

FISHERMAN BORDER ALERT SYSTEM USING IOT

Submitted in partial fulfillment of the
requirements for the award of
Bachelor of Technology in Information Technology

By

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DEPARTMENT OF INFORMATION TECHNOLOGY
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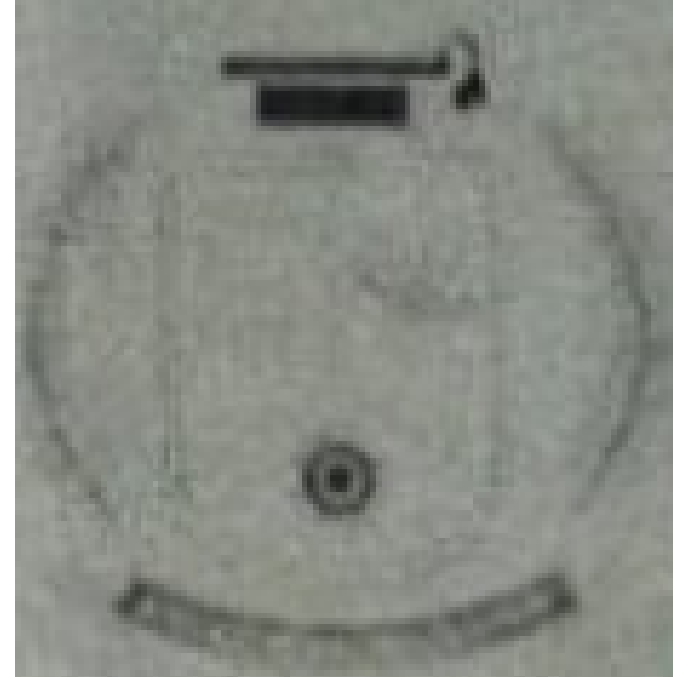
SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

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MAY - 2023



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DEPARTMENT OF INFORMATION TECHNOLOGY

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **Aishwaryalakshmi K (39120005)** and **Madhumithaa N (39120065)** who carried out the Project Phase-2 entitled **“FISHERMAN BORDER ALERT SYSTEM USING IOT”** under my supervision from November 2022 to May 2023.

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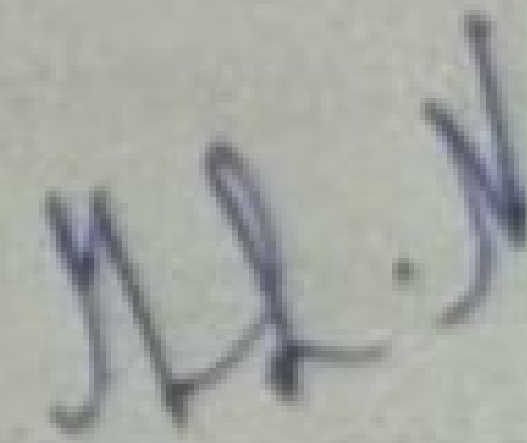
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DECLARATION

I, MADHUMITHA.A.N (Reg.No- 39120065) hereby declare that the Project Phase-2 Report entitled "FISHERMAN BORDER ALERT SYSTEM USING IOT" done by me under the guidance of Dr.S.GOWRI, M.E.Ph.D. is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Information Technology.

DATE: 10.05.2023

PLACE: Chennai



SIGNATURE OF THE CANDIDATE

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I convey my thanks to Dr. T.SASIKALA M.E., Ph. D, Dean, School of Computing, Dr.R.SUBHASHNI M.E., Ph.D., Head of the Department of Information Technology for providing me necessary support and details at the right time during the progressive reviews.

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I wish to express my thanks total Teaching and Non-teaching staff members of the Department of Information Technology who were helpful in many ways for the completion of the project.

ABSTRACT

In our regular day to day existence, we have overcome many incidents on Indian fishermen caught arrested or even killed by Sri Lankan navy. However, it's an "unsubstantiated allegation". Asserting that its personnel is not authorized to open fire in such situations, the major cause set to be the negligence of the anglers who aren't aware of the Maritime borders. Indian fishermen enter Sri Lankan boundary unknowingly. In major areas it's impossible to know the exact border without the help of the GPS and GSM. the GPS/GSM gets the coordinates from the ARDUINO microcontroller and wireless transmission of information is transferred from IOT tracking unit to the monitoring unit that store the coordinate of the exact location and if the anglers cross the border the microcontroller signals the ignition to set off, so that the anglers don't have to cross the maritime border as well as the life of the fishermen's is saved and the coordinates of the anglers is sent to the listed members or the naval officers as web page who can rescue the fishermen's on time.

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CHAPTER 1

INTRODUCTION

The coastal area people are purely depend on fishing occupation in the sea. If the fisherman cross the border it should be treated as a serious offence. Due to unawareness about the boundary limits, the fisherman cross the maritime borders .Once they crossed the border, the boats are being captured by the neighborhood countries coastal guards. Under such situation lives of fisherman are in danger.In such cases our border alert system for fisherman will help to over come the project. Using GPS the current latitude and longitude values can be determined and it compare the current location and predefined latitude and longitude values. fisherman is an individual whose work is to catch fish and sell them in the local markets. He even sails into the sea in groups/clusters for the reason. But there are lot of risks involved in this profession than what our eyes can see. The major threats faced by fishermen are the climatic changes, damage to ship due to crashes and overfishing. Nowadays, border crossing has also become a major threat to the fishermen as, it leads to arresting them or even get killed. This threat is growing rapidly in major coastal regions of Tamilnadu. Fear, agony, and shock grips the fishing hamlets of coastal districts in Tamil Nadu. To reduce the causalities caused due to this issue, a method was proposed to detect the border and alert the fishermen who are travelling when they reach the border. Indian government has also taken steps in these regards and has provided satellite phone to the fishermen who sail deep sea. The lack of proper communication facilities proves to be a challenge in rescuing fishermen during natural calamities, and the safety of fishermen who venture into the deep sea. The Fisheries Department has decided to provide 1,000 phones to fishermen across the state. Other methods used by the fishermen are the GPS Navigators which are purely analog. These navigators gives the current location in terms of latitude and longitude. Fishermen use these latitudes and longitudes as a secondary compass while sailing in the sea. The major disadvantage of these methods are lack of awareness among the fishermen of the existing solutions. Tracking of fishermen is very hard by the people on the surface as the existing solution does not provide information of their path. Many people of the fishing clusters don't know how to use the existing method. Currently there are no digital way of detecting the border of a country

1.1 WORKING PRINCIPLE

The GPS Modem will continuously give the signal which determines the latitude and longitude and indicates the position of the fishermen to them. Then it gives the output which gets read and displayed in the LCD. The same data is sent to the mobile of the fisherman and simultaneously the same data is sent to the Sea border security. An EEPROM is used to store the data, received by GPS receiver. The hardware which interfaces with microcontroller are LCD display, GSM modem and GPS Receiver. GPS (Global Positioning System) is increasingly being used for a wide range of applications. It provides reliable positioning, navigation, and timing services to worldwide users on a continuous basis in all weather, day and night, anywhere on or near the Earth. 28 satellites inclined at 55° to the equator orbit the Earth every 11 hours and 58 minutes at a height of 20,180 km on 6 different orbital Lanes and each one of these satellites has up to four atomic clocks on board. All we require is an accurate clock. By comparing the arrival time of the satellite signal with the onboard clock time, at which the signal was emitted, the latitude and longitudinal degree of the boat's location is determined. The current design is an embedded application, which will continuously monitor a moving Boat and once the boat goes beyond the level of the defined layer the particular operation will be done. For doing so an AT89c51 microcontroller is interfaced serially to a GSM MODEM AND GPS receiver.

1.2 OVERVIEW

At the present time there are few existing systems Which help to identify the current position of the boats/ships using GPS System and view them on an electronic map. For the purpose of identification the fisherman are using the GPS72h, equipment used for the navigation in sea. It provides the fastest and most accurate method for Mariners to navigate, measure speed, and determines location. This system enables increased levels of safety and efficiency. It ensures whether the ship reaches its destination safely. The accurate position information becomes even more critical as the vessel departs from or arrives in port.

CHAPTER - 2

LITERATURE REVIEW

2.1 INFERENCE FROM LITERATURE SURVEY

Title: IoT-BASED NAUTICAL TRACING SYSTEM

Author: V. Ulagamuthalvi; G. Kulanthaivel; A. Jesudoss; Anudeep; Avinash Sharma

Description: Observation is an essential issue for perimeter command and the security of business workplaces. The ocean edge between the countries isn't really unmistakable, which is the guideline clarification behind this cross-periphery viciousness for fishers. The motto behind this research work is to give a simple to utilize and well-legitimate condition to avoid various disasters and to alert the fishermen on the periphery domains. An organized structure using microcontroller unit guarantees the fishermen by advising the border edge using Global Positioning System (GPS). GPS authority is used to find the present region of the calculating barge or vessel. Using GPS, the present extension and longitude regards can be traced and can be sent to the control unit. By then the control unit finds the present territory by differentiating the current degree and longitudinal characteristics with the predefined regard. From the eventual outcome of the examination, the system alert concerned fishers that they will accomplish the nautical periphery.

Title: A smart low-consumption IoT framework for location tracking and its real application

Author : Hao Tang; Jian Shi; Kai Lei

Description: Location-based services are increasing popular. Smart devices embedded with GPS receiver are widely used in vehicle tracking, law enforcement and person monitoring. To provide real-time data collecting and analyzing, a backend server is necessary. A mobile app can work as a user client for accessing location data and remote control. In this paper, we describe the design and implementation of a system providing real-time positioning and tracking service. Our system consists of three parts: tracking device, backend server and mobile app. Our tracking device integrates GPS module, GSM/GPRS module and TCP/IP stack, capable of generating location data, establishing TCP connection and receiving SMS. Location three parts: tracking device, backend server and mobile app. Our tracking device integrates GPS module, GSM/GPRS module and TCP/IP stack, capable of generating location data, establishing TCP connection and receiving SMS. Location data are transmitted over TCP connection from device to our backend server. The server is responsible for collecting and storing data. The server also provides an HTTP-based RESTful API for mobile app and web service. A mobile app is built for displaying data and controlling device remotely. Data accessing is via calling REST

API and remote control is sent to device by SMS. Our device is compact in volume, accurate in positioning, and long in battery life. Our device has been integrated in a walking stick as a real-world product

Title: Intelligent security system based on location information

Author: He Weixin; Cong Linhu

Description: The current military management of important materials lacks real-time monitoring means. Once important materials are lost or stolen, they can only be analyzed and speculated through post-event investigations and evidence collection. People can't immediately locate the real-time location of the item. Based on the above considerations, the NB-IoT communication module, Beidou positioning module, and buzzer are used to form a positioning device. When important materials are active outdoors, the NB-IoT SIM card on the device is activated, and the SIM card sends real-time location information of the materials to the cloud platform in real time to ensure that real-time trends are grasped, and the data will be sent to the computer terminal. In the process of data transmission, AES encryption is used to ensure data security. Installed on important materials, the management software will display the location, movement track, environmental status and other information of the materials in real time, which solves the needs of real-time monitoring, status monitoring and anti-theft warning of important materials.

2.2 PROBLEMS IN EXISTING SYSTEM

The coastal area people are purely depend on fishing occupation in the sea. If the fisherman cross the border it should be treated as a serious offence. Due to unawareness about the boundary limits, the fisherman cross the maritime borders . we have overcome many incidents on Indian fishermen caught arrested or even killed by Sri Lankan navy. However, it's an "unsubstantiated allegation

2.2.1 PROPOSED SYSTEM

The proposed system of the project states that the major areas it's impossible to know the exact border without the help of the GPS and GSM. then gsm send the sms in mobile. So we proposed a project with the help of GPS gets the coordinates from the ARDUINO microcontroller and wireless transmission of information is transferred from IOT tracking unit to the monitoring unit that store the coordinate of the exact location and if the anglers cross the border the microcontroller signals the ignition to set off, so that the anglers don't have to cross the maritime border as well as the life of the fishermen's is saved and the coordinates of the anglers is sent to the listed members or the naval officers as web page who can rescue the fishermen's on time.

CHAPTER 3

REQUIREMENTS ANALYSIS

3.1. SOFTWARE REQUIREMENTS SPECIFICATION DOCUMENT:

HARDWARE REQUIREMENTS

- ARDUINO UNO
- GPS MODULE
- GSM MODULE
- NODE MCU
- LED
- BUZZER
- LCD DISPLAY
- POWER SUPPLY

SOFTWARE SPECIFICATION

- ARDUINO IDE
- EMBEDDED C

3.2 FEASIBILITY STUDIES/RISK ANALYSIS OF THE PROJECT :

Some ARM processors clock frequencies, which is why speeds and memory bandwidths are limited in such cases. The scheduling of instructions makes debugging difficult. It provides the fastest and most accurate method for mariners to navigate, measure speed, and determines location. This system enables increased levels of safety and efficiency. It ensures whether the ship reaches its destination safely. The accurate position information becomes even more critical as the vessel departs from or arrives in port. The disadvantage here is that border alert is intimated only for the fisherman, but not to the control station. about the issues that occur due to opponent forces in ships to server. This can act as an incident management application to avoid conflicts at varying situations. The disadvantage here is that border alert is intimated only for the fisherman, but not to the control station. The device would also warns the fisherman (beep and vibrate) when they approach near the national sea border and controls them to trawl (go fishing) within the correct region safely.

3.3 SYSTEM USE CASE :

Now, S1 and S2 are substituted in above equation of line.

Here two cases are possible:

Case 1: If $LHS < RHS$, then vessel is inside country border.

When vessel is inside country's border, the Microcontroller gets the input from GPS receiver after a short Delay loop. Latitude and longitude is extracted and manipulation with the new locations is done in the algorithm.

Case 2: If $LHS > RHS$, then vessel has crossed border.

When vessel crosses border, an alarm is Generated immediately. Along with alarm a signal is also sent. To GSM module for transmission of message to desired sender. Alarm continues until the vessel comes back inside the country's border.

The data received contains many details along with latitude and longitude. The current positions are compared with already stored latitude and longitude of countries boundary locations. At first the latitude is compared with stored latitude which identifies if the current position is located near to the boundary. If the latitude matches then the adjacent latitudes and longitudes of the present latitude is retrieved from the current position received from S21(latitude) and S2(longitude).

CHAPTER 4

DESCRIPTION OF PROPOSED SYSTEM

4.1 SELECTED METHODOLOGY OF PROCESSED MODEL

The GPS device will continuously give the signal which determines the latitude and longitude and indicates the position of fishermen to them. Then it gives the output which gets read and displayed in LCD. The global Positioning system (GPS) is a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites.

4.2 ARCHITECTURE/OVERALL DESIGN OF PROPOSED SYSTEM

Input to the controller is GPS receiver module. More specifically NEO-6M GPS receiver module. It has very powerful chip NEO-6M. This NEO-6M chip can track to the max of 22 satellites to identify the locations all over the world. This low power chip makes it as the most suitable for fisherman navigation system, as they have to be in ocean for even months and years. GPS receivers work based on the process called Trilateration. GPS receiver track the location by calculating how far it is from a number of satellites. These satellites send data about their location and the actual time as radio signals which will be captured by the GPS receiver to map the boat's location. This GPS receiver makes use of three least distant satellite information to figure out exact position of the ship. This entire process is called Trilateration. To facilitate the microcontroller to access the cloud for data storage, ESP8266 Wi-Fi module is used. This affordable Wi-Fi microchip is in-built SOC with TCP/IP protocol is being integrated. Thereby the GPS location data is uploaded in the IOT cloud for centralized data monitoring system.

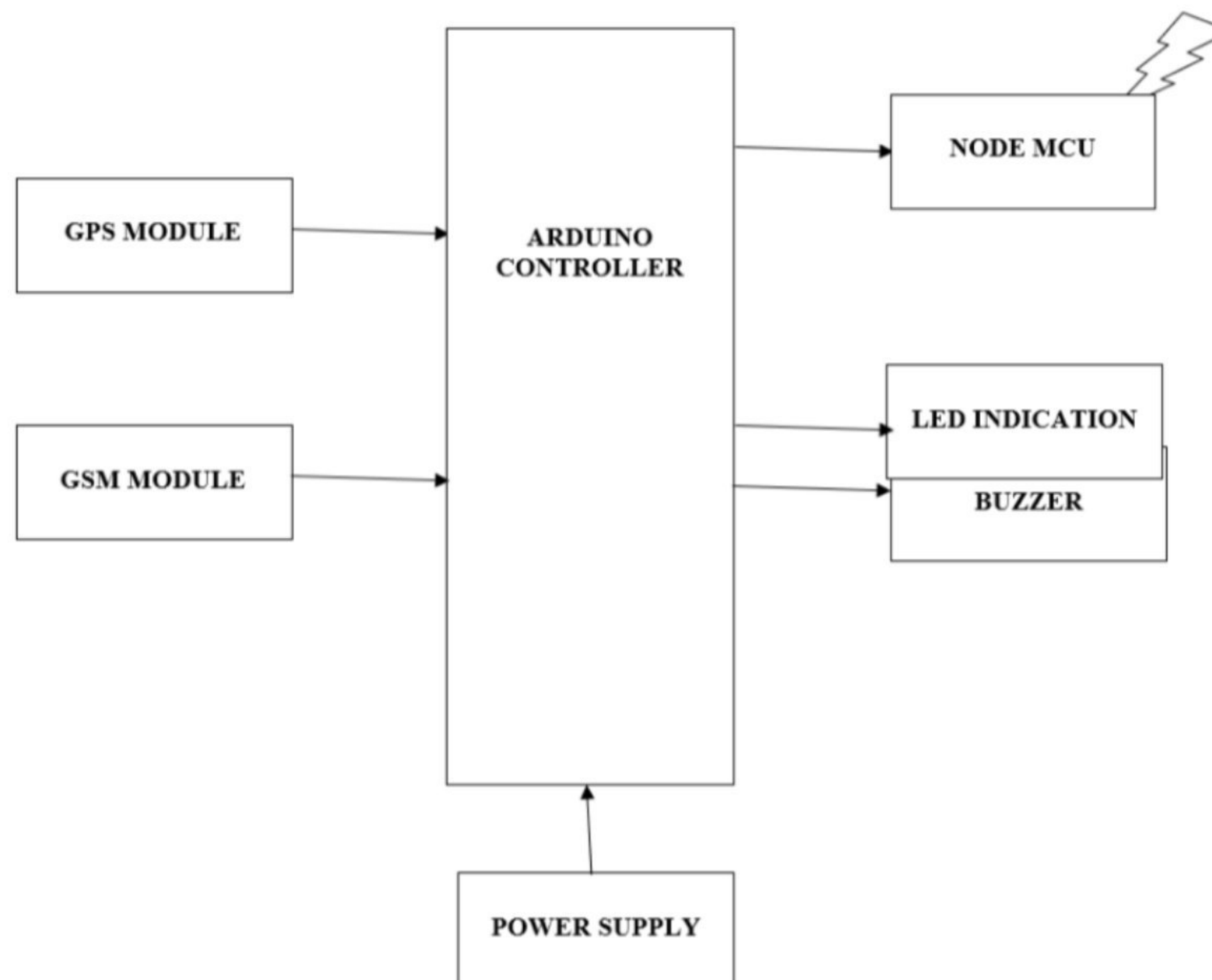


Fig 4.1 A rough diagram of block diagram

4.3 DESCRIPTION OF SOFTWARE FOR IMPLEMENTATION AND TESTING PLAN OF THE PROPOSED MODEL/SYSTEM

4.3.1 ARDUINO UNO

Arduino is an open source, computer hardware and software company, project, and user community that designs and manufactures Single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.



Fig 4.2Arduino UNO

Arduino is an open-source project that created microcontroller-based kits for building digital devices and interactive objects that can sense and control physical devices. The project is based on microcontroller board designs, produced by several vendors, using various microcontrollers. These systems provide sets of digital and analog input/output (I/O) pins that can interface to various expansion boards (termed shields) and other circuits. The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on a programming language named Processing, which also supports the languages C and C++. Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter. Arduino Uno has a number of facilities for communicating with a computer, another Arduino board, or other microcontrollers.

FEATURES

- Microcontroller: ATmega328P
- Operating voltage: 5V
- Input voltage: 7-12V
- Flash memory: 32KB
- SRAM: 2KB
- EEPROM: 1KB

APPLICATIONS

- Real time biometrics
- Robotic applications
- Academic applications

Atmega328 Ic

The ATmega328 is a single-chip microcontroller created by Atmel in the mega AVR family. The Atmel 8-bit AVR RISC-based microcontroller combines 32 kB ISP flash memory with read-while-write capabilities, 1 kB EEPROM, 2 kB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device achieves throughput approaching 1 MIPS per MHz.



Fig 4.3 ATmega328P IC

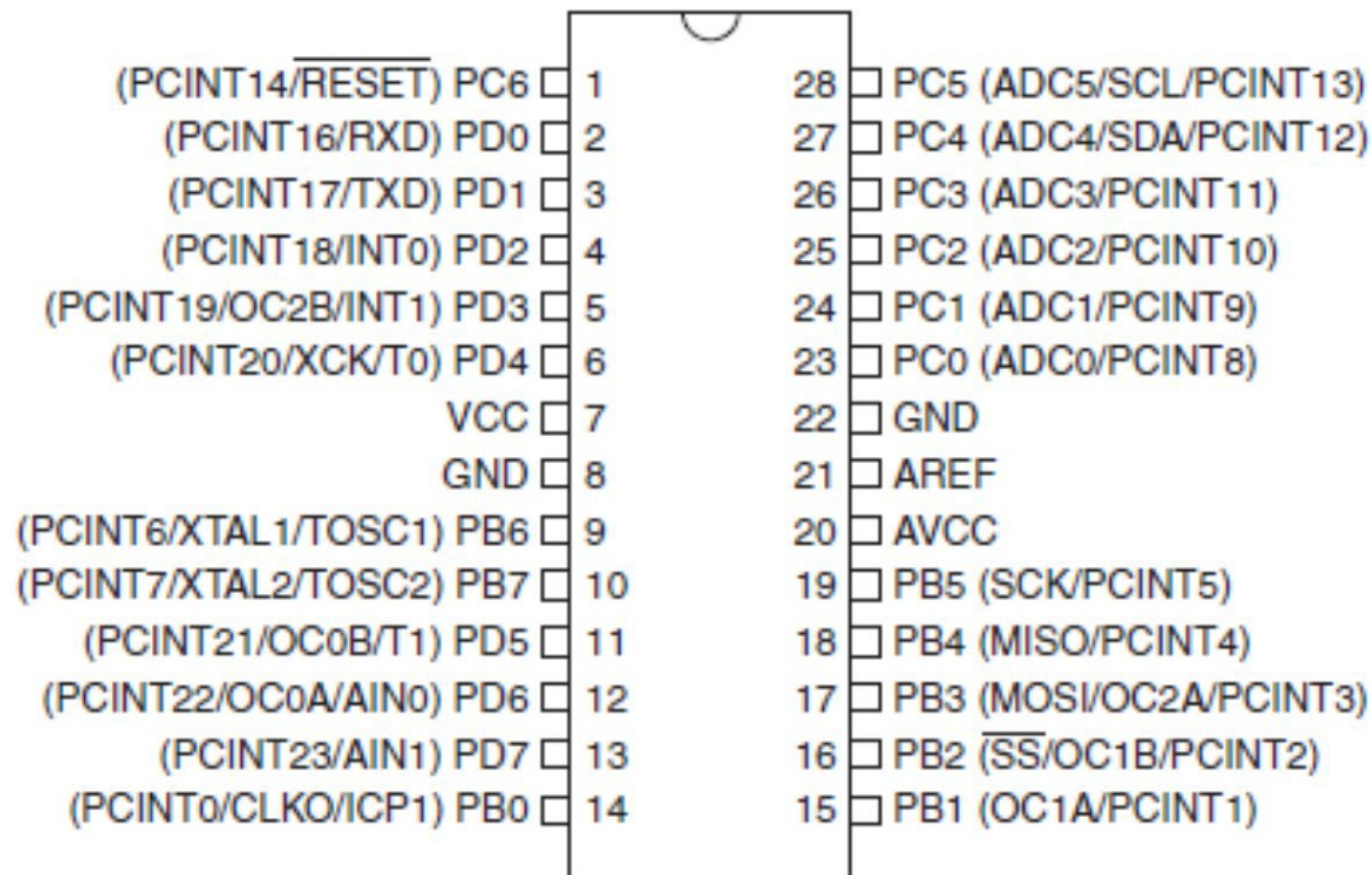
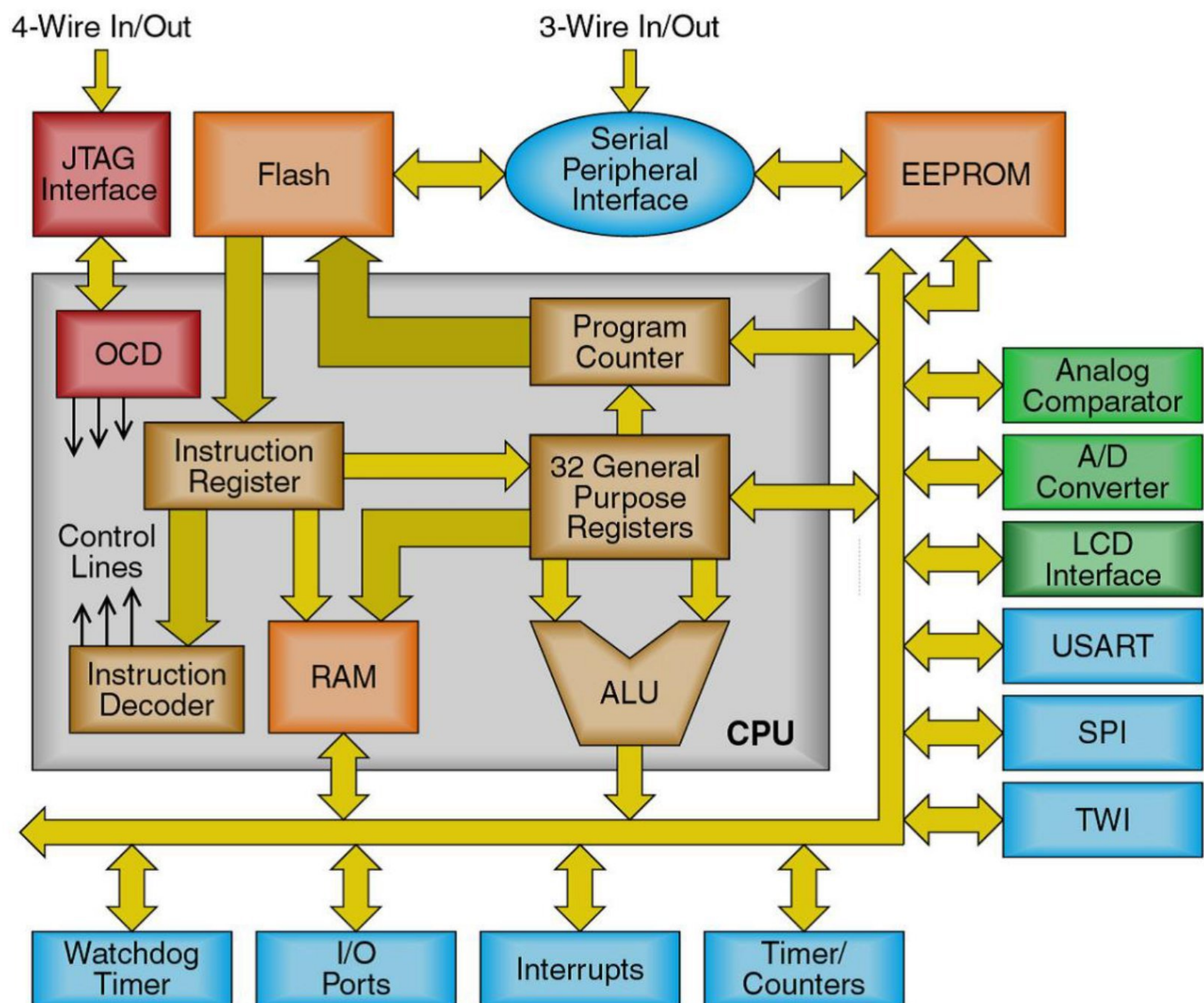


Fig 4.4 Pin Diagram

- High Performance, Low Power Atmel®AVR® 8-Bit Microcontroller Family
- Advanced RISC Architecture
- 131 Powerful Instructions
- Most Single Clock Cycle Execution
- 32 x 8 General Purpose Working Registers
- Fully Static Operation
- Up to 20 MIPS Throughput at 20MHz
- On-chip 2-cycle Multiplier
- High Endurance Non-volatile Memory Segments
 - 4/8/16/32KBytes of In-System Self-Programmable Flash program memory
 - 256/512/512/1KBytes EEPROM
 - 512/1K/1K/2KBytes Internal SRAM
 - Write/Erase Cycles: 10,000 Flash/100,000 EEPROM C(1)°C/100 years at 25°–Data retention: 20 years at 85
 - Optional Boot Code Section with Independent Lock Bits In-System Programming by On-chip Boot Program
 - True Read-While-Write Operation

- Programming Lock for Software Security Atmel® QTouch® library support
- Capacitive touch buttons, sliders and wheels—QTouch and QMatrix® acquisition
- Up to 64 sense channels
- Peripheral Features
 - Two 8-bit Timer/Counters with Separate Prescaler and Compare Mode
 - One 16-bit Timer/Counter with Separate Prescaler, Compare Mode, and Capture Mode
 - Real Time Counter with Separate Oscillator
 - Six PWM Channels
 - 8-channel 10-bit ADC in TQFP and QFN/MLF package
 - Temperature Measurement
 - 6-channel 10-bit ADC in PDIP Package
 - Temperature Measurement
 - Programmable Serial USART—Master/Slave SPI Serial Interface
 - Byte-oriented 2-wire Serial Interface (Philips I2 C compatible)
 - Programmable Watchdog Timer with Separate On-chip Oscillator
 - On-chip Analog Comparator
 - Interrupt and Wake-up on Pin Change



4.5. Architecture Diagram

4.3.2 SPECIAL MICROCONTROLLER FEATURES

- Power-on Reset and Programmable Brown-out Detection
- Internal Calibrated Oscillator
- External and Internal Interrupt Sources
- Six Sleep Modes: Idle, ADC Noise Reduction, Power-save, Power-down, Standby, and Extended Standby
- I/O and Packages
- 23 Programmable I/O Lines
- 28-pin PDIP, 32-lead TQFP, 28-pad QFN/MLF and 32-pad QFN/MLF

Operating Voltage: 1.8 - 5.5V

Temperature Range: -40 °C to 85°

Speed Grade: 0 - 4MHz@ 1.8 - 5.5V, 0 - 10MHz@ 2.7 - 5.5V, 0 - 20MHz @ 4.5 - 5.5V °C

Power Consumption at 1MHz, 1.8V, 25

Active Mode: 0.2Ma

Power-down Mode: 0.1 μ A

Power-save Mode: 0.75 μ A (Including 32kHz RTC)

PIN DISCRIPTION

VCC Digital supply voltage

GND Ground.

Port B (PB7:0) XTAL1/XTAL2/TOSC1/TOSC2

Port B is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port B output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port B pins that are externally pulled low will source current if the pull-up resistors are activated. The Port B pins are tri-stated when a reset condition becomes active, even if the clock is not running. Depending on the clock selection fuse settings, PB6 can be used as input to the inverting Oscillator amplifier and input to the internal clock operating circuit. Depending on the clock selection fuse settings, PB7 can be used as output from the inverting Oscillator amplifier. If the Internal Calibrated RC Oscillator is used as chip clock source, PB7..6 is used as TOSC2..1 input for the Asynchronous Timer/Counter2 if the AS2 bit in ASSR is set.

Port C (PC5:0)

Port C is a 7-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The PC5 0 output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port C pins that are externally pulled low will source current if the pull-up resistors are activated. The Port C pins are tri-stated when a reset condition becomes active, even if the clock is not running.

PC6/RESET

If the RSTDISBL Fuse is programmed, PC6 is used as an I/O pin. Note that the electrical characteristics of PC6 differ from those of the other pins of Port C. If the RSTDISBL Fuse is unprogrammed, PC6 is used as a Reset input. A low level on this pin for longer than the minimum pulse length will generate a Reset, even if the clock is not running. The minimum pulse length is given in Table 28-3 on page 308. Shorter pulses are not guaranteed to generate a Reset.

Port D (PD7:0)

Port D is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port D output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port D pins that are externally pulled low will source current if the pull-up resistors are activated. The Port D pins are tri-stated when a reset condition becomes active, even if the clock is not running.

AVCC

AVCC is the supply voltage pin for the A/D Converter, PC3:0, and ADC7:6. It should be externally connected to VCC, even if the ADC is not used. If the ADC is used, it should be connected to VCC through a low-pass filter. Note that PC6..4 use digital supply voltage, VCC

AREF

AREF is the analog reference pin for the A/D Converter

ADC7:6 (TQFP and QFN/MLF Package Only)

In the TQFP and QFN/MLF package, ADC7:6 serve as analog inputs to the A/D converter. These pins are powered from the analog supply and serve as 10-bit ADC channels.

ANALOG PORTS

In electronics, an analog-to-digital converter (ADC, A/D, A–D, or A-to-D) is a system that converts an analog signal, such as a sound picked up by a microphone or light entering a digital camera, into a digital signal. An ADC may also provide an isolated measurement such as an electronic device that converts an input analog voltage or current to a digital number proportional to the magnitude of the voltage or current. In an embedded system, A/D conversion is very important as embedded systems deal with digital values; their surroundings usually occupy various analog signals. Analog signals need to be altered into digital before being treated by the microcontroller. At present, we can observe how to read an external analog signal using PIC microcontroller and exhibit the digital o/p conversion on an LCD display. The i/p signal can be a varying voltage between 0 to 5v.

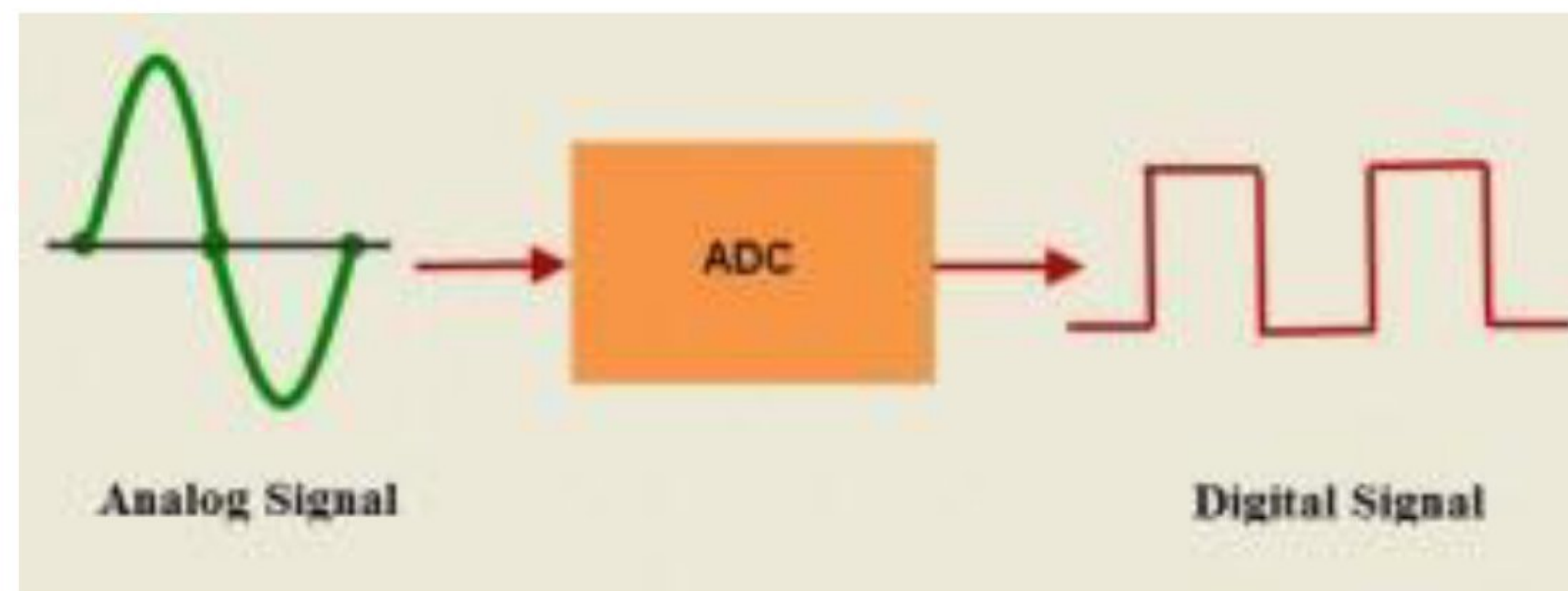


Fig 4.6 ADC Conversion

The Arduino UNO board has five analog input pins A0 through A5. These pins can read the signal from an analog sensor like the humidity sensor or temperature sensor and convert it into a digital value that can be read by the microprocessor. In the world of Arduino an Analog signal is simply a signal that can be HIGH (on), LOW (off) or anything in between these two states. This means an Analog signal has a voltage value that can be anything between 0V and 5V (unless you mess with the Analog Reference pin). Analog allows you to send output or receive input about devices that run at percentages as well as on and off. The Arduino does this by sampling the voltage signal sent to these pins and comparing it to a voltage reference signal (5V). Depending on the voltage of the Analog signal when compared to the Analog Reference signal the Arduino then assigns a numerical value to the signal somewhere between 0 (0%) and 1023 (100%). The digital system of the Arduino can then use this number in calculations and sketches.

PWM PIN'S

PWM stands for Pulse Width Modulation, which in itself is not very useful if you don't know what modulation is. In the electronics world, modulation is the technique of superimposing information on a high speed signal or carrier.

Verage wattage a number of APV's use pulse width to regulate power down below the battery's supplied voltage, since most lipo packs and all 18650 style batteries output 3.7 volts at a nominal charge level. ... DC-DC is a flat signal.

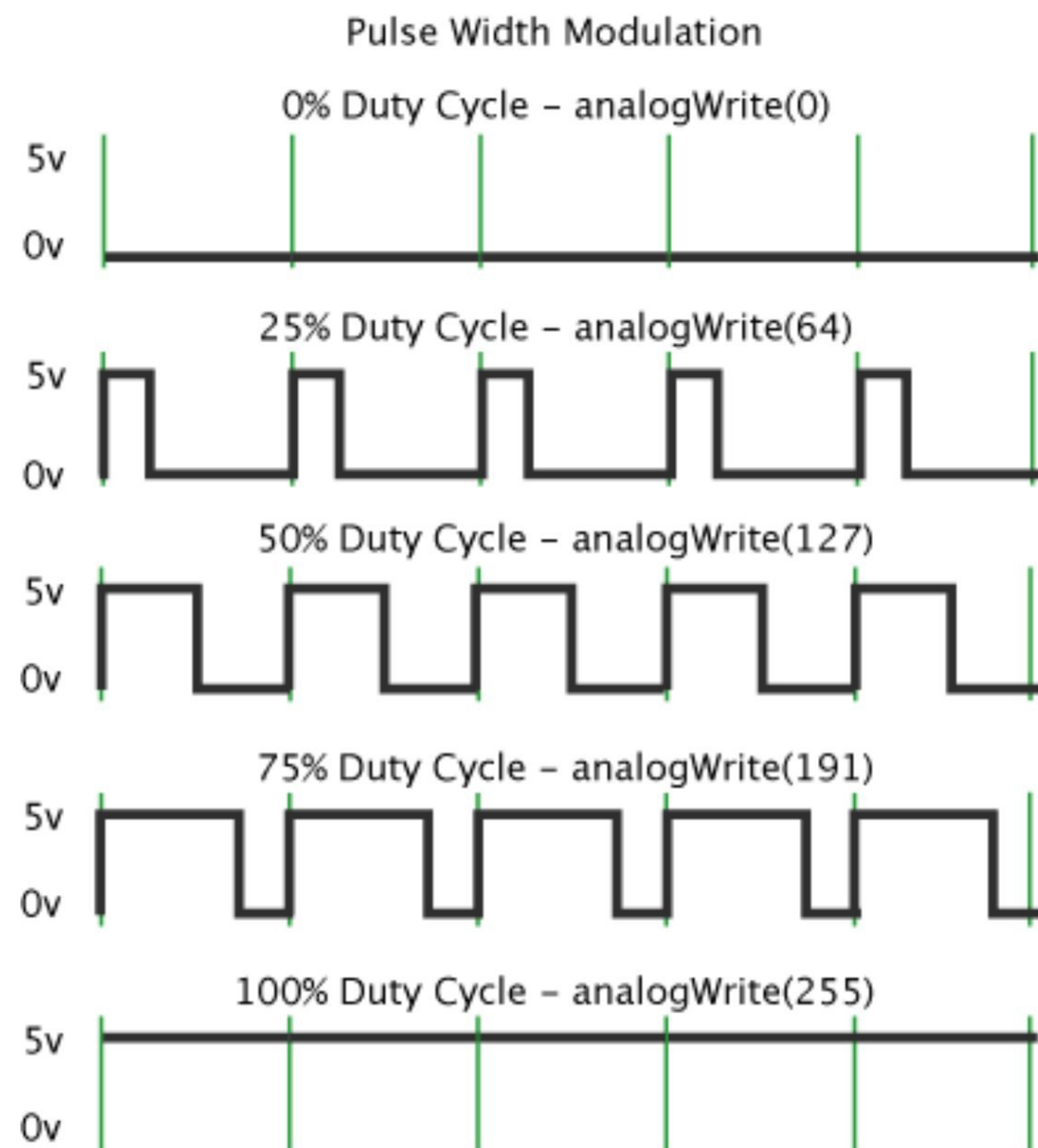


Fig 4.7 PWM Pins

Pulse width modulation (PWM) is a fancy term for describing a type of digital signal. Pulse width modulation is used in a variety of applications including sophisticated control circuitry. A common way we use them here at SparkFun is to control dimming of RGB LEDs or to control the direction of a servo motor.

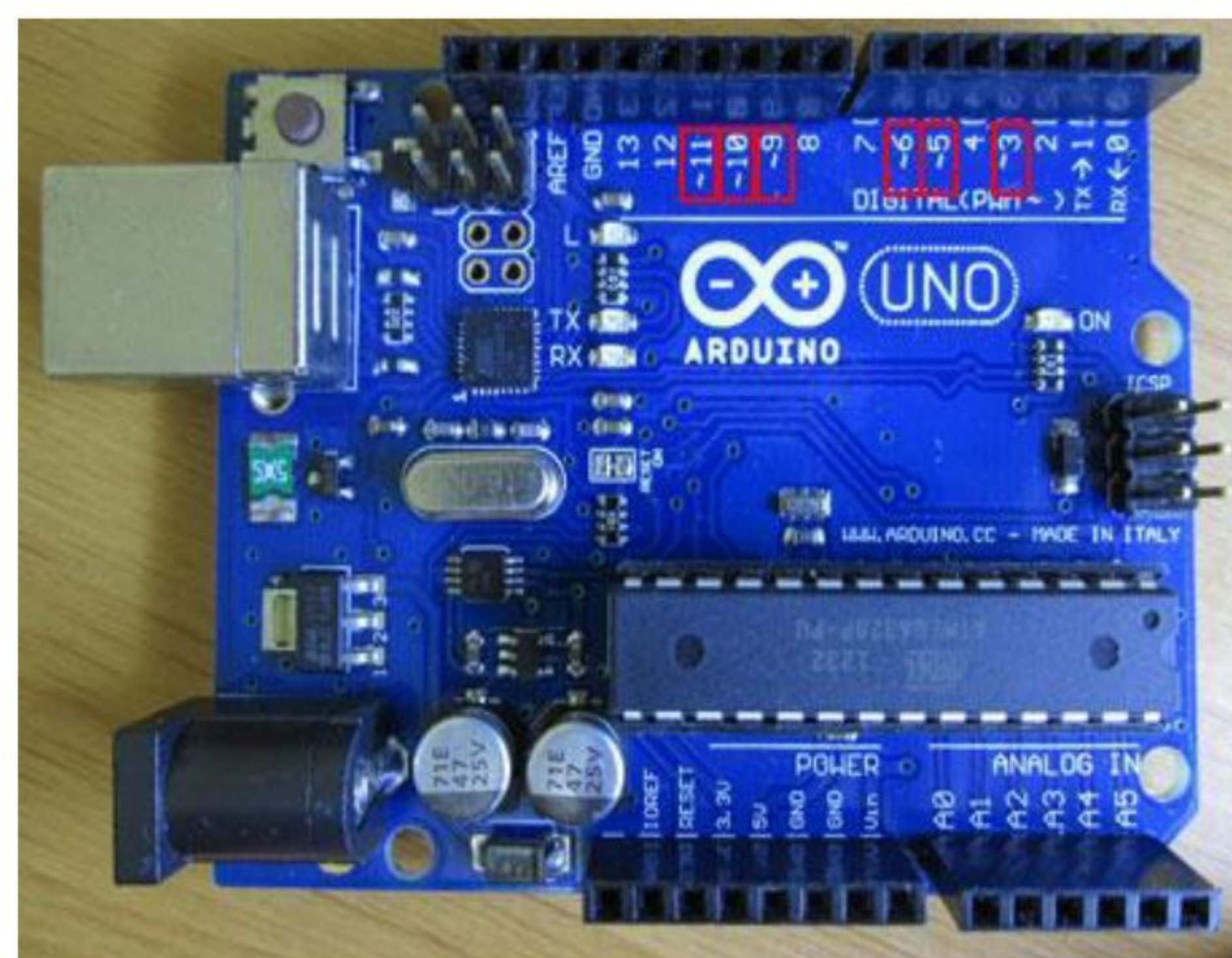


Fig 4.8 Pulse width Modulation

4.3.3 PWM PIN'S ARDUINO

Pulse Width Modulation, or PWM, is a technique for getting analog results with digital means. Digital control is used to create a square wave, a signal switched between on and off. This on-off pattern can simulate voltages in between full on (5 Volts) and off (0 Volts) by changing the portion of the time the signal spends on versus the time that the signal spends off. The duration of "on time" is called the pulse width. To get varying analog values, you change, or modulate, that pulse width. If you repeat this on-off pattern fast enough with an LED for example, the result is as if the signal is a steady voltage between 0 and 5v controlling the brightness of the LED. In the graphic below, the green lines represent a regular time period. This duration or period is the inverse of the PWM frequency. In other words, with Arduino's PWM frequency at about 500Hz, the green lines would measure 2 milliseconds each. A call to `analogWrite()` is on a scale of 0 - 255, such that `analogWrite(255)` requests a 100% duty cycle (always on), and `analogWrite(127)` is a 50% duty cycle (on half the time) for example.

4.3.4 REGULATOR

A voltage regulator is designed to automatically maintain a constant voltage level. A voltage regulator may be a simple "feed-forward" design or may include negative feedback control loops. It may use an electromechanical mechanism, or electronic components. This series of fixed-voltage integrated-circuit voltage regulators is designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. Each of these regulators can



Fig 4.9 Regulator

4.3.5 RESET BUTTON

The first circuit pulls the RESET pin low to enable the chip. The second circuit is the same, but with a reset button. If you press that, the chip will get reset. When the 5V power is switched on, the capacitor shorts to 5V, and then gradually the RC circuit discharges to bring the reset pin to 0.

A power-on reset (PoR) generator is a microcontroller or microprocessor peripheral that generates a reset signal when power is applied to the device. It ensures that the device starts operating in a known state.

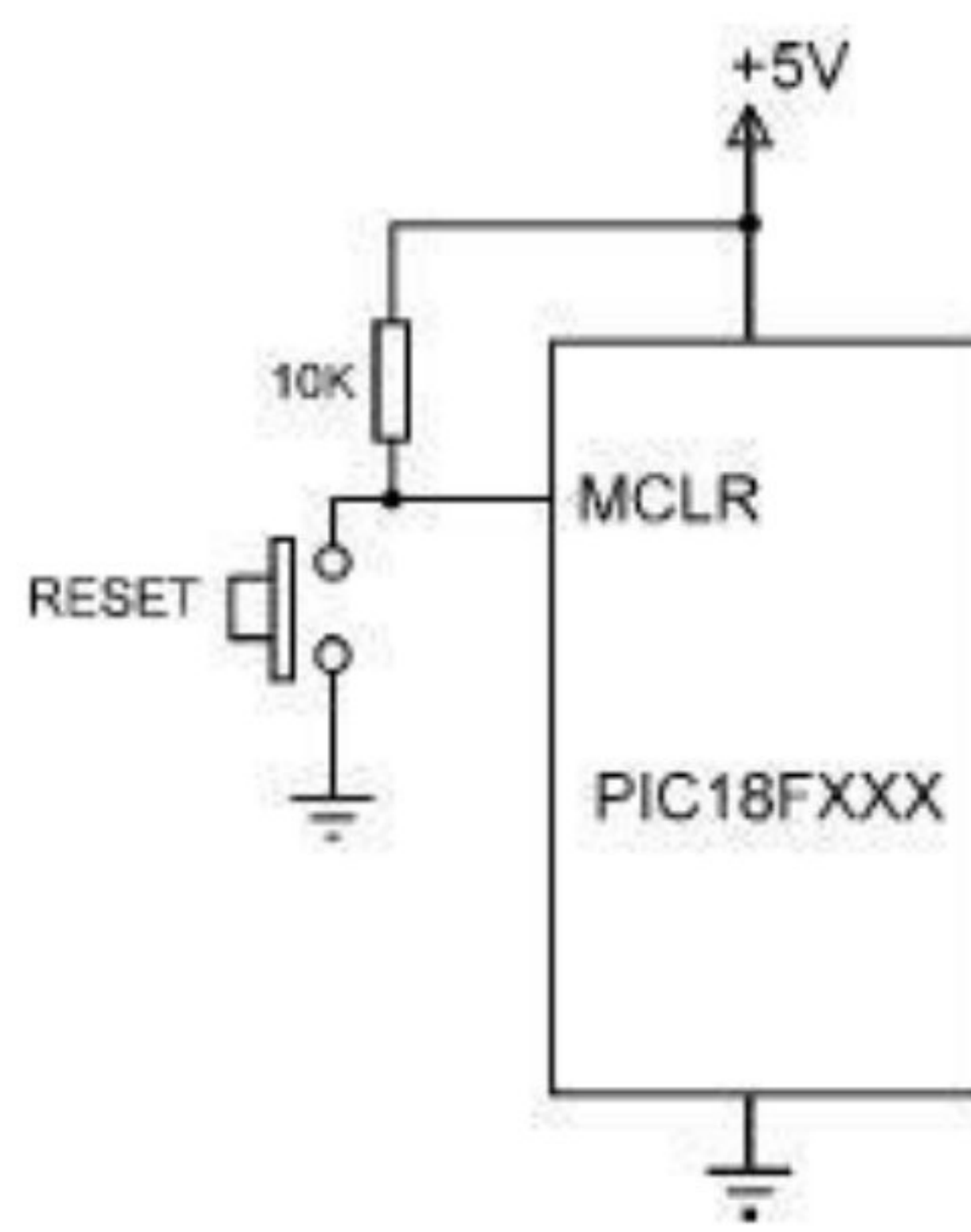


fig.4.10 circuit diagram for reset button connect with controller

A power-on reset (PoR) is a circuit that provides a predictable, regulated voltage to a microprocessor or microcontroller with the initial application of power. A PoR system can be a peripheral, but in sophisticated processors or controllers the PoR is integrated on the main chip.

4.3.6 UART COMMUNICATION PORT

A universal asynchronous receiver/transmitter (UART) is a block of circuitry responsible for implementing serial communication. Essentially, the UART acts as an intermediary between parallel and serial interfaces.

A universal asynchronous receiver/transmitter (UART /'ju:ɑ:rt/), is a computer hardware device for asynchronous serial communication in which the data format and transmission speeds are configurable. ... UARTs are commonly used in conjunction with communication standards such as TIA (formerly EIA) RS-232, RS-422 or RS-485.

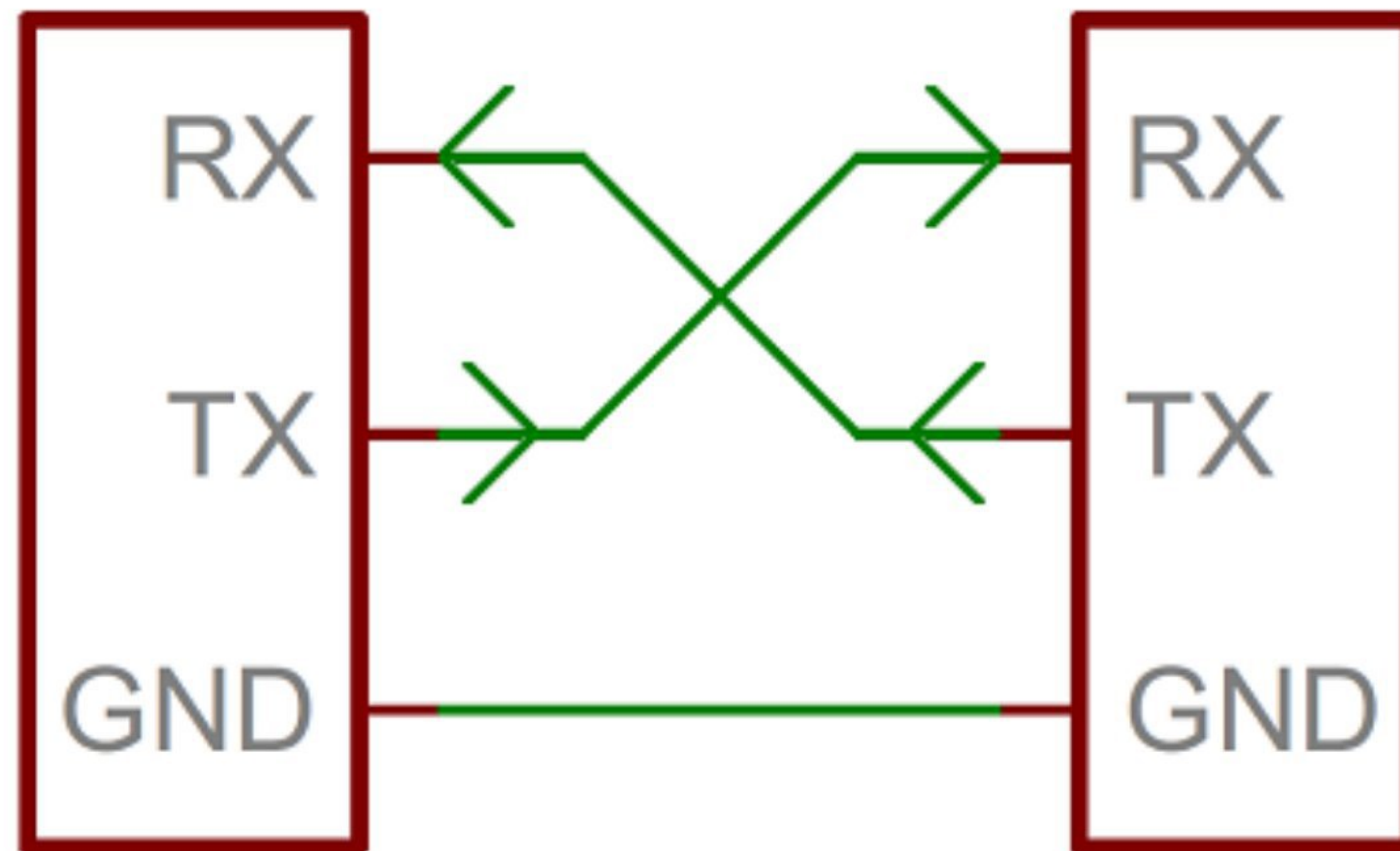


Fig 4.11 Uart Communication

The UART that is going to transmit data receives the data from a data bus. The data bus is used to send data to the UART by another device like a CPU, memory, or microcontroller. Data is transferred from the data bus to the transmitting UART in parallel form. After the transmitting UART gets the parallel data from the data bus, it adds a start bit, a parity bit, and a stop bit, creating the data packet. Next, the data packet is output serially, bit by bit at the Tx pin. The receiving UART reads the data packet bit by bit at its Rx pin. The receiving UART then converts the data back into parallel form and removes the start bit, parity bit, and stop bits. Finally, the receiving UART transfers the data packet in parallel to the data bus on the receiving end.

START BIT

The UART data transmission line is normally held at a high voltage level when it's not transmitting data. To start the transfer of data, the transmitting UART pulls the transmission line from high to low for one clock cycle. When the receiving UART detects the high to low voltage transition, it begins reading the bits in the data frame at the frequency of the baud rate.

DATA FRAM

The data frame contains the actual data being transferred. It can be 5 bits up to 8 bits long if a parity bit is used. If no parity bit is used, the data frame can be 9 bits long. In most cases, the data is sent with the least significant bit first.

PARITY

Parity describes the evenness or oddness of a number. The parity bit is a way for the receiving UART to tell if any data has changed during transmission. Bits can be changed by electromagnetic radiation, mismatched baud rates, or long distance data transfers. After

the receiving UART reads the data frame, it counts the number of bits with a value of 1 and checks if the total is an even or odd number. If the parity bit is a 0 (even parity), the 1 bits in the data frame should total to an even number. If the parity bit is a 1 (odd parity), the 1 bits in the data frame should total to an odd number. When the parity bit matches the data, the UART knows that the transmission was free of errors. But if the parity bit is a 0, and the total is odd; or the parity bit is a 1, and the total is even, the UART knows that bits in the data frame have changed.

STOP BITS

To signal the end of the data packet, the sending UART drives the data transmission line from a low voltage to a high voltage for at least two bit durations.

ADVANTAGES

- Only uses two wires
- No clock signal is necessary
- Has a parity bit to allow for error checking
- The structure of the data packet can be changed as long as both sides are set up for it
- Well documented and widely used method

DISADVANTAGES

- The size of the data frame is limited to a maximum of 9 bits
- Doesn't support multiple slave or multiple master systems
- The baud rates of each UART must be within 10% of each other
- Continue on to part three of this series, Basics of the I2C Communication Protocol to learn about another way electronic devices communicate. Or if you haven't already, check out part one, Basics of the SPI Communication Protocol.

4.3.7 NODE MCU ESP32

ESP32 is a single 2.4 GHz Wi-Fi-and-Bluetooth combo chip designed with the TSMC ultra-low-power 40 nm technology. It is designed to achieve the best power and RF performance, showing robustness, versatility and reliability in a wide variety of applications and power scenarios. The ESP32 series of chips includes ESP32-D0WD-V3, ESP32-D0WDQ6-V3, ESP32-D0WD, ESP32-D0WDQ6, ESP32-D2WD, ESP32-S0WD, and ESP32-U4WDH, among which, ESP32-D0WD-V3, ESP32-D0WDQ6-V3, and ESP32-U4WDH are based on ECO V3 wafer.

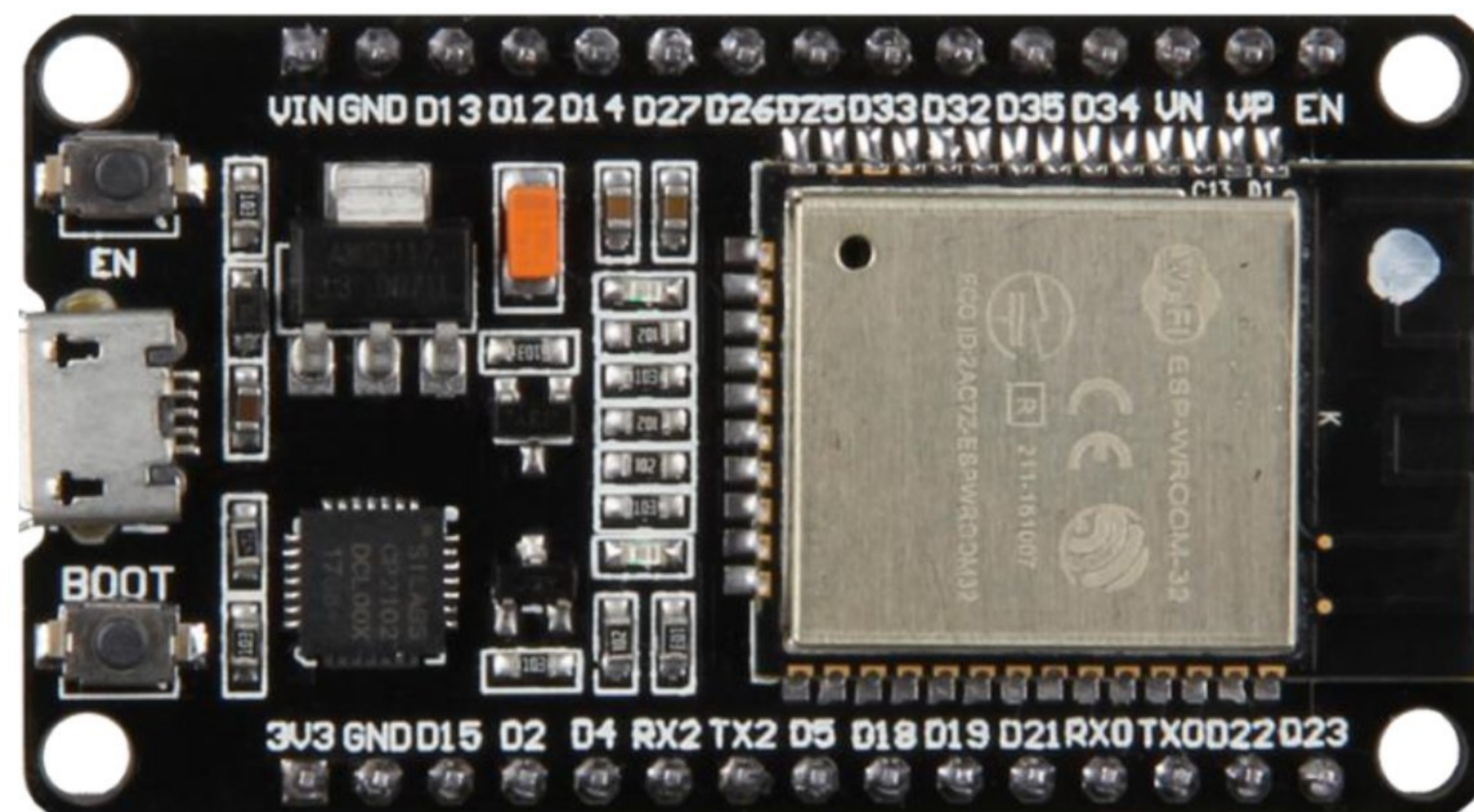


Fig 4.12 Node MCU ESP32

4.3.8 GPS MODULE

The Global Positioning System (GPS), originally Navstar GPS, is a space-based radio navigation system owned by the United States government and operated by the United States Air Force. It is a global navigation satellite system that provides geo location and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. The GPS system does not require the user to transmit any data, and it operates independently of any telephonic or internet reception, though these technologies can enhance the usefulness of the GPS positioning information. The GPS system provides critical positioning capabilities to military, civil, and commercial users around the world. The United States government created the system, maintains it, and makes it freely accessible to anyone with a GPS receiver.



Fig 4.13 Gps Module

The Global Positioning System (GPS) is a global navigation satellite system that provides location and time information in all weather conditions. The GPS operates independently of any telephonic or internet reception, though these technologies can enhance the usefulness of the GPS positioning information. GPS satellites transmit signal information to earth. This signal information is received by the GPS receiver in order to measure the user's correct position. The GPS concept is based on time and the known position of specialized satellites. GPS satellites continuously transmit their current time and position. A GPS receiver monitors multiple satellites and solves equations to determine the precise position of the receiver and its deviation from true time. At a minimum, four satellites must be in view of the receiver for it to compute four unknown quantities. Each GPS satellite continually broadcasts a signal (carrier wave with modulation) that includes a pseudorandom code (sequence of ones and zeros) that is known to the receiver and a message that includes the time of transmission (TOT) of the code epoch and the satellite position at that time.

FEATURES

- Supply voltage: 12v DC
- Interface: UART RS232
- Optional T-TL uart also available
- Precision: 5 meters
- Automatic antenna switching function

APPLICATIONS

- GPS trackers
- Automated vehicle
- Robotics
- Fleet tracking

4.3.9 GSM Modem

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. This tutorial will explain how to interface a GSM modem with Toradex modules.



Fig 4.14 Gsm Modem

SIMCom Wireless Solutions is a subsidiary of SIM Technology Group Ltd (stock code: 2000. H.K). It is a fast-growing wireless M2M company, designing and offering a variety of wireless modules based on GSM/GPRS/EDGE, WCDMA/HSDPA and TD-SCDMA technical platforms. By partnering with third parties, SIMCom Wireless provides customized design solutions in M2M, WLL, Mobile Computing, GPS and other applications. SIMCom Wireless also provides ODM services for customers. According to ABI Insight report, SIMCom Cellular Module was number two provider of wireless modules worldwide in 2008 with 20% acquisition of global market share. This GSM Modem can accept any GSM network act as SIM card and just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. The SIM900A is a complete Dual-band GSM/GPRS solution in a SMT module featuring an industry-standard interface; the SIM800 delivers GSM/GPRS 900/1800MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption. With a tiny configuration of 24mm x 24mm x 3 mm, SIM800 can fit almost all the space requirements in your applications, especially for slim and compact demand of design.

FEATURES

- High Quality Product
- RS232 interface @ RMC Connector for direct communication with computer or MCU kit
- Configurable baud rate

- SMA connector with GSM Antenna.
- SIM Card holder.
- Built in Network Status LED
- Inbuilt Powerful TCP/IP protocol stack for internet data transfer over GPRS.
- Audio interface Connector
- Normal operation temperature: -20 °C to +55 °C
- Input Voltage: 4.5V-12V DC

APPLICATIONS

- Short Message Service(SMS)
- Internet
- Incoming /outgoing calls

4.3.10 LIGHT EMITTING DIODE

A light-emitting diode (LED) is a two-lead semiconductor light source. It is a p–n junction diode that emits light when activated. When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electroluminescence, and the color of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor. LEDs are typically small (less than 1 mm²) and integrated optical components may be used to shape the radiation pattern.



Fig 4.15. LIGHT EMITTING DIODE

Appearing as practical electronic components in 1962, the earliest LEDs emitted low-intensity infrared light. Infrared LEDs are still frequently used as transmitting elements in

remote-control circuits, such as those in remote controls for a wide variety of consumer electronics. The first visible-light LEDs were also of low intensity and limited to red. Modern LEDs are available across the visible, ultraviolet, and infrared wavelengths, with very high brightness. Early LEDs were often used as indicator lamps for electronic devices, replacing small incandescent bulbs. They were soon packaged into numeric readouts in the form of seven-segment displays and were commonly seen in digital clocks. Recent developments have produced LEDs suitable for environmental and task lighting. LEDs have led to new displays and sensors, while their high switching rates are useful in advanced communications technology.

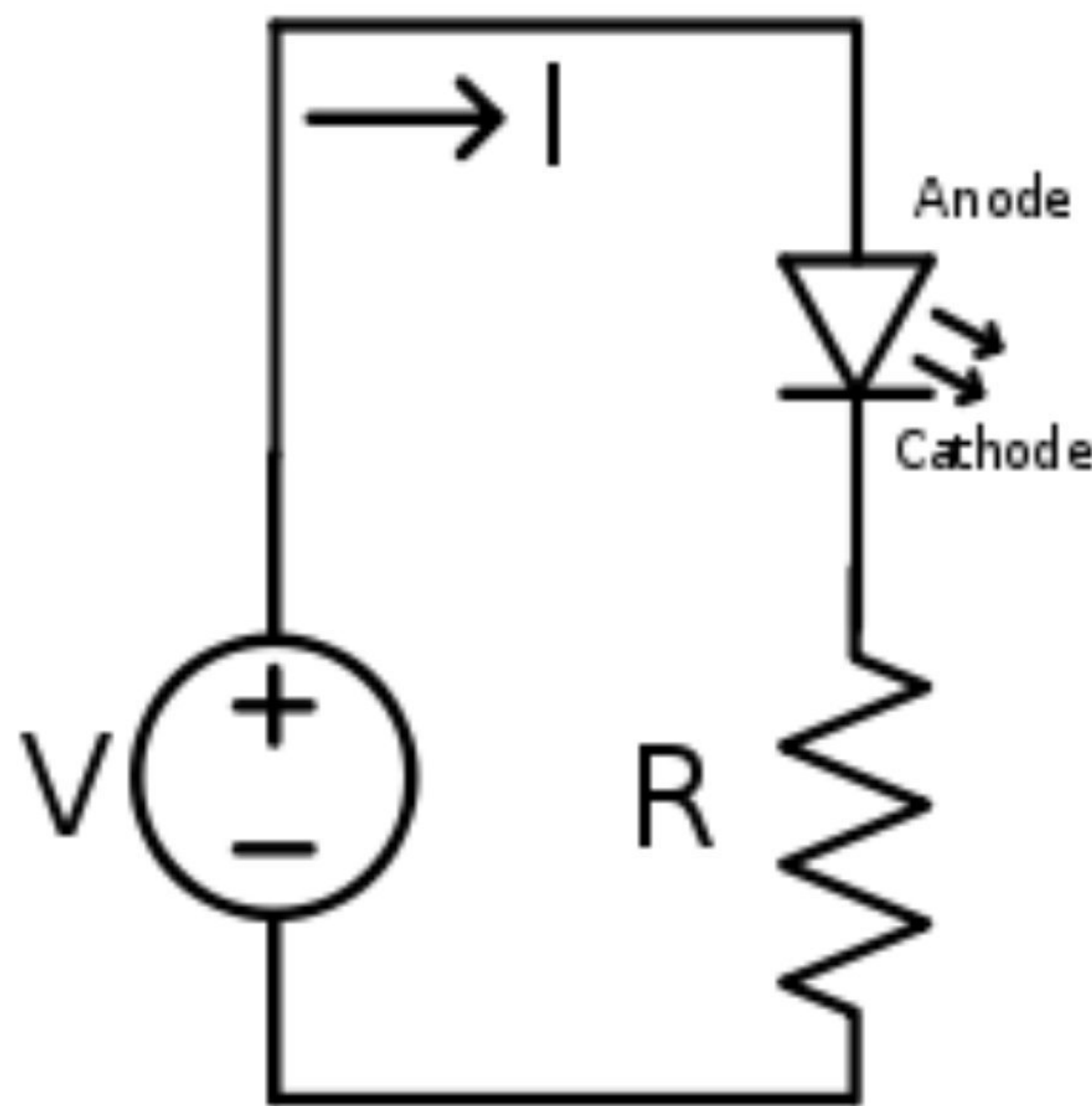


Fig 4.16 CIRCUIT DIAGRAM

A light-emitting diode (LED) is a semiconductor device that emits visible light when an electric current passes through it. The light is not particularly bright, but in most LEDs it is monochromatic, occurring at a single wavelength. The output from an LED can range from red (at a wavelength of approximately 700 nanometers) to blue-violet (about 400 nanometers). Some LEDs emit infrared (IR) energy (830 nanometers or longer); such a device is known as an infrared-emitting diode (IRED).

FEATURES

- Energy Efficiency.
- Environmentally Friendly.

- Maintenance and safety.

APPLICATIONS

- Retail and office.
- Industrial.
- Healthcare.
- Street Lighting.

4.3.11 BUZZER

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or key stroke. Buzzer is an integrated structure of electronic transducers, DC power supply, widely used in computers, printers, copiers, alarms, electronic toys, automotive electronic equipment, telephones, timers and other electronic products for sound devices. Active buzzer 5V Rated power can be directly connected to a continuous sound, this section dedicated sensor expansion module and the board in combination, can complete a simple circuit design, to "plug and play."



Fig 4.17 Buzzer

4.3.12 ARDUINO IDE

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .ino. The editor has features

for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom righthand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor. Before uploading your sketch, you need to select the correct items from the Tools > Board and Tools > Port menus. The boards are described below. On the Mac, the serial port is probably something like /dev/tty.usbmodem241 (for an Uno or Mega2560 or Leonardo) or /dev/tty.usbserial-1B1 (for a Duemilanove or earlier USB board), or /dev/tty.USA19QW1b1P1.1 (for a serial board connected with a Keyspan USB-to-Serial adapter). On Windows, it's probably COM1 or COM2 (for a serial board) or COM4, COM5, COM7, or higher (for a USB board) - to find out, you look for USB serial device in the ports section of the Windows Device Manager. On Linux, it should be /dev/ttyACMx , /dev/ttyUSBx or similar. Once you've selected the correct serial port and board, press the upload button in the toolbar or select the Upload item from the Sketch menu. Current Arduino boards will reset automatically and begin the upload. With older boards (pre-Diecimila) that lack auto-reset, you'll need to press the reset button on the board just before starting the upload. On most boards, you'll see the RX and TX LEDs blink as the sketch is uploaded. The Arduino Software (IDE) will display a message when the upload is complete, or show an error. When you upload a sketch, you're using the Arduino bootloader, a small program that has been loaded on to the microcontroller on your board. It allows you to upload code without using any additional hardware. The bootloader is active for a few seconds when the board resets; then it starts whichever sketch was most recently uploaded to the microcontroller. The bootloader will blink the on-board (pin 13) LED when it starts (i.e. when the board resets).

4.3.13 PROGRAMMING LANGUAGE

Embedded C is a set of language extensions for the C programming language by the C Standards Committee to address commonality issues that exist between C extensions for different embedded systems. Embedded C is a set of language extensions for the C programming language by the C Standards Committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations. An embedded system is a computer system with a

dedicated function within a larger mechanical or electrical system, often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. Embedded systems control many devices in common use today. Ninety-eight percent of all microprocessors are manufactured as components of embedded systems. Examples of properties of typical embedded computers when compared with general-purpose counterparts are low power consumption, small size, rugged operating ranges, and low per-unit cost. This comes at the price of limited processing resources, which make them significantly more difficult to program and to interact with. However, by building intelligence mechanisms on top of the hardware, taking advantage of possible existing sensors and the existence of a network of embedded units, one can both optimally manage available resources at the unit and network levels as well as provide augmented functions, well beyond those available. For example, intelligent techniques can be designed to manage power consumption of embedded systems. Modern embedded systems are often based on microcontrollers (i.e. CPU's with integrated memory or peripheral interfaces), but ordinary microprocessors (using external chips for memory and peripheral interface circuits) are also common, especially in more-complex systems. In either case, the processor(s) used may be types ranging from general purpose to those specialized in certain class of computations, or even custom designed for the application at hand. A common standard class of dedicated processors is the digital signal processor (DSP). Since the embedded system is dedicated to specific tasks, design engineers can optimize it to reduce the size and cost of the product and increase the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale. Embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, and largely complex systems like hybrid vehicles, MRI, and avionics. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure.

CHAPTER 5

IMPLEMENTATION DETAILS

5.1 MODULES INVOLVED

- SENSOR INTERFACING
- PREPARING POWER SUPPLY UNIT
- MICRO-CONTROLLER PROGRAMMING
- READING ANALOG DATA
- TEST AND DEBUG
- SUBMISSION

5.1.1 SENSOR INTERFACING

Sensor interfacing is a mix of amplification, filtering, and other signal conditioning as well as analog-to-digital conversion. The analog-to-digital converter (ADC) may be in your microcontroller, but you will still need to make the sensor compatible with the ADC input.

5.1.2 PREPARING POWER SUPPLY UNIT

A power supply unit (or PSU) converts mains AC to low-voltage regulated DC power for the internal components of a controller. A power supply is used to reduce the mains electricity at 240 volts AC down to something more useable, say 12 volts DC. There are two types of power supply, linear and switch mode. A linear power supply uses a transformer to reduce the voltage. The AC signal is rectified and regulated to produce a high DC voltage. An AC adapter, AC/DC adapter, or AC/DC converter is a type of external power supply, often enclosed in a case similar to an AC plug. Adapters for battery-powered equipment may be described as chargers or rechargers (see also battery charger). AC adapters are used with electrical devices that require power but do not contain internal components to derive the required voltage and power from main power. The internal circuitry of an external power supply is very similar to the design that would be used for a built-in or internal supply.

5.1.3 MICRO-CONTROLLER PROGRAMMING

A microcontroller is a programmable IC, capable of multiple functions depending on how it's programmed. Many different kinds of microcontrollers exist that offer a wide range of functionality. The versatility of the microcontroller is what makes it one of the most powerful tools in modern design. This guide will explain the basics of microcontrollers and how they are programmed.

5.1.4 READING ANALOG DATA

The microcontroller of the board has a circuit inside called an analog-to-digital converter or ADC that reads this changing voltage and converts it to a number between 0 and 1023. When the shaft is turned all the way in one direction, there are 0 volts going to the pin, and the input value is 0. When the shaft is turned all the way in the opposite direction, there are 5 volts going to the pin and the input value is 1023. In between, `analog Read()` returns a number between 0 and 1023 that is proportional to the amount of voltage being applied to the pin.

5.1.5 TEST AND DEBUG

Testing means verifying correct behavior. Testing can be done at all stages of module development: requirements analysis, interface design, algorithm design, implementation, and integration with other modules. In the following, attention will be directed at implementation testing. Implementation testing is not restricted to execution testing. An implementation can also be tested using correctness proofs, code tracing, and peer reviews, as described below. Debugging is a cyclic activity involving execution testing and code correction. The testing that is done during debugging has a different aim than final module testing. Final module testing aims to demonstrate correctness, whereas testing during debugging is primarily aimed at locating errors. This difference has a significant effect on the choice of testing strategies.

CHAPTER 6

RESULT AND DISCUSSION

The project described involves the use of mobile SMS alerts and LED lights with buzzer sounds to notify fishermen before reaching the border. The purpose of this project is to enhance the safety of fishermen by providing them with early warnings of the border and preventing them from straying into restricted waters. When a fisherman approaches the border, a signal is sent to the base station using sensors installed in the water. The base station then sends an SMS alert to the fisherman's mobile phone, notifying them of their proximity to the border. Simultaneously, an LED light with a buzzer sound is triggered on the fishing boat to attract the attention of the fishermen and alert them to the approaching border. This system has several advantages over traditional warning methods, such as flags and beacons, which can be difficult to see at night or in poor weather conditions. The LED light and buzzer sound provide a clear and immediate warning, ensuring that the fishermen are aware of the approaching border and can take necessary precautions to avoid it. The system is also highly cost-effective as it uses simple technology and does not require any significant investment. Additionally, it can be easily installed on fishing boats and does not require any special training for fishermen to use it. In conclusion, this project provides an effective and affordable solution to enhance the safety of fishermen by providing them with early warnings of the border. The use of mobile SMS alerts and LED lights with buzzer sounds offers a reliable and immediate warning system, which can help to prevent accidents and save lives. This project is highly recommended for implementation in areas where fishermen operate near borders, especially at night or in poor weather conditions.

CHAPTER - 7

CONCLUSION AND FUTURE WORK

7.1 CONCLUSION

In conclusion, the alert system we have developed is an innovative and effective solution to enhance the safety of fishermen and prevent them from crossing national borders. This project has the potential to save many lives by reducing the number of accidents and fatalities caused by fishermen inadvertently crossing borders. The system is easy to install, operate, and maintain, making it a cost-effective solution for fishermen. The use of mobile SMS alerts, LED lights, and buzzer sounds provides clear and immediate warnings, ensuring that fishermen are aware of their proximity to the border and can take necessary precautions to avoid it. Moreover, the implementation of this project will contribute to the smooth relationship between two countries, as it reduces the number of incidents that can cause tensions between neighboring countries. By preventing fishermen from crossing borders, the Sri Lankan navy can focus on protecting the country's maritime borders and preventing illegal activities such as smuggling and piracy. Overall, the success of this project will lead to a decrease in the death rate of fishermen and an increase in their lifespan. It will also contribute to the development of the fishing industry by ensuring the safety of fishermen and their boats. Therefore, this project is highly recommended for implementation in areas where fishermen operate near borders, especially at night or in poor weather conditions.

7.2 FUTURE WORK

The future improvements of the alert system will focus on enhancing its accuracy, reliability, and user-friendliness. One potential improvement is the incorporation of artificial intelligence and machine learning algorithms to improve the system's ability to detect and classify different types of vessels and objects in the water, as well as to predict and prevent potential accidents or border crossings. Another area of development is the creation of a mobile application for remote monitoring and control. This app would allow fishermen and authorities to access real-time data on the location of fishing boats and receive alerts if they are approaching borders or restricted areas. The app could also provide additional features such as weather updates, navigation assistance, and emergency response. Data privacy and security will also be a key consideration in the future development of the system. The system will collect and store sensitive data such as the location and activity of fishing boats,

so appropriate data privacy and security measures will be necessary to prevent unauthorized access or data breaches. This will involve implementing encryption protocols, access controls, and regular security audits to ensure that the system remains secure and compliant with relevant data privacy regulations. In summary, the future improvements to the alert system will focus on enhancing its accuracy, reliability, and user-friendliness through the incorporation of artificial intelligence and machine learning algorithms, the development of a mobile application for remote monitoring and control, and the implementation of appropriate data privacy and security measures to protect sensitive data. These developments will further improve the safety of fishermen and contribute to the sustainable development of the fishing industry.

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APPENDIX

A. SCREEN SHOTS



GPS MODULE



GSM MODEM



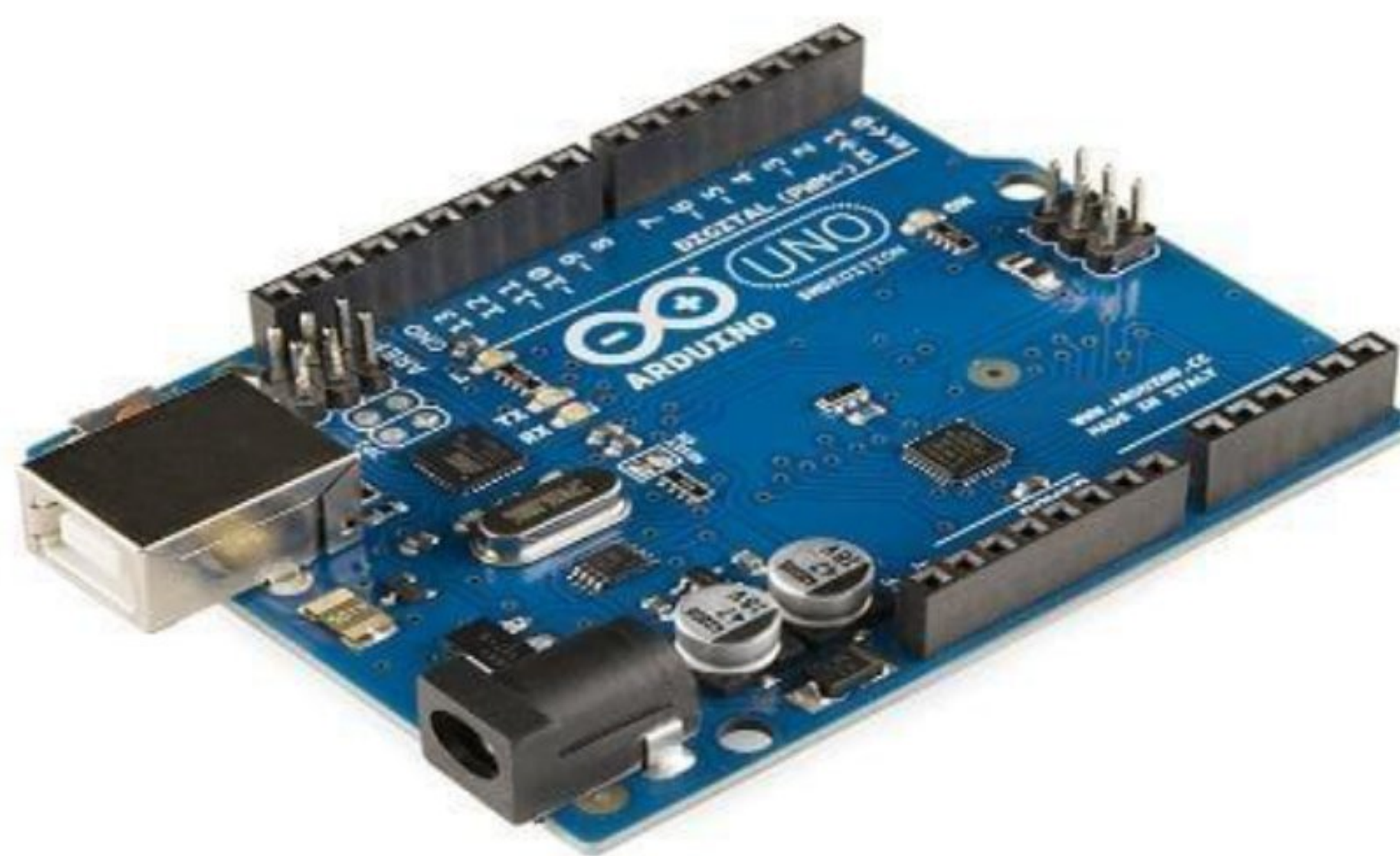
REGULATOR



PWM PIN'S ARDUINO



ATmega328P IC



ARDUINO UNO

B.SOURCE CODE

```
#include<ESP8266WiFi.h>
#include <WiFiClient.h>
#include <SoftwareSerial.h>
#include <ESP8266HTTPClient.h>
#include <ArduinoJson.h>

#define rx D3
#define tx D4

SoftwareSerial gpsSerial(rx, tx); //rx,tx
const char* ssid = "iot";
const char* password = "12345678";
char serverName[] = "http://iotcloud22.in/1318_fisherman/post_value.php";
WiFiClient client;
HTTPClient http;

int flag, c = 0, c1 = 0;

String httpRequestData;

int updates;
int failedUpdates;
int pos;
int stringplace = 0;

String timeUp;
String nmea[15];
String labels[12] {"Time: ", "Status: ", "Latitude: ", "Hemisphere: ", "Longitude: ",
"Hemisphere: ", "Speed: ", "Track Angle: ", "Date: "};

String ch;
String lat = "0.0000";
String lon = "0.0000";

int red = D6;
int green = D7;
int buz = D2;

void setup() {
  Serial.begin(9600);
  gpsSerial.begin(9600);
  pinMode(red, OUTPUT);
  pinMode(green, OUTPUT);
  pinMode(buz, OUTPUT);

  digitalWrite(red, LOW);
  digitalWrite(green, LOW);
  digitalWrite(buz, LOW);

  Serial.print("Connecting to ");
  Serial.println(ssid);
```



```

WiFi.begin(ssid, password);
while (WiFi.status() != WL_CONNECTED) {
  delay(500);
  Serial.print(".");
}
Serial.println("");
Serial.println("WiFi connected");
Serial.print(WiFi.localIP());
delay(1000);

}

void loop() {

  gps();
  sending_to_db();
  getdata();

}

void getdata()
{
  if (WiFi.status() == WL_CONNECTED) {
    //HTTPClient http; //Object of class HTTPClient
    http.begin(client, "http://iotcloud22.in/1318_fisherman/light.json");
    int httpCode = http.GET();
    //Check the returning code
    if (httpCode > 0) {
      // Parsing
    }
  }
}
StaticJsonDocument<256> doc;

DeserializationError error = deserializeJson(doc, http.getString());
Serial.println(http.getString());
if (error) {
  Serial.print(F("deserializeJson() failed: "));
  Serial.println(error.f_str());
  return;
}
//StaticJsonDocument<256> doc;
//  deserializeJson(doc, json);
//  auto error = deserializeJson(doc, json);
if (error) {
  Serial.print(F("deserializeJson() failed with code "));
  Serial.println(error.c_str());
  return;
}

String light = doc["light"]; // "on"
// Extract values
//Serial.print(F("Response:"));
//Serial.println(wheel);

```



```

if (light == "on")
{
    flag = 0;
} else if (light == "off")
{
    flag = 1;
} else if (light == "on1")
{
    flag = 2;
}

```

```

if (flag == 0)
{
    digitalWrite(green, LOW);
    digitalWrite(buz, LOW);
    digitalWrite(red, HIGH);
    if (c < 2) {
        near();
        c++;
    }
    c1 = 0;
}
if (flag == 1)
{
    digitalWrite(green, LOW);
    digitalWrite(buz, HIGH);
    digitalWrite(red, HIGH);
    if (c1 < 2) {
        cross();
        c1++;
    }
    c = 0;
}
if (flag == 2)
{
    digitalWrite(green, HIGH);
    digitalWrite(buz, LOW);
    digitalWrite(red, LOW);
    c = 0;
    c1 = 0;
}

```

```

http.end(); //Close connection
//Serial.println(flag);
delay(1000);
}
void near() {
    Serial.println("AT\r");
    delay(1000);
    Serial.println("AT+CMGF=1\r");
    delay(1000);
    Serial.println("AT+CMGS=\"+919384945352\"\r");
}

```



```

delay(3000);
Serial.println("***BORDER ALERT***");

Serial.println("NEAR TO BORDER");

delay(3000);
Serial.println((char)26);
delay(1000);
}
void cross() {
  Serial.println("AT\r");
  delay(1000);
  Serial.println("AT+CMGF=1\r");
  delay(1000);
  Serial.println("AT+CMGS=\"+919384945352\"\r");
  delay(3000);
  Serial.println("***BORDER ALERT***");

  Serial.println("CROSSED BORDER");

  delay(3000);
  Serial.println((char)26);
  delay(1000);
}
void gps()
{
  gpsSerial.flush();
  while (gpsSerial.available() > 0)
  {
    gpsSerial.read();
  }
  if (gpsSerial.find("$GPRMC,") {
    String Msg = gpsSerial.readStringUntil('\n');
    for (int i = 0; i < Msg.length(); i++) {
      if (Msg.substring(i, i + 1) == ",") {
        nmea[pos] = Msg.substring(stringplace, i);
        stringplace = i + 1;
        pos++;
      }
      if (i == Msg.length() - 1) {
        nmea[pos] = Msg.substring(stringplace, i);
      }
    }
    updates++;
    nmea[2] = ConvertLat();
    nmea[4] = ConvertLng();
    //for (int i = 0; i < 9; i++) {
    /*Serial.print(labels[0]);
    Serial.print(nmea[0]);
    Serial.print(labels[8]);
    Serial.println(nmea[8]);*/
    Serial.print("https://maps.google.com/maps?f=q&q=");
    Serial.print(nmea[2]);
    Serial.print(",");
    Serial.println(nmea[4]);
  }

```



```

        int lat1 = nmea[2].toInt();
        if (lat1 > 0) {
            Serial.println("new data");
            lat = nmea[2];
            lon = nmea[4];
        }
        else {
            Serial.println("old data");
        }
        Serial.println("");
        //}

    }
    else {

        failedUpdates++;

    }
    stringplace = 0;
    pos = 0;
}

String ConvertLat() {
    String posneg = "";
    if (nmea[3] == "S") {
        posneg = "-";
    }
    String latfirst;
    float latsecond;
    for (int i = 0; i < nmea[2].length(); i++) {
        if (nmea[2].substring(i, i + 1) == ".") {
            latfirst = nmea[2].substring(0, i - 2);
            latsecond = nmea[2].substring(i - 2).toFloat();
        }
    }
    latsecond = latsecond / 60;
    String CalcLat = "";

    char charVal[9];
    dtostrf(latsecond, 4, 6, charVal);
    for (int i = 0; i < sizeof(charVal); i++)
    {
        CalcLat += charVal[i];
    }
    latfirst += CalcLat.substring(1);
    latfirst = posneg += latfirst;
    return latfirst;
}

String ConvertLng() {
    String posneg = "";
    if (nmea[5] == "W") {
        posneg = "-";
    }
}

```



```

String lngfirst;
float lngsecond;
for (int i = 0; i < nmea[4].length(); i++) {
    if (nmea[4].substring(i, i + 1) == ".") {
        lngfirst = nmea[4].substring(0, i - 2);
        //Serial.println(lngfirst);
        lngsecond = nmea[4].substring(i - 2).toFloat();
        //Serial.println(lngsecond);
    }
}
lngsecond = lngsecond / 60;
String CalcLng = "";
char charVal[9];
dtostrf(lngsecond, 4, 6, charVal);
for (int i = 0; i < sizeof(charVal); i++)
{
    CalcLng += charVal[i];
}
lngfirst += CalcLng.substring(1);
lngfirst = posneg += lngfirst;
return lngfirst;
}

void sending_to_db()
{
    if (WiFi.status() == WL_CONNECTED)
    {
        http.begin(client, serverName);
        http.addHeader("Content-Type", "application/x-www-form-urlencoded");

        httpRequestData = "&value1=" + String(lat) + "&value2=" + String(lon) + "";
        // Serial.print("httpRequestData: ");
        Serial.println(httpRequestData);
        int httpResponseCode = http.POST(httpRequestData);
        if (httpResponseCode > 0) {
            Serial.print("HTTP Response code: ");
            Serial.println(httpResponseCode);
        }
        else {
            Serial.print("Error code: ");
            Serial.println(httpResponseCode);
        }
        http.end();
    }
    else {
        Serial.println("WiFi Disconnected");
    }

    delay(1000

```


FISHERMAN BORDER ALERT SYSTEM USING IOT

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Abstract - This paper presents a system for Fisherman border alert system. In coastal area people are purely depend on fishing occupation in the sea if the fisherman crosses the border it should be treated as a serious offence. Due to unawareness about the boundary level limits, the fisherman cross the maritime borders. Once they cross the border the boats are being captured by the neighborhood countries and coastal guards. Under such situations lives of fisherman are in danger. In such cases our border alert system for fisherman will help to overcome the danger. The objective of this project is to safe guard the lives of fisherman by using the technology GPS (Global Positioning System). The location of the boat can be tracked with the help of the GPS. If the fisherman crosses the border, the alarm sound will get generated and alert the fisherman and main office. The relay circuit will reverse the boat. When they are near the border we will get SMS in our mobiles. It sends each and every information in SMS. Border alert system for fisherman using GPS is one such system which protects the fisherman by notifying the country border to them by using GPS(Global Positioning System) and GSM(Global System For Mobile Communication). GPS receiver is used to find the current location of the fishing boat. Using GPS, the current latitude and longitude values can be determined and is then sent to microcontroller unit. Later the controller unit finds the current location by comparing the present latitude and longitude values with the predefined values. Then from the result of the comparison, this system aware the fisherman that they are about to reach the nautical border and safety measures.

INTRODUCTION

Many issues have been faced in recent times as the fisherman crossing the border that risks their lives in danger. Many fisherman's have been caught by neighboring countries for entering their border. To reassure the fisherman to reconnoiter inside our sea nation consuming GPS(Global positioning System) and GSM(Global System for Mobile Communication).GSM leads the note to the coastal guard office. If the boat more rapidly to the restricted zone the speed of the boat reduces automatically and when it nears the border the engine shuts down and the buzzer will alarm the fisherman. If the fishermen go belly up to snub the caution and they transfer to reaches the restricted zone repeatedly engine gets off

and send through the message. This comes with a unswerving resolution for this delinquent and defends the Indian fisherman from unsafe situation and being voyage the maritime boundary and save their life and recover the wellbeing of fisherman. The system is premeditated by using GPS and GSM .A GPS route device is a device that indeed determines natural area by attainment data from GPS satellites. This device can pathway the GPS data every on its own time at whatever point the fisherman's fractious the Indian border. It is a substantial hopelessness problem and reassures trouble in the both individuals and also their pecuniary disbursements. The GPS device will over and over again give the signal which governs the latitude and longitude and indicates the situation of the fishermen and which gets recite and demonstrated in the LED. The hardware which crossing point with as follows : Micro-controller, LED display, GSM modem and GPS receiver. GPS provides unswerving positioning, navigation, and timing services to manipulators on a continuous basis in every single day and night. Then GPS accumulation the stowing of the maritime position [2]. While associating the aforementioned maritime circumscribed position and up-to-date position and result will be the latitude and longitudinal degree of the boats location is single-minded if the boat more rapidly to the restricted zone the alarm will turn on and the sound keep on cumulative and also speediness of the engine will get abridged by using pulse width cadence. Border alert

which defends the fisherman by reporting the nation state border to them by using GPS(Global Positioning System) and GSM(Global System For Mobile Communication). GPS receiver is used to find the present site of the fishing boat. Using GPS, the current latitude and longitude values can be single-minded and is then directed to microcontroller unit. Later the controller unit finds the present location by associating the present latitude and longitude values with the predefined values. Then from the result of the assessment, this system cognizant the fisherman that they are about to reach the nautical border. Thoroughgoing risks transpire for fisherman in state of affairs where they travel on a boat for fishing. In some circumstances, they should not interchange after some point and they should not cross the threshold into other nation state area. There is a real obligation in deceitful a system that can pathway the vehicle and send the statistics about the vehicle so the troubled person can also vigilant the fisherman .



Data of Death Rate

LITERATURE SURVEY

Arduino based Maritime Border Alert System for Fisherman:

The proposed system is instituted on Arduino R3 Uno as a auxiliary for of using a PIC-18F4520 microcontroller [20]. Arduino is realistic and has open-source hardware and software. Arduino Uno's ATmega328 is used in a system coupled with GPS,

GSM and a Buzzer. The receiver end of Arduino Uno is connected with GPS and the transmitter end is connected with GSM of Arduino Uno. By overriding implanted C, a predefined location is reputable and if this is crossed, an SMS alert will be referred to a predefined number. This allocation using the incomparable STK400 procedure.

Alert System for Fishermen Crossing Border using Android

In 2016,The tender the whole kit and caboodle as an instinctive incident management bid that relatives the user if border crossing occurs. The submission that is being made is mounted in the mobile phones and the device/mobile phone is stalked by via its IMEI number. The tender also records thematters that chronicled information are sent to the server, which is scrutinized by the security force in the border ranges and also stores them in all devices approaching under that range .The data/information is transported from web to mobile and vice versa via a windows server. This is formulated to use even by very typical people at their reasonably priced rates

BORDER ALERT SYSTEM AND EMERGENCY CONTACT FOR FISHERMAN USING RSSI:

The anticipated paper of the Border ready and sharpening with alert using RSSI has concluded up being a low endeavor. The venture additionally goes for philanthropic imperturbability at the environs and decreases the pressures between the two realms. The anticipated framework's engineering is compacted most noteworthy advantageous position of the RSSI framework is the bureau of the creation to work in any climate situations and in any implies.The framework apprehended will moreover combine a permeable that the circuit is not disposed to any maltreatment , The framework give high precision and high

meticulousness valuations of the Scope and Longitude. This archetypal launches to contest the as of now bring about to survive model which just uses a DGPS contrivance to track the far-flung and make the watercraft move rearwards.

Alert System for Fishermen Crossing Border consuming Android:

The tender can be extensively used by individuals in the border to find the apposite path to reach the journey's end. The report will be sent to the border security forces which act as the headwaitress to entirely other devices that are operated by people in ships. The tender will notify the statistics of where the devices are being located and warn them about the problems that occur due to rival forces in ships to server. This can act as an occasion management tender to avoid struggles at varying situations. This is administered mainly for Indian fishermen's who are laboring in the borders. The instinctive alarming system is going to be on condition that along with this device which sirens in case any sort of issues. This is articulated in such a technique that the tender can be easily been exploited by all the people in the backgrounds. The bid operates based on device tracking. This affords luxury to operate even for illiterate people.

IoT based Fisherman Border Alert and Weather Alert Security System:

On bearing in mind the issue we projected a minimal effort and modest climate Alert framework for angler's which is exploited to follow their family members, cohorts and other anglers in the happening that some angler antagonizing any issues like unanticipated climatic changes or catastrophes mean this agenda will support the angler. In this endeavor, we are going to

canopy climate state of the harpooning zone and furthermore if angler cross the fringe by employing sensors like adhesiveness and temperature, wind speed sensor and Rain sensor this sensor stubbornly aptitudes the angler angling zone and send statistics to the server exploiting Zigbee module consistently at whatever point they need any backing implies there is crisis button is there in the occasion that they press mean alarm was sent to the explicit principle server where they get the prospect to provision and GPS Location is furthermore sent.

IOT BASED FISHERMAN BORDER ALERT SYSTEM USING GPS AND WSN:

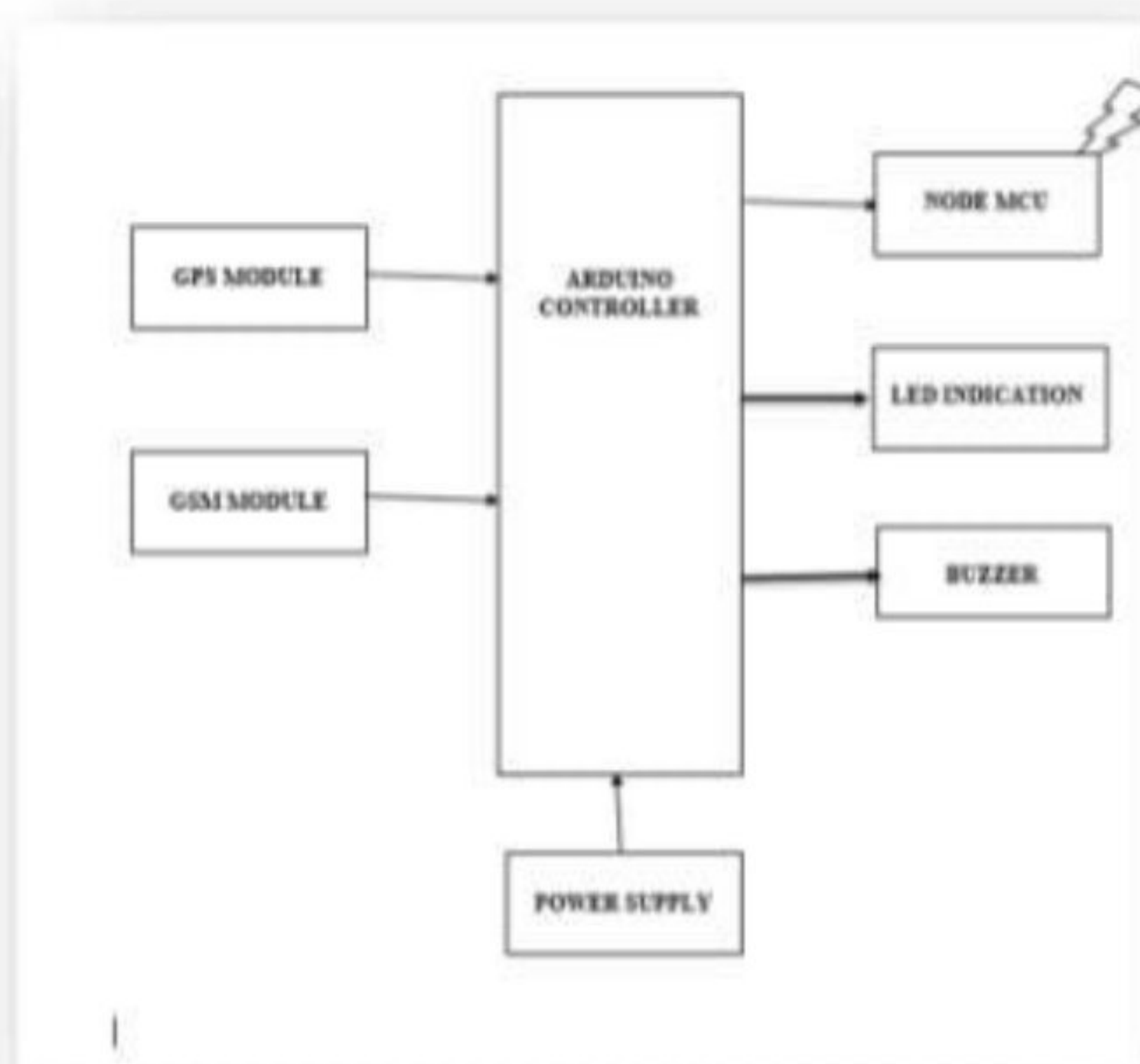
The unbiased of this project is to safe guard the exists of fisherman by consuming the expertise GPS(Global Positioning System) and WSN (Wireless Sensor Network).GPS is used to pathway the current location of the boat. If the fisherman fractionous the boundary, the buzzer sound will get engendered. The transmit circuit will reverse the boat. The WSN technology is to handover the information between fisherman and IOT (Internet of Things) station. The alert system which we have advanced will afford an operative solution for fishermen problem and thwart them from voyage other country border. This supposition will save numerous fishermen exists from voyage the national border. Our project mainly emphases on smooth relationship flanked by two countries. Expiry rate will be lessened and fishermen life time can be amplified.

BORDER ALERT SYSTEM AND EMERGENCY CONTACT FOR FISHERMAN USING RSSI :

The anticipated paper of the Border prepared and sharp succeeding with alert consuming RSSI has concluded up being a low endeavor. The venture moreover goes for generous imperturbability at the fringes and diminutions the compressions amid the two nations.

The projected framework's commerce is compacted most striking satisfactory situation of the RSSI framework is the bureau of the conception to exertion in any climate circumstances and in any indicates. The framework perceived will furthermore integrate a impermeable that the circuit is not persuaded to any destruction. The agenda give high exactness and high meticulousness valuations of the Scope and Longitude. This archetypal validates to encounter the as of now manage to survive prototypical which just uses a DGPS apparatus to way the far-flung and make the watercraft move toward the rear

PROPOSED WORK



System Architecture

A) Arduino Uno :

The Arduino Uno is a microcontroller board developed by a company that goes by the name Arduino. It is an open source microcontroller board and is based on ATmega328P microcontroller. The Arduino Uno has a set of digital as well as analog input and output pins that can be used in various circuits and expansion boards. It consists of 14 digital pins and 6 analog pins. It is programmable with Arduino IDE (Integrated Development Environment) using a type B USB cable. It works fine with voltages between 7volts and 20 volts, although it is mostly used

with a 9-V battery. The name Uno is because it was among the first USB-based Arduino boards.

B) GSM-Global System For Mobile Communication:

Global System for Mobile Communication(GSM) is a huge collection of Satellite that provide signals from space and transmits position and timing related data to GSM receivers. The receiver afterwards uses this data to determine locations. It can provide positioning to worldwide users on a continuous basis in all weather, irrespective of day or night, anywhere on or near the Earth provided the place has an unobstructed view of four or more GSM satellites. GSM satellites broadcasts signals from space that GSM receivers uses to provide latitude, longitude and altitude. GSM is made up of three segments: Space, Control and User. The Space Segment consists of 24 to 32 satellites in medium Earth orbit and also contains boosters required to launch them into orbit. The Control system is composed of a Master Control Station, an Alternate Master Control Station, and a host of dedicated and shared Ground Antennas and Monitor Stations. The User segment is composed of hundreds of thousands of allied military users of the secure GSM Precise Positioning Service and tens of millions of civil, commercial and scientific users of the Standard Positioning Service. GSM is widely being used worldwide for navigation purposes, tracking and surveillance.

C) Power Supply DC and Microcontroller:

It requires some power source. This power is supplied using a DC power supply ranging from +5 V to +12 V. The available energy source is of 230v-50Hz, and a centre tapped step down transformer is used. The Arduino operates at low power.

D) RelayA :

Relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating control terminals. Relays are used where it is needed to control a circuit by an independent low power signal. It is also used where it is needed to control several circuits by one signal. The conventional form of a relay uses an electromagnet to close or open the contacts. There are several other operating principles that have been invented, one of those are in solid state relays. It uses semiconductor properties for control and does not rely on moving parts.

E) BuzzerA :

Buzzer is an electronic device for signaling purposes. These are mostly used in automobiles, household appliances and other electronic devices. It has a number of switches connected to control unit that determines if and which button was pushed, or if a preset time has lapsed, and sounds a warning in the form of a continuous buzzing or beeping sound. If the boat approaches the restricted area, the buzzer will

sound automatically and will keep on beeping by means of pulse width modulation.

F) LED Display:

The Light Emitting Diode is a flat-panel display which uses liquid crystals in its primary form of operation. Light modulating property of light emitting diode is used in LEDs. Light emitting does not emit light directly, instead it uses backlight or reflector to produce images or information in color or monochrome. The LED used is a 2x16 LED module. This is an alphanumeric LED display and can display both alphabets and numbers. The Pin 1 is connected to the ground. The pin 2 powers the LED with required supply. The pin 3 decides the contrast level of display. It is grounded for maximum contrast. The pin 4 is Register select that is connected to the microcontroller to shift between command and data register. The pin 5 is a Read or Write, it is used to read or write data. It is normally grounded for writing. The pin 6 is connected to the microcontroller pin and toggled between 0 and 1 for data acknowledgement. The pins numbered from 7 to 14 are data pins. These form an 8-bit data line and are connected to microcontroller to send 8-bit data. The pin 15 is Backlight LED pin positive terminal and the pin 16 is Backlight LED pin negative terminal.

RESULT AND DISCUSSIONS

The project described involves the use of mobile SMS alerts and LED lights with buzzer sounds to notify fishermen before reaching the border. The purpose of this project is to enhance the safety of fishermen by providing them with early warnings of the border and preventing them from straying into restricted waters. When a fisherman approaches the border, a signal is sent to the base station using sensors installed in the water. The base station then sends an SMS alert to the fisherman's mobile phone, notifying them of their proximity to the border. Simultaneously, an LED light with a buzzer sound is triggered on the fishing boat to attract the attention of the fishermen and alert them to the approaching border. This system has several advantages over traditional warning methods, such as flags and beacons, which can be difficult to see at

night or in poor weather conditions. The LED light and buzzer sound provide a clear and immediate warning, ensuring that the fishermen are aware of the approaching border and can take necessary precautions to avoid it. The system is also highly cost-effective as it uses simple technology and does not require any significant investment. Additionally, it can be easily installed on fishing boats and does not require any special training for fishermen to use it. In conclusion, this project provides an effective and affordable solution to enhance the safety of fishermen by providing them with early warnings of the border. The use of mobile SMS alerts and LED lights with buzzer sounds offers a reliable and immediate warning system, which can help to prevent accidents and save lives. This project is highly recommended for implementation in areas where fishermen operate near borders, especially at night or in poor weather conditions.

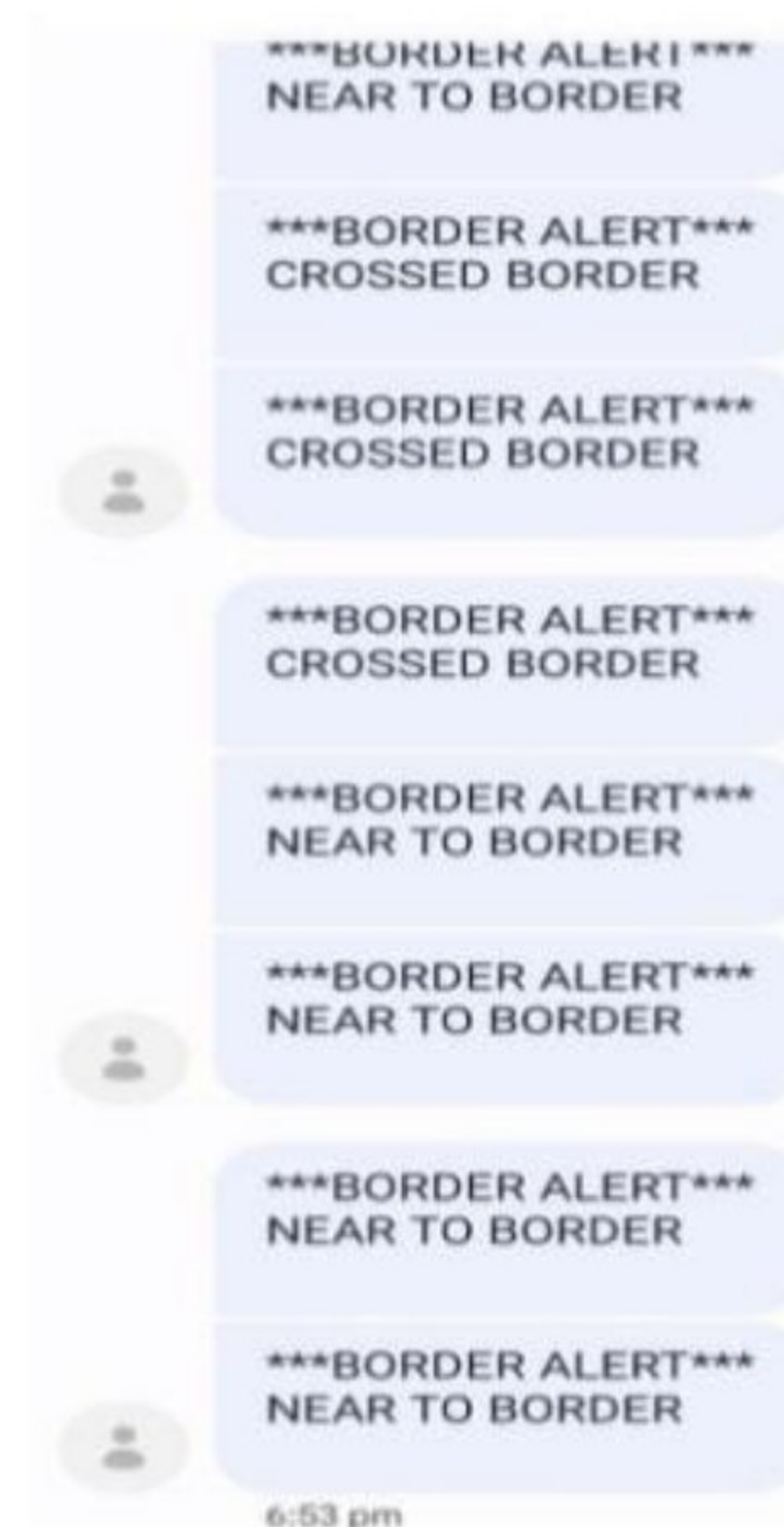


Fig 1.4 Alert Notification

CONCLUSION

The alert system which we have developed will provide an effective solution for fishermen problem and prevent them from crossing other country border. This conclusion will save many fishermen lives from crossing the national border. Our project mainly focus on smooth relationship between two countries. Death rate will be decreased and fishermen life time can be increased.

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