, is a bit of a PC structure that contains data or PC rules, rather than the physical gear from which the system is collected. In programming designing and programming building, PC writing computer programs is all information arranged by PC structures, tasks and data. PC programming joins PC ventures, libraries and related non executable data, for instance, online documentation or mechanized media. PC hardware and programming require each other and neither can be sensibly used on its own.[14]

8.2 Proteus

The Proteus Structure Suite is an exclusive programming device suite utilized fundamentally for electronic plan computerization. The product is utilized primarily by electronic plan architects and experts to make schematics and electronic prints for assembling printed circuit sheets.

8.3 Product Modules

The Proteus Structure Suite is a Windows application for schematic catch, reproduction, and PCB format plan. It very well may be bought in numerous setups, contingent upon the measure of plans being delivered and the necessities for microcontroller reproduction. All PCB Structure items incorporate an AutoRoute and fundamental blended mode Zest recreation abilities.

8.4 Schematic Capture

Schematic capture in the Proteus Plan Suite is utilized for both the reproduction of structures and as the structure period of a PCB design venture. It is in this manner a center part and is incorporated with all item designs.

8.5 Microcontroller Simulation

The smaller scale controller recreation in Proteus works by applying either a hex document or a troubleshoot record to the microcontroller part on the schematic. It is then co-reproduced alongside any simple and advanced gadgets associated with it. This empowers its utilization in a wide range of undertaking prototyping in zones, for example, engine control, temperature control and UI plan. It likewise discovers use in the general specialist network and, since no equipment is required, is helpful to use as a preparation or instructing device. Support is accessible for co-recreation of:

- Microchip Technologies PIC10, PIC12, PIC16, PIC18, PIC24, dsPIC33 Microcontrollers.
- Atmel AVR (and Arduino), 8051 and ARM Cortex-M3 Microcontrollers
- NXP 8051, ARM7, ARM Cortex-M0 and ARM Cortex-M3 Microcontrollers.
- Texas Instruments MSP430, PICCOLO DSP and ARM Cortex-M3 Microcontrollers.
- Parallax Basic Stamp, Free scale HC11, 8086 Microcontrollers.

8.6 PCB Design

The PCB Design module is naturally given network data as a net list from the schematic capture module. It applies this data, together with the client indicated configuration rules and different structure computerization devices, to help with blunder free board plan. Configuration Standard Checking does exclude fast plan limitations. PCB's of up to 16 copper layers can be delivered with configuration measure constrained result design.

8.7 3D Verification

The 3D Watcher module enables the load up a work in progress to be seen in 3D together with a semi-straightforward tallness plane that speaks to the load up's walled in area. STEP yield would then be able to be utilized to exchange to mechanical computer aided design programming, for example, Strong works or Autodesk for exact mounting and situating of the board.

8.8 Arduino Software IDE

A program for Arduino may be written in any programming tongue for a compiler that produces twofold machine code for the goal processor. Atmel gives an enhancement area to their microcontrollers, AVR Studio and the more up and coming Atmen Studio. The Arduino venture gives the Arduino coordinated advancement condition (IDE), which is a cross stage application written in the programming lingo Java. It began from the IDE for the vernaculars Handling and Wiring. It joins a code administrator with features, for instance, content reordering, looking and overriding substance, customized indenting, prop organizing, and etymological structure highlighting, and gives fundamental a solitary tick segments to gather and exchange tasks to an Arduino board. It moreover contains a message zone, a substance console, a toolbar with gets for ordinary limits and a request of movement menus.

A program composed with the IDE for Arduino is known as a portray. Representations are saved money on the advancement PC as content documents with the record expansion. Arduino Programming (IDE) pre-1.0 spared draws with the expansion.

The Arduino IDE supports the vernaculars C and C++ using uncommon measures of code arranging. The Arduino IDE supplies an item library from the Wiring adventure, which gives various ordinary data and yield procedures. Customer formed code just requires two basic limits, for starting the blueprint and the essential program circle, that are joined and associated with a program stub `basic()` into an executable cyclic authority program with the GNU toolchain, in like manner included with the IDE

allocation. The Arduino IDE uses the program avrdude to change over the executable code into a substance record in hexadecimal encoding that is stacked into the Arduino board by a loader program in the board's firmware.[15]

8.9 Summary

The control panel of Fruit sorting and packing machine are design and simulate by using protease software. Also using Arduino IDE to programming in Atmega32p microcontroller (Arduino).

CHAPTER-9

DISCUSSION & CONCLUSION

9.1 Discussion

Brilliant locally situated on IOT innovation are winding up increasingly well known. Fundamental Moto of IOT is to associate equipment world to web. At that point, Web of Things (IOT) developed to effortlessly interface sensors to the web, get the information and trade information on the web that has been created by the gadgets. We have gone altogether through number of diaries, research and meeting papers and task reports to completely comprehend the idea of IOT innovation. Likewise, we have investigated different IOT based ventures that have been planned and created before. A portion of the proposed and existing keen homes stages are as per the following.

The READY4 Brilliant Homes goes for lessening intricacy of human face in his home because of absence of time. This undertaking is proposed to produce and give distinctive models which are been working utilizing web only IOT and so on. Be that as it may, it doesn't envelop crucial IOT areas like home atomize in less cost and so forth and neither does it notice need to incorporate a thinking motor to dissect IOT information. The STAR-HOME undertaking is conveyed in different urban communities. According to their structure diverse sensors like gas identification, IR sensor, Fire sensor and so forth are utilized to shield our home from different ways and make home high secure. The task is essentially centered around the home security and simple application.

9.2 Conclusion

The point of this undertaking is to remotely control home gadgets through Web of Things. So here built up an application, which is the quick and wide run correspondence media between the two unique stages contrasted with the past accessible advancements like Bluetooth, Zigbee, Zwave and so on. Exhibit of exchanging ON/OFF of three lights and a Fan with its speed control is appeared.

9.3 Recommendation

By utilizing this task in future a security framework can likewise be worked for homes. This venture will make homes progressively secure in future. With the assistance of this venture live picture sof robotized homes will be found in PCs continuously from a remote area. Home temperature control is conceivable from a remote area by utilizing Web of things. An answer for change an ordinary house to a shrewd house while lessening the vitality utilization is proposed. This application can likewise be reached out to modern robotization applications.

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Appendix

```
#include <SPI.h>
#include <WiFi101.h>

char networkName[] = ""; // your network SSID (name)
char wifiPass[] = ""; // your wifi password

// Frequency of the buzzer
const int BUZZER_FREQUENCY = 1000;
// buzzer pin
const int BUZZER_PIN = 3;
// Power Relay to turn router on/off
const int RELAY_PIN = 0;

// interval after which checking should be done When in connected state
const int CheckAfterDuration = 1*60*1000;

// interval after which disconnected should be processed.
// This give heads up to those connected using wires prior to reboot.
const int RebootDelay = 20*1000;

// The time for which router remains off.
const int RouterOffDuration = 30*1000;

// The time for router to fully restart wifi from the time of power on.
const int WifiStartDuration = 2*60*1000;

// remote server for testing connectivity
char servername[] = "google.com";

// Initialize the client library
WiFiClient client;

// States of the apparatus
enum States
{
  Checking,
  Connected,
  Disconnected,
  RouterOff,
  RouterOn
};

// time at which state started
```

```

long stateStartMilliSec = 0;

// current state
enum States currentState;

void setup()
{
  Initialize serial and wait for port to open:
  Serial.begin(9600);
  while (!Serial)
    pinMode(RELAY_PIN, OUTPUT);

  connect to Wi-Fi
  ConnectToWiFi();

  // set initial state
  ChangeState(Checking);
}

// the loop function
void loop()
{
  // call process method as per state
  switch(currentState)
  {
    case Checking:
      Process_State_Checking();
      break;

    case Connected:
      Process_State_Connected();
      break;

    case Disconnected:
      Process_State_Disconnected();
      break;

    case RouterOff:
      Process_State_RouterOff();
      break;

    case RouterOn:
      Process_State_RouterOn();
      break;
  }
}

void Enter_State_Checking()
{
  // wifi.status() method does not return status correctly. It would return connected

```

// even after wi-fi has been shut. To get around this, the method attempts to connect to the server.

```
States nextState = client.connect(servername, 80) ? Connected : Disconnected;
if(nextState == Disconnected)
{
    // Serial.println("WiFi Disconnected");
}
else
{
    client.stop(); // disconnect
    // Serial.println("WiFi Connected");
}
ChangeState(nextState);
}
```

```
void Process_State_Checking()
{
    // do nothing
}
```

```
void Enter_State_Connected()
{
    // reset the timer
    stateStartMilliSec = millis();
}
```

```
void Process_State_Connected()
{
    // if time has elapsed, tranistion to Checking state
    long timeNow = millis();
    if((timeNow - stateStartMilliSec) >= CheckAfterDuration)
    {
        ChangeState(Checking);
    }
}
```

```
void Enter_State_Disconnected()
{
    // reset the timer
    stateStartMilliSec = millis();
    // Turn on the speaker prior to reboot
    tone(BUZZER_PIN, BUZZER_FREQUENCY);
}
```

```
void Process_State_Disconnected()
{
    // wait for some time, for reboot
    long timeNow = millis();
    if((timeNow - stateStartMilliSec) >= RebootDelay)
```

```

    {
        ChangeState(RouterOff);
    }
}

void Enter_State_RouterOff()
{
    // reset the timer
    stateStartMilliSec = millis();

    // Turn the router off here
    // router is connected in NC mode.
    // So turn off requires pin to be set to high
    digitalWrite(RELAY_PIN, HIGH);
}

void Process_State_RouterOff()
{
    // after the router is turned off for sufficient duration
    // change state to On
    long timeNow = millis();
    if((timeNow - stateStartMilliSec) >= RouterOffDuration)
    {
        // Turn the router on
        ChangeState(RouterOn);
    }
}

void Enter_State_RouterOn()
{
    // turn router on now
    // Relay is in NC mode.
    // To turn it on, set the pin to low
    digitalWrite(RELAY_PIN, LOW);
}

void Process_State_RouterOn()
{
    // wait till router completely boots and the WiFi is ready
    long timeNow = millis();
    if((timeNow - stateStartMilliSec) >= WifiStartDuration)
    {
        // stop the speaker sound
        noTone(BUZZER_PIN);
        // now the router is really on and should be transmitting.
        // connect and perform the check
        ConnectToWiFi();
        ChangeState(Checking);
    }
}
}

```

```

void ChangeState(States newState)
{
  // call enter method as per state
  // Serial.print("Entering state: ");
  // Serial.println(newState);
  currentState = newState;
  switch(newState)
  {
    case Checking:
      Enter_State_Checking();
      break;

    case Connected:
      Enter_State_Connected();
      break;

    case Disconnected:
      Enter_State_Disconnected();
      break;

    case RouterOff:
      Enter_State_RouterOff();
      break;

    case RouterOn:
      Enter_State_RouterOn();
      break;
  }
}

// common method to connect to Wi-Fi
void ConnectToWiFi()
{
  // set up wifi
  WiFi.begin(networkName, wifiPass);

  // wait 10 seconds for connection
  delay(10000);
}

```