GPS module Interfacing with AVR Microcontroller ATMEGA 32

Mini project report submitted
In
partial fulfillment of requirement for awardof degree of

Bachelor of Engineering
In
Electronics & Telecommunication

Submitted by

GUNGUN TEMBHURNE   LAJJA BHAJIKHAYE
MOHAMMAD ATHAR   KALASH SAHARE
                    HIMANSHU HATIPACHEL

Under the guidance of
Dr. Mohammad Nasiruddin
Associate Professor, ETC

Department of
Electronics & Telecommunication Engineering
Anjuman College of Engineering & Technology

Sadar, Nagpur

(Affiliated to : Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur)

Session 2021-2022

Declaration

We hereby declare that the work which is being presented in the mini project entitled **"GPS MODULE INTERFACING WITH AVR MICROCONTROLLER ATMEGA 32"** by "**GUNGUN TEMBHURNE, LAJJA BHAJIKHAYE, MOHAMMAD ATHAR, KALASH SAHARE, HIMANSHU HATIPACHE"** in partial fulfilment of requirements for the award of degree of B.E. in Electronics & Telecommunication Engineering submitted in the Department of Electronics & Telecommunication Engineering at Anjuman College of Engineering &Technology, Nagpur under Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur is an authentic record of our own work carried out during a period from 2021 to 2022 under the supervision of **Dr. Mohammad Nasiruddin**, Associate Professor, Department of Electronics & Telecommunication Engineering. The matter presented in this thesis has not been submitted in any other University / Institute for the award of B.E. Degree.

1. GUNGUN TEMBHURNE_____

2.LAJJA BHAJIKHAYE_____

3.MOHAMMAD ATHAR _____

4.KALASH SAHARE _____

5.HIMANSHU HATIPACHEL_____

CERTIFICATE

The thesis titled **"GPS MODULE INTERFACING WITH AVR MICROCONTROLLER ATMEGA 32"** submitted by **GUNGUN TEMBHURNE, LAJJA BHAJIKHAYE, MOHAMMAD ATHAR, KALASH SAHARE, HIMANSHU HATIPACHEL"**
for the award of degree of Bachelor of Engineering in Electronics & Telecommunication Engineering, has been carried out under my supervision at the Department of Electronics & Telecommunication Engineering of Anjuman College of Engineering & Technology, Nagpur.
The work is comprehensive, complete and fit for evaluation.

Dr.Mohammad Nasiruddin   **Dr. A. S. Khan**
Associate Professor, ETC   Head, Department of ETC
Engineering
A.C.E.T, Nagpur   A.C.E.T,Nagpur

Forwarded by-

Dr.S.M.Ali
Principal,
AnjumanCollegeofEngineering&Technology Nagpur

External Examiner

ACKNOWLEDGEMENT

Completing a task is never a one man's effort. Several prominent people have helped in the present project work; their collective efforts have led in presentation of this Dissertation work, it is hard task to mention them all. It is an immense pleasure in expressing genuine and profound gratitude towards the guide – '**Dr. Mohammad Nasiruddin'** and for this valuable suggestions, guidance, constant support, and encouragement during completion of this dissertation work. We are grateful to **Dr. A.S Khan**, H.O.D, Project coordinator**Dr. Mohammad Nasiruddin,** Department of Electronics and Telecommunication Engineering, Anjuman College of Engineering and Technology, Sadar, Nagpur for this valuable suggestions and guidance.

We are obliged to **Dr. S. M. Ali**, Principal, Anjuman College of Engineering and Technology, Sadar, Nagpur, without whose support and encouragement, the work couldn't have been completed in the craze that now it has been distinguished and accomplished. We are grateful to all the teaching and non-teaching staff of Electronics and Telecommunication Engineering department for their timely help.

At this onset, We desire to avail the opportunity to express appreciation towards, my friends and good wishes for their constant support. Last but not the least the backbone of my success and confidence lies solely on the blessing of my parents and my family.

GUNGUN TEMBHURNE

LAJJA BHAJIKHAYE

MOHAMMAD ATHAR

KALASH SAHARE

HIMANSHU HATIPACHEL

IV Semester B.E.

Electronics & Telecommunication Engineering

A.C.E.T

INDEX

Abstract

GPS modules are widely used in electronics applications to track the location based on longitude and latitude coordinates. Vehicle tracking system, GPS Clock, Accident Detection Alert System, traffic navigationsurveillance system etc. are few of the examples where GPS functionality is essential. GPS provides Altitude, Latitude, Longitude, UTC time and many other information about the particular location, which are taken from more than one satellite. To read data from GPS, a microcontroller is needed so here we are **interfacing GPS module with AVR microcontroller Atmega16** and printing the longitude and latitude on 16x2 LC.

List of Figures

List of Abbreviations

Sr. No.	Abbreviations	Full Forms
1	IDE	Integrated Development Environment
2	API	Integrated Application Programming Interface
3	FTDI	Future Technology Devices International.
4.	UART	Universal Asynchronous Reception and Transmission
4.	TXD	Transmit Data
5.	RXD	Receive Data
6.	TTL	Transistor-transistor logic
7.	GPS	Global Positioning System

List of Table

CHAPTER 1
INTRODUCTION

1. Overview

GPS modules are widely used in electronics applications to track the location based on longitude and latitude coordinates. [Vehicle tracking system](#), [GPS Clock](#), [Accident Detection Alert System](#), traffic navigation surveillance system etc. are few of the examples where GPS functionality is essential. GPS provides Altitude, Latitude, Longitude, UTC time and many other information about the particular location, which are taken from more than onesatellite. To read datafrom GPS, a microcontroller is needed so here we are **interfacing GPS module with AVR microcontroller** [Atmega16](#) and printing the longitude and latitude on 16x2 LCD display.

GPS Module

The concept of GPS module (Global Positioning system) started with things and identity communication devices. The devices could be tracked, controlled or monitored using remote computers connected through Internet. The GPS module has different definitions. ." GPS is a satellite navigation system used to determine the ground position of an object. GPS technology was first used by the United States military in the 1960s and expanded into civilian use over the next few decades. Today, GPS receivers are included in many commercial products, such as automobile , [smartphones](#), exercise watches, and [GIS](#) devices.

[Vehicle tracking system](#), [GPS Clock](#), [Accident Detection Alert System](#), traffic navigation surveillance system etc. are few of the examples where GPS functionality is essential. GPS provides Altitude, Latitude, Longitude, UTC time and many other information about the particular location, which are taken from more than one satellite. To read data with sensors or with any embedded systems and made connected to network via wired or wireless connections. These connected devices are called as smart devices or smart objects. And it consists of smart machines, which communicate, interact with other machines, environment, objects etc. And these can be processing by using some processors such as network processor, hybrid processor MCU/MPU etc.

2. Problem Definition

- ➢ Using GPS tracking systems, you can manage employee transportation fleet and improve its efficienency. You can save time and fuel, thereby minimizing expenses.

- GPS tracking features have really helped police to nab criminals, especially drug peddlers. Police have even successfully tracked drug thieves. Police concealed decoy drug parcels under GPS and tracked the criminals successfully to nab them with important information. This has opened another dimension in the use of GPS and given authorities necessary help in controlling drugs-related crimes.

- In a developing nation like India, people experience regular price-hikes of fuel. A tracking device, installed on the top of the bus, could help a lot in controlling fuel cost.

- The GPS tracker helps greatly in pre-planning the movement of the buses in their routes. This could optimize the returns from the movement of the buses and bring improvement in fuel consumption and reduction in maintenance cost.

- Using GPS tracking systems, you can manage employee transportation fleet and improve its efficiency. You can save time and fuel, thereby minimizing expenses.

- While participating in a crowed gathering, concert, or graduation ceremony, GPS has the feature to track relatives, friends, and family members and help the person in locating his belovved ones easily

1.3 Objectives

A GPS tracking vehicle tracking devices gadget isn't the same as an auto GPS. Equally GPS products operate by employing details by using satellite coordinates. The fundamental function of the GPS tracker is usually to monitor a particular concentrate on auto or motor vehicles. The tracking machine will be able to relay info relating to where by the motor vehicle has traveled, just how long the automobile stopped, and so on. GPS monitoring equipment are generally set up in autos. Having said that, GPS tracking units may be useful for motor cycles, scooters and bicycles. Some GPS trackers are created to monitor and keep track of movements of laptop computer pcs if computer is lostor stolen.

All GPS trackers use worldwide positioning satellites which may identify properly a vehicle's locale and speed. The GPS monitoring process sends info to orbiting GPS satellites which route the info by way of a mobile or cellular phone network back to an linked obtaining machine. GPS trackers may also send details by means of the internet and warn the receiver

Like a popular auto GPS procedure, GPS trackers may deliver thorough mapping information showing in which a concentrate on vehicle has traveled. The mapping particulars

GPS trackers are utilized by law enforcement, private investigators, fraud or coverage investigators, corporate and personal folks to safe details needed for investigative applications. Some firms, like limousine firms, cab providers and supply providers, use GPS trackers keep an eye on and preserve precise facts records on how company car or truck fleets or homes are being utilized. In addition, GPS monitoring equipment is usually occurs

Some providers applied GPS monitoring systems to enhance productiveness by monitoring

mileage and pace of organization motor vehicles to control gas use, therefore preserving fuel charge. GPS tracking units may be accustomed to log how staff use organization autos for consumer linked shipping and delivery of solutions by detailing just each time a merchandisewas

Also, GPS tracking devices can be utilised legally to monitor relatives pursuits, i.e. children or spouses. Having said that, the usage of GPS trackers is controversial in these regions. Although GPS monitoring equipment is often utilized for most States, lawfully with no special permit or license, a single must test relevant State or Federal laws regarding the usage of GPS tracking gadgets.

CHAPTER 2

LITERATURE SURVEY AND REVIEW

2.1 Literature Survey of Existing System

1. Race control: in some sports, such as gliding, participants are required to carry a tracker. In particular, this allows race officials to know if the participants are cheating, taking unexpected shortcuts, and how far apart they are. This use was illustrated in the movie *Rat Race*.

2. Espionage/surveillance: a tracker on a person or vehicle allows movements to be tracked.

3. Vehicle tracking: some people use GPS Trackers to monitor activity of their own vehicle, especially in the event of a vehicle being used by a friend or family member.

4. GPS personal tracking devices are used in the care of the elderly and vulnerable, and can be used to track small children who may get into danger.[8][9] Some devices can send text alerts
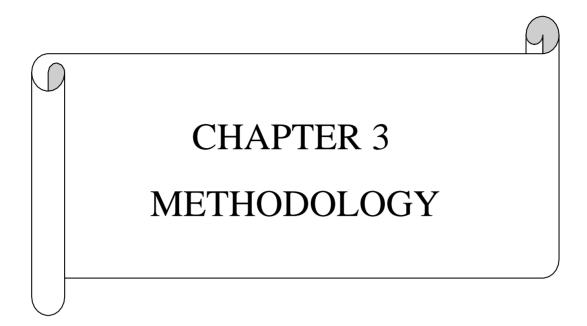
to carers if the wearer moves into an unexpected place. Some devices allow users to call for assistance, and optionally allow designated carers to locate the user's position, typically within five to ten meters.

5. Their use helps promote independent living and social inclusion for the elderly. Devices often incorporate either one-way otwo-way voice communication. Some devices also allow the user to call several phone numbers using pre-programmed speed dial buttons. Trials using GPS personal tracking devices for sufferers of early-stage dementia are underway in several countries.

6. Text and voice communication is usually provided by a connection to mobile telephony, but GPS devices are available that use satellite communications, always available even if out of mobile telephone range.[10]

7. Some Internet Web 2.0 pioneers have created their own personal web pages that show their position constantly, and in real time, on a map within their website. These usually use data push from a GPS enabled cell phone or a personal GPS tracker.

8. Sports: the movements of a ramblers, cyclists, and so on, can be tracked. Statistics such as instantaneous and average speed, and distance travelled, are logged.[2] In the rugby union Six Nations Championship, all players wear trackers, sewn into their shirts.[11] Some rugby clubs also use GPS units on their players.[12] The England Rugby Union team uses GPS.[13]

9. Adventure sports: GPS tracking devices such as the SPOT Satellite Messenger are available to allow the position of a person to be tracked. In particular, this allows rescue personnel to locate the carrier. These devices also allow the carrier to send messages and emergency alerts, even when out of cellular telephone range.[10]

10. Monitoring employees: GPS-handled tracking devices with a built-in cellphone are used to monitor employees by various companies, especially those engaged in fieldwork.

11. Lone Workers : It is ideal for improving the safety of your employees working in distant, isolated work sites. Maintenance workers, forestry, mining, and employees in similar fields may be required to work in remote areas without any contact nearby, in such scenarios the risk of their well-being increases

2.2 Summary:

Global Positioning System (GPS), Precise satellite-based navigation and location system originally developed for U.S. military use. GPS is a fleet of more than 24 communications satellites that transmit signals globally around the clock. With a GPS receiver, one can quickly and accurately determine the latitude, the longitude, and in most

cases the altitude of a point on or above Earth's surface. A single GPS receiver can find its own position in seconds from GPS satellite signals to an accuracy of one metre; accuracy within one centimetre can be achieved with sophisticated military-specification receivers.
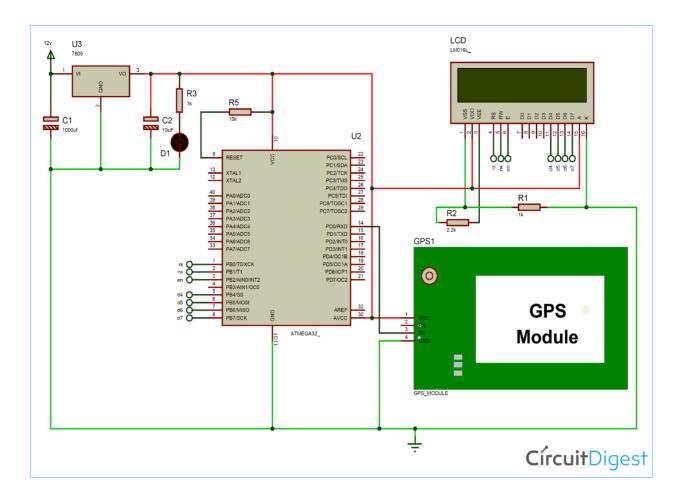
CHAPTER 3

METHODOLOGY

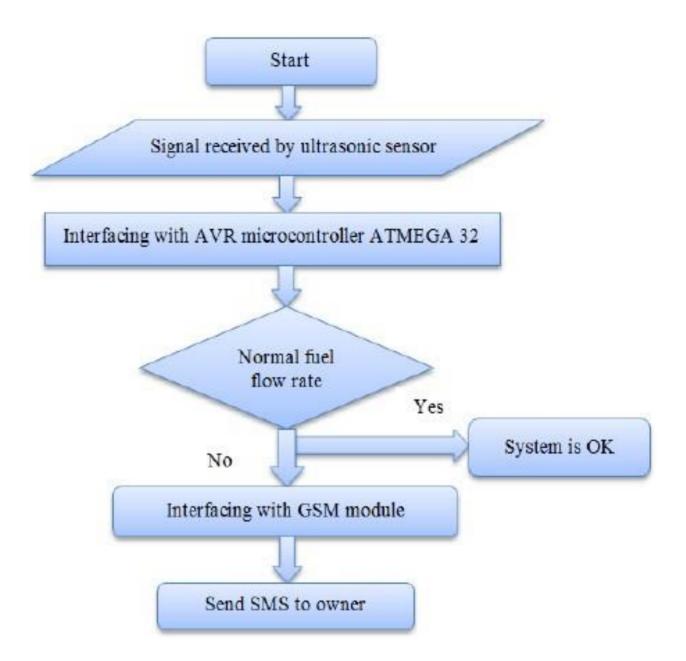## 3.1 Proposed System

Our target to design this project is

- GPS receivers are generally used in smartphones, fleet management system, military etc. **for tracking or finding location**. Global Positioning System (GPS) is a satellite-based system that uses satellites and ground stations to measure and compute its position on Earth.

3.2 circuit Diagram

1. **1.)ATMEGA 32–** ATMEGA 32 development board provides a very simple and cost effective platform for prototype solution.The compact design provides connection to all the pins of the user.

2. **2.)NEO-6M GPS –** The u-blox NEO-6M GPS engine on these modules is quite a good one, and it also has high sensitivity for indoor application. Further more there one MS62EF compatible settings.

3. **3.)16*2 LCD Display module – 16*2 LED Display** is named so because it has 16 columns and 2 rows. There are a lot of combination available like,8*1,8*2,10*2,16*2 LCD,hence we are using it here.

4. **4.)Connecting wire –**The basics of electronics wire for electronics wiring including the equivalent between the American AWG wires and metrics wires as well as the insulation including PVS wire, PTFE wire and enameled copper wire.

5. **5.)LM7805 Voltage –** The LM7805 is a voltage regulator that outputs +5 volts like most other regulators in the market it is a three pin IC input pin for accepting incoming DC voltage, ground for the regulator and output pin that supplies the positive 5 volts.

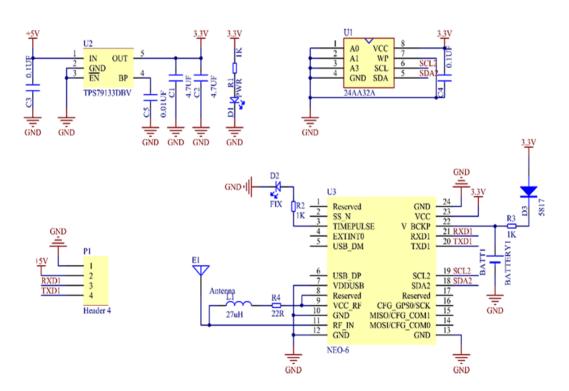**Fig 3.3.1 Flow chart of GPS module**

CHAPTER 4
TOOLS/PLATFORM

4.Hardware and Software requirements

4.1.1 The NEO-6M GPS

The NEO-6M GPS module is a well-performing complete GPS receiver with a built-in 25 x 25 x 4mm ceramic antenna, which provides a strong satellite search capability. With the power and signal indicators, you can monitor the status of the module. Thanks to the data backup battery, the module can save the data when the main power is shut down accidentally. Its 3mm mounting holes can ensure easy assembly on your aircraft, which thus can fly steadily at a fixed position, return to Home automatically, and automatic waypoint flying, etc. Or you can apply it on your smart robot car for automatic returning or heading to a certain destination, making it a real "smart" bot!

The heart of the module is a NEO-6M GPS chip from u-blox. It can track up to 22 satellites on 50 channels and achieves the industry's highest level of sensitivity i.e. -161 dB tracking, while consuming only 45mA supply current. The u-blox 6 positioning engine also boasts a Time-To-First-Fix (TTFF) of under 1 second.

Features

1)A complete GPS module with an active antenna integrated, and a built-in EEPROM to save.configuration   .
2) Built-in 25 x 25 x 4mm ceramic active antenna provides strong satellite search capability.
3)Equipped   with   power   and   signal   indicator   lights   and   data   backup   battery.
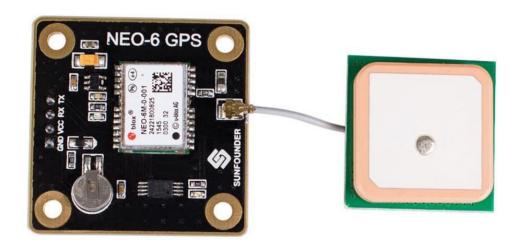4)Power
supply: 3-5V;   Default   baud   rate: 9600bps.
5) Interface: RS232 TTL

4.1.2 LONG Wire Antenna

A random wire antenna is a radio antenna consisting of a long wire suspended above the ground, whose length does not bear a particular relation to the wavelength of the radio waves used, but is typically chosen more for convenience. The wire may be straight or it may be strung back and forth between trees or walls just to get enough wire into the air. Due to the great variability of the (unplanned) antenna structure, effectiveness can vary wildly from one installation to another. Random wire antennas are typically fed at one end against a suitable counterpoise (such as earth ground).

They are widely used as receiving antennas on the long wave, medium wave, and short wave bands, as well as transmitting antennas on these bands for small outdoor, temporary or emergency transmitting stations, as well as in situations where more permanent antennas cannot be installed.
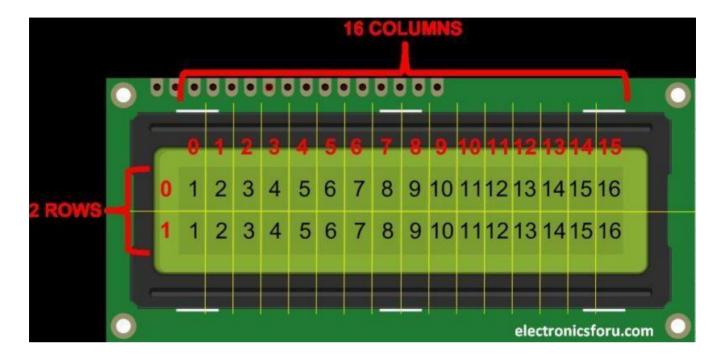
A random wire antenna usually consists of a long (at least one quarter wavelength) wire with one end connected to the radio and the other in free space, arranged in any way most convenient for the space available. Ideally, it is a straight wire strung as high as possible between trees or buildings, the ends insulated from supports with strain insulators. Typically it is made from number 12 or 14 AWG (1.6 to 2.0 mm (0.063 to 0.079 in) diameter) copperclad wire. Folding the wire into a zigzag pattern to fit in a limited space such as an apartment or attic will reduce effectiveness and make theoretical analysis extremely difficult. (The added length helps more than the folding typically hurts.)

If used for transmitting, a random wire antenna usually will also require an antenna tuner, as it has an unpredictable impedance that varies with frequency.[1] One side of the output of the tuner is connected directly to the antenna, without a transmission line, the other to a good earth ground. A quarter-wavelength sized wire works best, and unless fed through an unun, a half-wavelength will exceed the matching ability of most tuners.[5][6] Even without a good earth, the antenna will also radiate, but it will do so by coupling capacitively to any nearby conducting material; this is not recommended.[7] The ground for a random wire antenna may be chosen by experimentation. Grounds could be returned to a nearby cold water pipe or a wire approximately one-quarter wavelength long, or can be replaced by randomly laid-out quarter-wavelength counterpoise wires attached to the ground connection.[1]

4.1.3 16*2 LCD

We come across Liquid Crystal Display (LCD) displays everywhere around us. Computers, calculators, television sets, mobile phones, digital watches use some kind of display to display the time. An LCD screen is an electronic display module that uses liquid crystal to produce a visible image. The 16×2 LCD display is a very basic module commonly used in DIYs and

circuits. The 16×2 translates o a display 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5×7 pixel matrix.

RS (Register select)

A 16X2 LCD has two registers, namely, command and data. The register select is used to switch from one register to other. RS=0 for command register, whereas RS=1 for data register.

Command Register: The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task. Examples like:

- initializing it
- clearing its screen
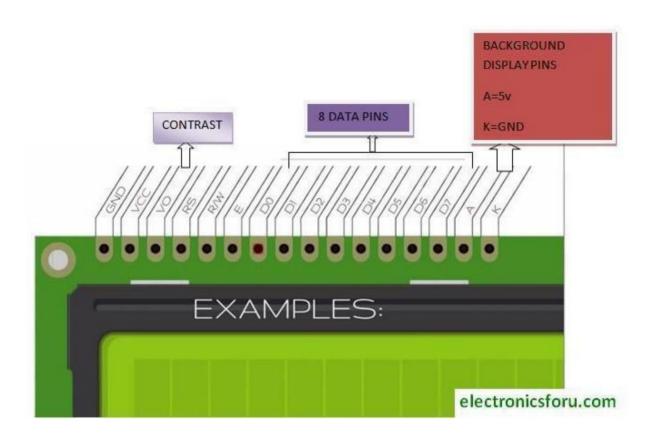- setting the cursor position
- controlling display etc.

Processing for commands happens in the command register.

Data Register: The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. When we send data to LCD it goes to the data register and is processed there. When RS=1, data register is selected.

Important command codes for LCD

Sr.No.	Hex Code	Command to LCD instruction Register
1	01	Clear display screen
2	02	Return home
3	04	Decrement cursor (shift cursor to left)
4	06	Increment cursor (shift cursor to right)
5	05	Shift display right
6	07	Shift display left
7	08	Display off, cursor off
8	0A	Display off, cursor on
9	0C	Display on, cursor off
10	0E	Display on, cursor blinking
11	0F	Display on, cursor blinking
12	10	Shift cursor position to left
13	14	Shift cursor position to right
14	18	Shift the entire display to the left
15	1C	Shift the entire display to the right

16	80	Force cursor to beginning (1st line)
17	C0	Force cursor to beginning (2nd line)
18	38	2 lines and 5×7 matrix

EXAMPLES:

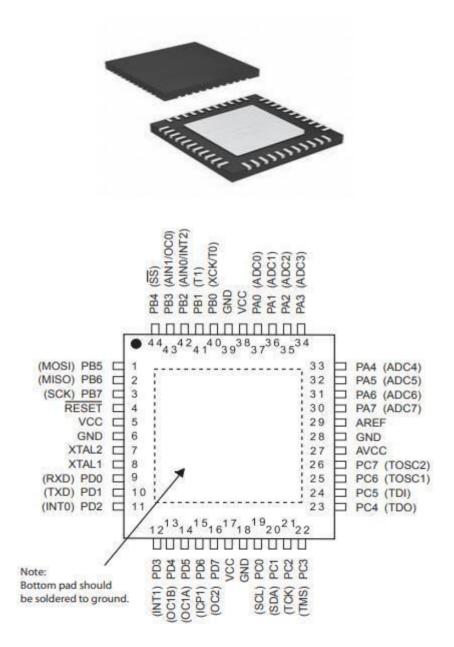| Pin No.	Function	Name
1	Ground (0V)	Ground
2	Supply voltage; 5V (4.7V – 5.3V)	Vcc
3	Contrast adjustment; the best way is to use a variable resistor such as a potentiometer. The output of the potentiometer is connected to this pin. Rotate the potentiometer knob forward and backwards to adjust the LCD contrast.	Vo / VEE
4	Selects command register when low, and data register when high	RS (Register Select)
5	Low to write to the register; High to read from the register	Read/write
6	Sends data to data pins when a high to low pulse is given; Extra voltage push is required to execute the instruction and EN(enable) signal is used for this purpose. Usually, we set en=0, when we want to execute the instruction we make it high en=1 for some milliseconds. After this we again make it ground that is, en=0.	Enable
7	8-bit data pins	DB0
8		DB1
9		DB2
10		DB3
11		DB4
12		DB5
13		DB6
14		DB7
15	LED Backlight VCC (5V)	Led+
16	LED Backlight Ground (0V)	Led-

4.1.4 – ATMEGA 32

ATMEGA32 Microcontroller is in TQFP44 sheath and is one of the **8-bit value microcontroller types** working with 16MHz frequency. 32 of the 44 pins on it are I / O, ie Input Output pins.
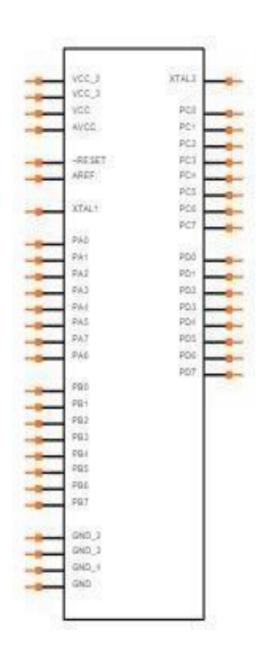
These microcontrollers with FLASH memory function in the 4.5V to 5.5V supply range and at temperatures ranging from -55 to +125 degrees Celsius.
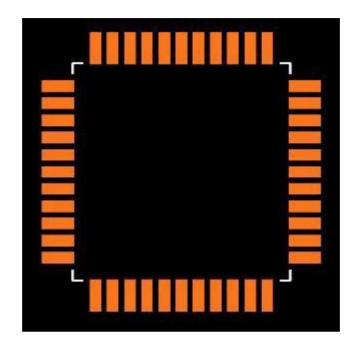
Review the datasheet for the ATMEGA32-16AU Microcontroller to learn more about the features and functions of this integrated.
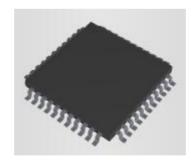
ATMEGA32 Pins

ATMEGA32 CAD Model

VCC_3	XTAL2
VCC_3	
VCC	PC0
AVCC	PC1
	PC2
~RESET	PC3
AREF	PC4
	PC5
XTAL1	PC6
	PC7
PA0	
PA1	PD0
PA2	PD1
PA3	PD2
PA4	PD3
PA5	PD4
PA7	PD5
PA6	PD6
	PD7
PB0	
PB1	
PB2	
PB3	
PB4	
PB5	
PB6	
PB7	
GND_2	
GND_3	
GND_4	
GND	

ATMEGA32 Symbol

ATMEGA32 Footprint

ATMEGA32 3D Model

Specifications

Microchip Technology ATMEGA32-16MU technical specifications, attributes, parameters and parts with similar specifications to Microchip Technology ATMEGA32-16MU.

- ype
  Parameter
-
- Factory Lead Time
  7 Weeks
- Contact Plating
  Tin
- Mount
  Surface Mount
- Mounting Type
  Surface Mount
- Package / Case
  44-VFQFN Exposed Pad
- Number of Pins
  44
- Operating Temperature
  -40°C~85°C TA
- Packaging
  Tray
- Published
  2004
- Series
  AVR® ATmega
- JESD-609 Code
  e3
- Pbfree Code
  yes
- Part Status
  Active
- Moisture Sensitivity Level (MSL)
  3 (168 Hours)
- Number of Terminations
  44
- Termination
  SMD/SMT
- Subcategory
  Microcontrollers
- Technology
  CMOS
- Terminal Position
  QUAD
- Peak Reflow Temperature (Cel)
  260
- Supply Voltage

- 5V
- Terminal Pitch
  0.5mm
- Frequency
  16MHz
- Time@Peak Reflow Temperature-Max (s)
  40
- Base Part Number
  ATMEGA32
- Operating Supply Voltage
  5V
- Power Supplies
  5V
- Interface
  2-Wire, I2C, SPI, UART, USART
- Memory Size
  32kB
- Oscillator Type
  Internal
- Number of I/O
  32
- RAM Size
  2K x 8
- Voltage - Supply (Vcc/Vdd)
  4.5V~5.5V
- uPs/uCs/Peripheral ICs Type
  MICROCONTROLLER, RISC

ATMEGA32 Features

- 2 Kilo bytes of internal Static RAM
- 32 X 8 general working purpose registers
- 32 Kilo bytes of in-system self-programmable flash program memory.
- 1024 bytes EEPROM
- Programmable Serial USART
- 8 Channel, 10 bit ADC
- One 16-bit timer/counter with the separate presale, compare mode and capture mode.
- Available in 40 pin DIP, 44-pad QFN/MLF, and 44-lead QTFP
- Two 8-bit timers/counters with separate presales and compare modes
- 32 programmable I/O lines
- In system programming by an on-chip boot program

- Master/slave SPI serial interface
- 4 PWM channels
- Programmable watchdog timer with separate on-chip oscillator

ATMEGA32 Applications

- Temperature control systems
- Analog signal measuring and manipulations
- Embedded systems like coffee machine, vending machine
- Motor control systems
- Digital signal processing
- Peripheral Interface system

Alternatives for ATMEGA32

ATMEGA8, ATMEGA328p, ATMEGA16, ATMEGA8535, Atmega16, Attiny45, Attiny85, Attiny88
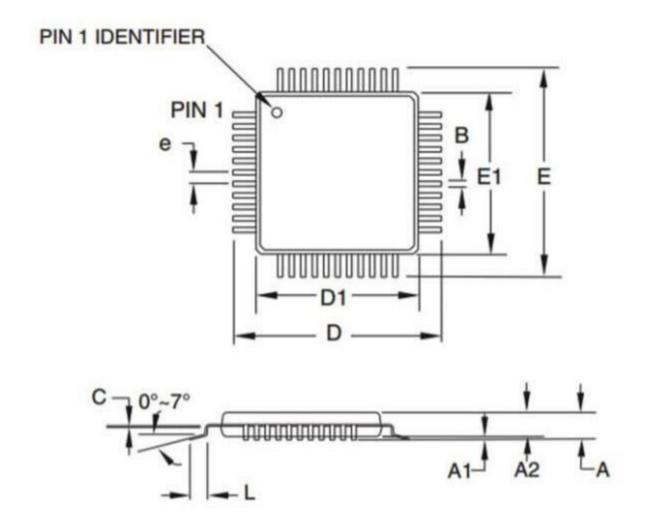
Use ATMEGA32

AVR controller ATMEGA32 is simple to program. It can fulfill most EMBEDDED SYSTEMS thanks to its large program memory. It can work on MOBILE EMBEDDED SYSTEMS with varied sleep modes. It can easily interface with various peripherals because of its 32 programmable Input/output pins. It may be used on systems with no human intervention since it has a Watchdog timer that resets when there is an error. With so many functions that complement each other, ATMEGA32 can be used in a variety of control systems.

How to Program ATMEGA32?

- Before you start with the programming of this microcontroller, you must have a clear understanding of GPIO pins.
- Firstly, download an integrated development environment (IDE) that has a built-in compiler for your selected microcontroller
- Select a Programmer that we will use to upload code to Atmega32
- Write your first simple program such as LED Blinking and upload code.
- After building code, building a circuit of LED interfacing and providing power
- You will see an LED blinking according to the rate you have defined in the program
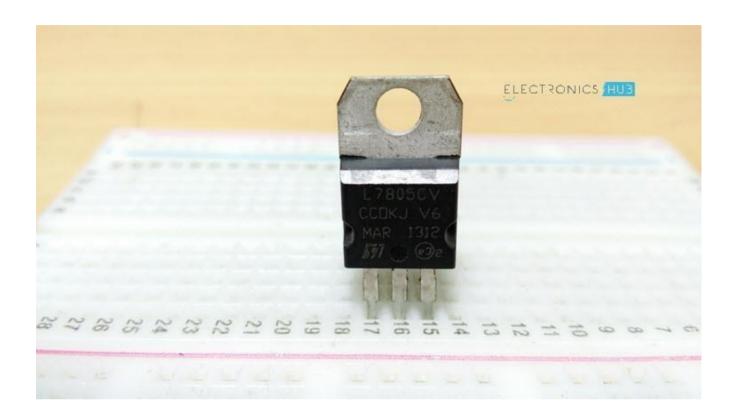
ATMEGA32 Dimensions

ATMEGA32 Manufacturer

Microchip Technology Inc. is a leading provider of microcontroller and analog semiconductors, providing low-risk product development, lower total system cost, and faster time to market for thousands of diverse customer applications worldwide. Headquartered in Chandler, Arizona, Microchip offers outstanding technical support along with dependable delivery and quality.

4.1.5 LM7805

7805 is a three terminal linear voltage regulator IC with a fixed output voltage of 5V which is useful in a wide range of applications. Currently, the 7805 Voltage Regulator IC is

manufactured by Texas Instruments, ON Semiconductor, STMicroelectronics, Diodes incorporated, Infineon Technologies, etc.
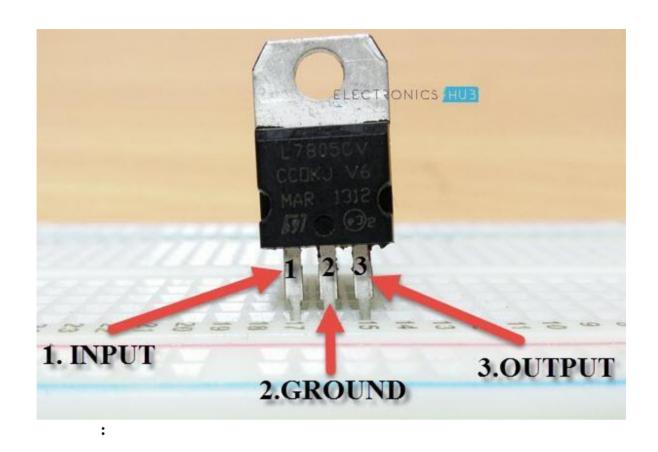

They are available in several IC Packages like TO-220, SOT-223, TO-263 and TO-3. Out of these, the TO-220 Package is the most commonly used one (it is the one shown in the above image.

Some of the important features of the 7805 IC are as follows:

- It can deliver up to 1.5 A of current (with heat sink).
- Has both internal current limiting and thermal shutdown features.
- Requires very minimum external components to fully function.

Pin Diagram of 7805 Voltage Regulator IC

As mentioned earlier, 7805 is a three terminal device with the three pins being 1. INPUT, 2. GROUND and 3. OUTPUT. The following image shows the pins on a typical 7805 IC in To-220 Package.
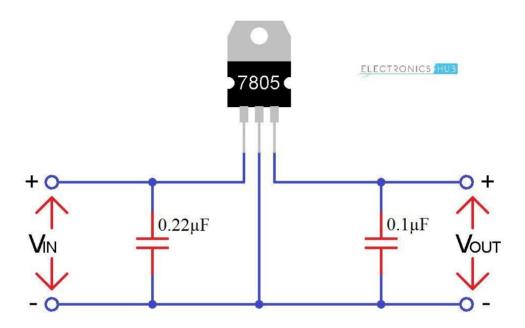
:

The pin description of the 7805 is described in the following table:

Pin No.	Pin	Function
1	INPUT	Input voltage (7V-35V)
2	GROUND	Ground (0V)
3	OUTPUT	Regulated output; 5V (4.8V5.2V)

Basic Circuit of 7805

As I have previously talked about regulated power supply as a device that works on DC voltages and it can uphold its output accurately at a fixed voltage all the time even if there is a significant alteration in the DC input voltage.

As per the datasheets of 7805 IC, the basic circuit required for 7805 to work as a complete regulator is very simple. In fact, if the input supply is an unregulated DC Voltage, then all you need are two capacitor (even those are not mandatory depending on the implementation).

Although batteries can be used as input to the 7805 Voltage Regulator IC, we face certain bumps like frequent discharge of batteries and reduction of battery voltage levels over a period of time.

The best alternative to using Batteries is to provide an unregulated but rectified DC Voltage from an AC Source. Since AC Source is easily available as mains supply, we can design a circuit to convert AC Mains to DC and provide it as input to the 7805 Voltage regulator IC.

4.1.6 DC Jake

A DC jack is a component used in many electronic devices that allows a steady power source to be plugged in. Though electronics require direct current (DC) power, alternating current (AC) is the type of electricity supplied to and available in household wall sockets, mainly because of its ability to be delivered over long distances without losing strength.

Therefore with
most electronics, an **AC adapter** connected to a DC jack is necessary to supply power in a usable way
Unlike AC plugs, which are uniform and regulated on a country-by-country basis, DC **jacks** and plugs, which are technically referred to as *coaxial power connectors*, are generally not standardized. Many electronics manufacturers have their own proprietary AC adapters, also known as *power bricks*, which employ unique sizes of DC jacks. Currently Germany and Japan are the only countries that have attempted to issue standards for DC jack sizes. Different AC adapters and DC jacks can vary in many ways, ranging from voltage to physical diameter.

Given the fragile nature of electronic circuitry, **power supplies** from different devices should not be mixed and matched. A DC jack is designed to accept only one size of connector. While various sizes may indeed look similar, it can be potentially dangerous to try and pair an unsuitable **power supply** with a device.
While the most common DC jack connectors measure .21 inches (5.5mm) in diameter and .37 inches (9.5mm) in length, it is not unusual to encounter some that are much longer and wider. Though not an absolute rule, larger connectors typically indicate higher voltages. Sony® is notable for instituting a system for its devices that indicates voltage in this way.

With laptop computers in particular, a DC jack is susceptible to suffering from wear and tear over time. With frequent connections and disconnections, the jack itself can begin to loosen and wear down it its housing, allowing the connector to slip out and disrupt power. While do-it-yourself repair can restore a tight fit without expensive labor costs, soldering is required and, for amateurs, the risk of doing greater damage to the device can be considerable.

Less common than the DC jacks that pair with AC adapters are styles known as *snap and lock connectors*. These jacks are standardized, with an outer diameter of .394 inches (10 mm) and connecting pins of .06 inches (1.5 mm) in diameter. The outer jacket of a snap and lock connector is grooved in such a way that matches grooves inside the paired DC jack, offering

a resilient physical connection. Examples of this design include the PS/2 connections used by some computer keyboards and mice.

4.1.6 Burgstips

Berg Strip is **a commonly found connector in all kind of circuit boards**. It is also called as Berg Stick because of its stick like structure. Berg Strip is designed by the Berg Electronics Corporation at Missouri. The Berg Strip is very light and compact and it can be easily assembled to a circuit board.

4.1.7 Breadboard,

A breadboard, or protoboard, is a construction base for prototyping of electronics. Originally the word referred to a literal bread board, a polished piece of wood used when slicing bread.[1] In the 1970s the solderless breadboard (a.k.a. plugboard, a terminal array board) became available and nowadays the term "breadboard" is commonly used to refer to these.
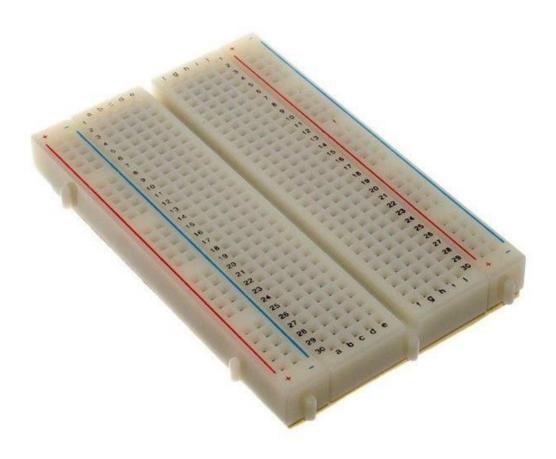
Because the solderless breadboard does not require soldering, it is reusable. This makes it easy to use for creating temporary prototypes and experimenting with circuit design. For this reason, solderless breadboards are also popular with students and in technological education. Older breadboard types did not have this property. A stripboard (Veroboard) and similar prototyping printed circuit boards, which are used to build semi-permanent soldered prototypes or one-offs, cannot easily be reused. A variety of electronic systems may be prototyped by using breadboards, from small analog and digital circuits to complete central processing units (CPUs).

Compared to more permanent circuit connection methods, modern breadboards have high parasitic capacitance, relatively high resistance, and less reliable connections, which are subject to jostle and physical degradation. Signaling is limited to about 10 MHz, and not everything works properly even well below that frequency.

A common use in the system on a chip (SoC) era is to obtain an microcontroller (MCU) on a pre-assembled printed circuit board (PCB) which exposes an array of input/output (IO) pins

in a header suitable to plug into a breadboard, and then to prototype a circuit which exploits one or more of the MCU's peripherals, such as [general-purpose input/output](#) (GPIO), [UART](#)/[USART](#) serial transceivers, [analog-to-digital converter](#) (ADC), [digital-to-analog converter](#) (DAC), [pulse-width modulation](#) (PWM; used in [motor control](#)), [Serial Peripheral Interface](#) (SPI), or [I²C](#).
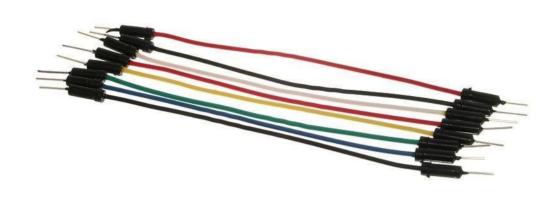
[Firmware](#) is then developed for the MCU to test, debug, and interact with the circuit prototype. High frequency operation is then largely confined to the SoC's PCB. In the case of high speed interconnects such as SPI and I²C, these can be debugged at a lower speed and later rewired using a different circuit assembly methodology to exploit full-speed operation. A single small SoC often provides most of these electrical interface options in a form factor barely larger than a large postage stamp, available in the American hobby market (and elsewhere) for a few dollars,

4.1.8 Jumperwires

A jump wire (also known as jumper, jumper wire, DuPont wire) is an [electrical wire](#), or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a [breadboard](#) or other prototype or test circuit, internally or with other equipment or components, without soldering.[1]

Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment.

4.1.9 2.2k,1k,10k Resistor

1) 2.2k- From the resistor color code table we need to find the color code of resistor with respect to its decimal value of the each band counted from left to right.
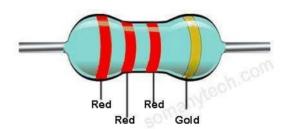

Fig. showing color code of 2.2k ohm resistor

Thus, for 2.2k ohm resistor, 1st digit is ' 2 ', ∴ look for color in a chart with value 2, then it's your 1st color(say red).
The next 2nd digit is ' 2 ', ∴ look for color in a chart with value 2, then it's your 2nd color (say red). Next 3rd digit '100' (but value 10^2 = 100) is multiplier ' 2 ', ∴ look for color in a chart with value 2, thenit's your 3rd color band (say red).

- The last bands in 4/5 th bands resistors shows the tolerance value of the resistor. Here, the Gold indicates a 5% tolerance value. For Silver, its values is 10%, and Brown it is value at 1% tolerance. If the 4th band is absent then it is taken as 20% tolerance.

2) 1k Resistor- This resistor most commonly used in electronic circuit and thus you can remember its color code.
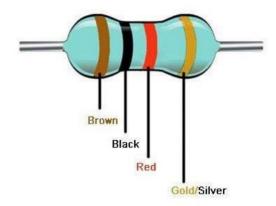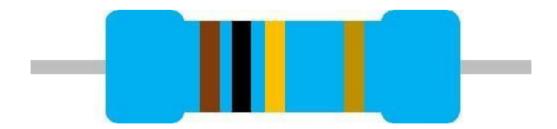

Fig. showing color code of 1k Ohm resistor

3) 10k Resistor- 10K / 10K Ohm Resistor Color Code – A resistor is a fundamental passive component for an electrical circuit. It provides a specific resistance to the circuit. Now we will learn how to get a 10k ohm resistor color code.

Resistor color code is a color code to indicate the resistance of that resistor. Resistor color code can be formed with 3, 4, or 5 color bands. Each band has their own number to form a resistance number. We can learn about this resistor color code easily when searching about "Resistor Color Code Chart". This resistor color code standard follows the IEC60062 used by worldwide applications.
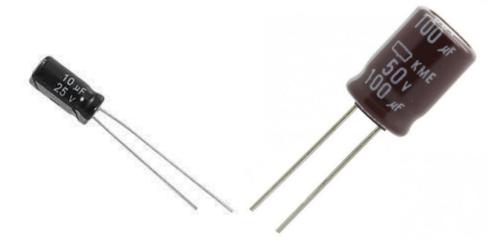
4.1.10 Capacitor 10uf , 100uf-

An **electrolytic capacitor** is a polarized [capacitor](#) whose [anode](#) or positive plate is made of a metal that forms an insulating [oxide](#) layer through [anodization](#). This oxide layer acts as the [dielectric](#) of the capacitor. A solid, liquid, or gel [electrolyte](#) covers the surface of this oxide layer, serving as the [cathode](#) or negative plate of the capacitor. Due to their very thin dielectric oxide layer and enlarged anode surface, electrolytic capacitors have a much higher [capacitance](#)-[voltage](#) (CV) product per unit volume than [ceramic capacitors](#) or [film capacitors](#), and so can have large capacitance values. There are three families of electrolytic capacitor: [aluminum electrolytic capacitors](#), [tantalum electrolytic capacitors](#), and [niobium electrolytic capacitors](#).

The large capacitance of electrolytic capacitors makes them particularly suitable for passing or bypassing low-frequency signals, and for storing large amounts of energy. They are widely used for decoupling or noise [filtering](#) in [power supplies](#) and DC link circuits for [variable-frequency drives](#), for coupling signals between [amplifier](#) stages, and storing energy as in a [flashlamp](#).

Electrolytic capacitors are polarized components due to their asymmetrical construction and must be operated with a higher voltage (ie, more positive) on the anode than on the cathode at all times. For this reason the polarity is marked on the device housing. Applying a reverse polarity voltage, or a voltage exceeding the maximum rated working voltage of as little as 1 or 1.5 volts, can destroy the dielectric and thus the capacitor. The failure of electrolytic capacitors can be hazardous, resulting in an explosion or fire. Bipolar electrolytic capacitors which may be operated with either polarity are also made, using special constructions with two anodes connected in series. A bipolar electrolytic capacitor can also be made by connecting two normal electrolytic capacitors in series, anode to anode or cathode to cathode.

CHAPTER 5
DESIGN AND
IMPLEMENTATION

1. Outcomes

1) Program

```cpp
#include <TinyGPS++.h>
#include <SoftwareSerial.h>

#include <Wire.h>
#include <LiquidCrystal_I2C.h>

LiquidCrystal_I2C lcd(0x27,16,2);

static const int RXPin = 4, TXPin = 3;
static const uint32_t GPSBaud = 9600;

// The TinyGPS++ object
TinyGPSPlus gps;

// The serial connection to the GPS device
SoftwareSerial GPS(RXPin, TXPin);

void setup(){
  Serial.begin(9600);
  GPS.begin(GPSBaud);

  lcd.begin();
  // Print a message to the LCD.
  lcd.backlight();
  lcd.setCursor(3,0);
  lcd.print("GPS System");
```

```cpp
}

void loop(){
  while (GPS.available() > 0){
    gps.encode(GPS.read());
    if (gps.location.isUpdated()){
      Serial.print("Latitude= ");
      Serial.print(gps.location.lat(), 6);
      Serial.print(" Longitude= ");
      Serial.println(gps.location.lng(), 6);
      lcd.clear();
      lcd.setCursor(0,1);
      lcd.print("Long:");
      lcd.setCursor(5,1);
      lcd.print(gps.location.lng(), 6);
      lcd.setCursor(0,0);
      lcd.print("Latt:");
      lcd.setCursor(5,0);
      lcd.print(gps.location.lat(), 6);
    }
  }
}
```
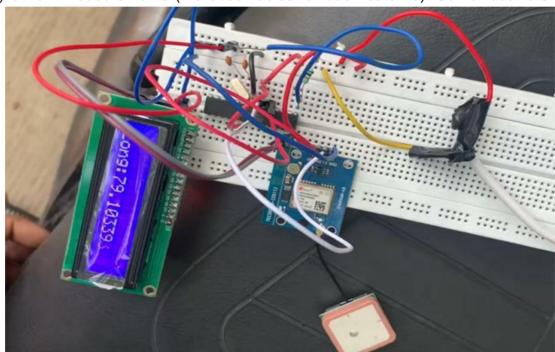
CHAPTER 6
RESULT AND CONCLUSION

6.1 RESULT

GPS receiver module gives output in standard (National Marine Electronics Association) NMEA string format. It provides output serially on Tx pin with default 9600 Baud rate. This NMEA string output from GPS receiver contains different parameters separated by commas like longitude, latitude, altitude, time etc.

The satellites continuously send data down to earth over dedicated RF frequencies. Our pocket-sized GPS receivers have tiny processors and antennas that directly receive the data sent by the satellites and compute your position and time on the fly.

This highly depends on the receiver model used and what kind of data you are looking for. Basically, two different types of outputs can be available, position solutions (including velocities) or raw measurements (the observables for each satellite). Some receivers (the

cheaper ones) are limited to position output, while other receivers can output the raw data as well. For positions, the NMEA format is quite handy, but not for raw measurements. These are usually output in a binary, proprietary protocol which is different between the various receiver manufacturers. However, most receivers include some tools which allow the transformation of these propietary protocols into the RINEX format. This is the "receiver independent exchange format", but is used for post-processing rather than for live output.

Additionally, professional GNSS receivers can be configured quite flexibly, so that the type of output, the update rate and the output port (network, serial ports, bluetooth, usb, ...) can be configured as desire.

6.2 CONCLUSION

GPS is a fantastic tool of the 21st century offering many functions: waypoint, MOB…. However, received information is not always reliable, and it would have been interesting to see in which cases it is not. Furthermore, the space segment is completely controlled by the American Army which enables them to completely remove the satellite cover in certain countries in the event of a war… This aspect mobilized Europe towards the creation of its own GPS system: the project GALILEO, which should be in place2008. The future of GPS appears to be virtually unlimited; technological fantasies abound. The system provides a novel, unique, and instantly available address for every square yard on the surface of the planet–a new international standard for locations and distances. To the computers of the world, at least, our locations may be defined not by a street address, a city, and a state, but by a longitude and a latitude. With the GPS location of services stored with phone numbers in computerized "yellow pages," the search for a local restaurant or the nearest gas station in any city, town, or suburb will be completed in an instant. With GPS, the world has been given a technology of unbounded promise, born in the laboratories of scientists who were motivated by their own curiosity to probe the nature of the universe and our world, and built on the fruits of publicly supported basic research.

CHAPTER 7
FUTURE SCOPE

7. Future Scope :

The GPS III satellites will continue to be launched through about 2025. The new GPS satellites can provide better positioning accuracy because of a new set of atomic clocks carried aboard each satellite. Because they have more transmitter power, GPS reception can be more reliable, even indoors and in dense urban areas.

By tracking and managing these vehicles in real-time, enterprises can efficiently utilize their resources. Vehicle tracking System by Utrack ensures the safety of vehicles. In case of an emergency, Utrack helps to locate the vehicles and show the exact location from where a distress signal was received.

Smartphone plays an important role in the day to day life. Technological revolution helps manufacturers introduce a variety of smartphones at lower prices. Advancements in technology and different software applications allow smartphone users to access GPS signals to track vehicles, etc.

Utrack has developed a mobile application which is easy to install, provide user-friendly GUI, and are affordable. Adoption of smartphones as tracking devices is increasing rapidly. Many cab service providers and transportation companies are using tracking devices to track their vehicles.

GPS tracking devices are available in sizes that are smaller than a smartphone and are expected to become even smaller in the near future. With recent technological advancements, it is possible to develop thumbnail-sized GPS receivers and tiny batteries, which make GPS tracking unit a long-lasting application.

The inbuilt non-rechargeable batteries in GPS tracker have an average lifespan of 3– 4 years; these help in smooth operations. Utrack devices will provide a high return on investment (ROI) and minimum sale guarantee for Distributors & Dealers. Pragati Advance GPS tracker provides various valuable information related to vehicle engine diagnosis, temperature control, and others. These devices can be used to monitor vehicles from a remote location.

The transportation & logistics industry represented the biggest portion of the GPS tracking device market. The said industry is expected to grow at the highest rate in the coming years. Utrack GPS tracking device can be used in commercial vehicles such as trucks, trailers, buses, and light commercial vehicles for tracking purposes.

The rise in adoption of intelligent transport systems is the prime driving factor of the global vehicle tracking systems market. Another factor which positively impacted the sales of vehicle tracking systems is the safety and security concern of women within transportation services. Utracker GPS tracker ID card is designed especially for women, older Citizens & children safety with multi-functional live tracking facilities. Wear around his/her neck like an ID card & Track and monitor your loved ones from the comfort of your home with Mobile Application.

Increase in choices creating market shifts is a challenging factor for the top players in the vehicle tracking systems market. These rising number of industry players leads to a fragmented industry structure. On the contrary, the vehicle tracking systems market analysis is expected to create an opportunistic market for place

REFERENCES

References:

[1] Altamimi, Z., Collilieux, X., and Métivier, L., 2011. ITRF2008: an improved solution of the international terrestrial reference frame. *Journal of Geodesy*, **85**(8), 457–473, doi:10.1007/s00190-011-0444-4.CrossRef

2BIPM, 1998. *The International System of Units (SI)*, 7th edn. Paris: International Bureau of Weights and Measures.

3IERS Conventions, 2010. In Petit, G., and Luzum, B. (eds.), *IERS Technical Note 36*. Frankfurt am Main: Verlag des Bundesamts für Kartographie und Geodäsie. 179 pp., ISBN 3-89888-989-6 (print version) http://www.iers.org/IERS/EN/Publications/TechnicalNotes/tn36.html

[4] Hofmann-Wellenhof, B., Lichtenegger, H., and Wasle, E., 2008. *GNSS- Global Navigation Satellite Systems: GPS, GLONASS, Galileo, and More*. Wein/New York: Springer. ISBN 978-3-211-73012-6.

4   Heda Venkata Sai Ajith, Pinjala Sai Kiran "Fuel Theft Detection System" International Journal of Research in Engineering, Science and Management (IJRESM),Volume-1, Issue-10, October-2018

5   Moritz, H., 1980. Geodetic reference system 1980. *Bulletin Géodésique*, **54**(3), 395–405.[CrossRef]A.

6   National Research Council, 2010. *Precise Geodetic Infrastructure: National Requirements for a Shared Resource*. Washington, DC: The National Academies Press.

7   Plag, H.-P., and Pearlman, M., 2009. *Global Geodetic Observing System*. Berlin: Springer.[CrossRef]

8   Prof. Trupti K. Wable, Prof. Rajashree R. Shinde "GSM Based Digital Fuel Meter and Fuel Theft Detection using PIC Microcontroller" International Journal of Advanced Research in Science, Engineering and Technology (IJARSET) Volume 03, Issue 04 , April 2016

9   Jaimon Chacko Varghese, BineshEllupurayil Balachandran "Low Cost Intelligent Real Time Fuel Mileage Indicator for Motorbikes" International Journal of Innovative Technology and Exploring Engineering (IJITEE) Volume-2 Issue-5, April 2013

10   Praik Manu Chikne, Nikhil Sanjay Dalvi, Rajkumar Dayanand Rathod, Mankesh Ajay Bhagat, Prof. Nilam R. Kapre "Design and development of digital fuel meter indicator for 2 wheelersplender vehicle" International Journal of Innovation in Engineering Research and Technology [IJIERT] Volume 7, Issue 4, Apr.-2020

11Raveena A1, Deepa R2 "Fuel measurement Using Loadcell" International Research Journal of Engineering and Technology (IRJET) Volume: 04 Issue: 10 Oct -2017