# TRACKERQUE

**A Project**

**Report of PBLA**

## EMBEDDED SYSTEM

BY

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**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**
**SCHOOL OF ELECTRICAL AND ELECTRONICS**

# SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY**
**(DEEMED TO BE UNIVERSITY)**
**Accredited with Grade "A" by NAAC**
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**APRIL - 2023**

**DEPARTMENT OF ELECTRONICS AND COMMUNICAITON ENGINEERING**

## BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of

DHANUSRI.E(40130047)

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who carried out the P B L A project entitled " **TRACKERQUE** " underour supervision from Jan 2023 to April2023.

**Faculty Incharge**

DR.MR.JEGAN.L

**Head of the Department**

**Dr. T. RAVI, M.E., Ph.D.,**

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**Submitted for Viva voce Examination held on_____**

**Internal Examiner** **External Examiner**

## DECLARATION

Myself DHANUSRI.E(40130047) , hereby declare that

project The title **“TRACKERQUE”**done by us under the guidance of Dr. /Prof./ Mr./Ms. JEGAN.L is submitted in partial fulfillment of the requirements for the Project Based Learning Assessment on “EMBEDDED SYSTEM FOR ELECTRONIC ENGINEERS”.

**DATE:26.04.2023**

**PLACE:chennai**

**SIGNATURE OF THE CANDIDATE.**

**DHANUSRI.E**

## ACKNOWLEDGEMENT

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

We convey my/our thanks to **Dr. N. M. NANDHITHA, M.E., Ph.D., Professor & Dean, School of Electrical and Electronics and Dr. T. RAVI, Ph.D., Professor & Head, Department of Electronics and Communication Engineering** for providing us necessary support and details at the right time during the progressive reviews.

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paved way for the successful completion of our project work.

We wish to express my/our thanks to all Teaching and Non-teaching staff members of the Department of Electronics and Communication Engineering who were helpful in many ways for the completion of the project.

## ABSTRACT

GPS tracking is a technology that allows the real-time tracking of objects or individuals through the use of Global Positioning System (GPS) technology. The system uses satellites to determine the location of the device or individual being tracked, and provides location data that can be accessed through a web interface or a mobile application. This technology is used in various fields such as transportation, logistics, law enforcement, and personal safety. The benefits of GPS tracking include improved efficiency, better asset management, increased safety and security, and improved customer service. This abstract provides a brief overview of GPS tracking technology and its applications.

## INTRODUCTION

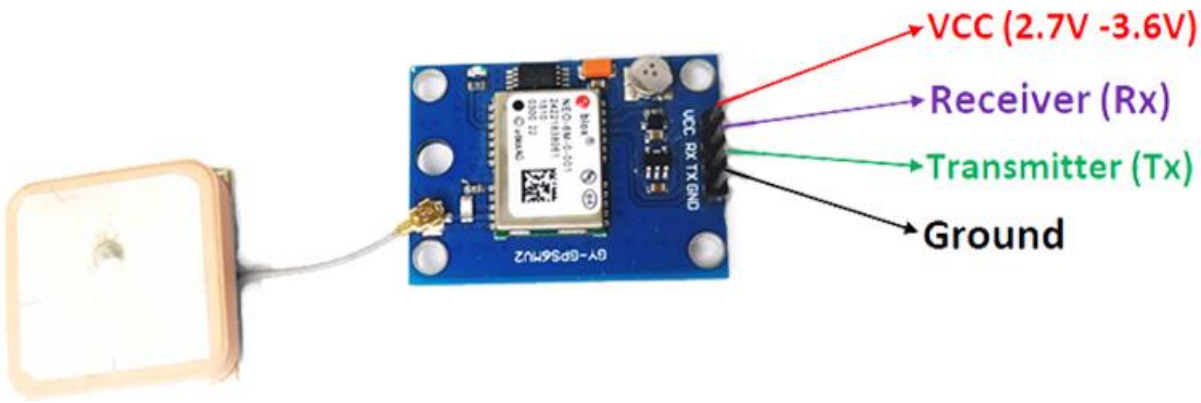
GPS tracking is a revolutionary technology that has transformed the way we track and locate objects and people. The technology relies on Global Positioning System (GPS) satellites to determine the precise location of the device or individual being tracked. The data obtained from GPS tracking is transmitted through cellular

networks or the internet, allowing users to access real-time location information from anywhere in the world. This technology has numerous applications, including vehicle and asset tracking, personal safety, and law enforcement. The benefits of GPS tracking include increased efficiency, better asset management, and improved safety and security. In this context, this introduction provides a broad overview of GPS tracking technology, its working principle, and its various applications.

GPS tracking is a technology that uses Global Positioning System (GPS) technology to track and locate objects and individuals in real-time. The technology relies on satellite signals to determine the precise location of the device or person being tracked, and the data obtained is transmitted through cellular networks or the internet. GPS tracking has a wide range of applications, including transportation, logistics, personal safety, and law enforcement. The benefits of GPS tracking include increased efficiency, better asset management, improved safety and security, and enhanced customer service.

## Components Required

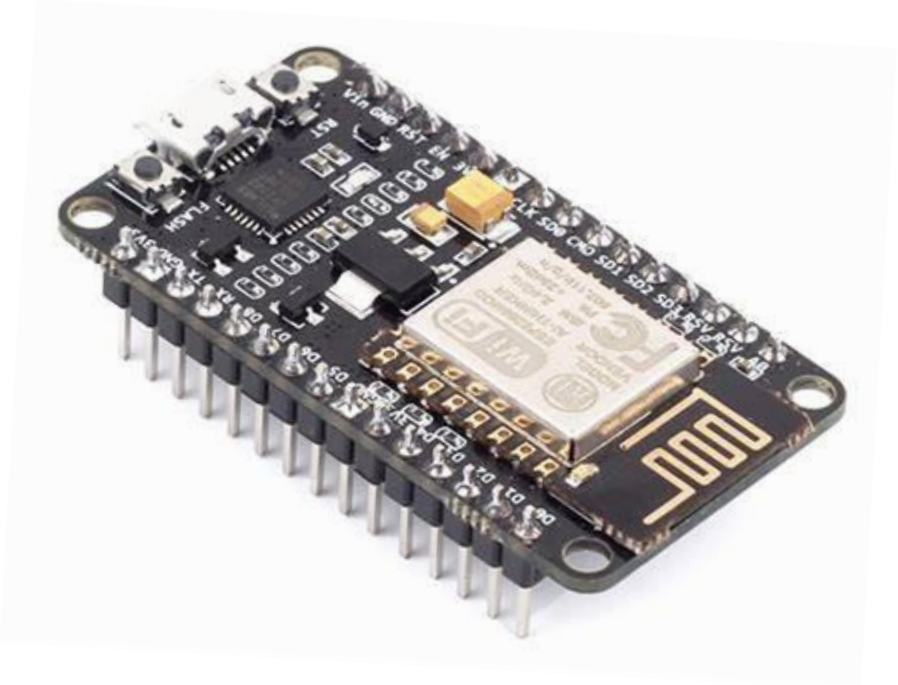
- NEO 6M GPS module
- Node MCU
- Connecting wires



The NEO-6M GPS module is a popular GPS receiver module that is widely used in GPS tracking applications. The module uses the Global Positioning System (GPS) to determine the device's location by receiving signals from GPS satellites. Here is a brief overview of how the NEO-6M GPS module works:

1. GPS Receiver: The NEO-6M GPS module consists of a GPS receiver that is responsible for receiving signals from GPS satellites. The receiver is designed to work with up to 22 satellites in a constellation and can receive signals from both the GPS and GLONASS satellite systems.
2. Microcontroller: The module also includes a microcontroller that is responsible for processing the GPS data received by the GPS receiver. The microcontroller uses this data to calculate the device's latitude, longitude, altitude, speed, and time.
3. UART Interface: The NEO-6M GPS module communicates with other devices using a UART (Universal Asynchronous Receiver/Transmitter) interface. This interface allows the module to transmit GPS data to other devices such as microcontrollers, computers, or smartphones.
4. Antenna: The NEO-6M GPS module requires an external active antenna to receive GPS signals. The antenna is connected to the module's antenna input, and it amplifies the GPS signals received by the module.
5. Power Supply: The module requires a power supply of 3.3V to 5V to operate.

In summary, the NEO-6M GPS module works by receiving GPS signals from satellites, processing the data using a microcontroller, and transmitting the location information over a UART interface. The module requires an external active antenna and a power supply to function.



The ESP8266 is a popular Wi-Fi module that can be used for GPS tracking by connecting it to a GPS module such as the NEO-6M. Here is a brief overview of the process for GPS tracking using the ESP8266:

1. Connect GPS module: The first step is to connect the GPS module to the ESP8266 module. This is usually done by connecting the TX and RX pins of the GPS module to the RX and TX pins of the ESP8266 module.
2. Configure GPS module: The GPS module needs to be configured to output GPS data in a specific format that can be read by the ESP8266. This can be done using the AT commands supported by the GPS module.
3. Program ESP8266: The ESP8266 module needs to be programmed to read GPS data from the GPS module and transmit it over Wi-Fi. This can be done using a programming language such as Arduino, Lua or MicroPython.
4. Connect to Wi-Fi: The ESP8266 module needs to be connected to a Wi-Fi network to transmit GPS data to a server or a web interface. The Wi-Fi credentials can be stored in the ESP8266's memory or input manually during setup.
5. Transmit GPS data: The ESP8266 module can transmit GPS data to a server or a web interface using HTTP requests, MQTT or other protocols. The GPS data can be visualized on a map or stored in a database for further analysis.

In summary, GPS tracking using the ESP8266 involves connecting a GPS module to the ESP8266, configuring the GPS module, programming the ESP8266 to read GPS data and transmit it over Wi-Fi, connecting to a Wi-Fi network, and transmitting GPS data to a server or a web interface.

## SOFTWARE COMPONENTS

- *THINGSPEAK*
- *ARDUINO IDE*
- *MIT APP INVERTOR*

*CODE FOR NODEMUCU(ESP8266) IN ARDUINO IDE*

- Gps module transmit the data through the nodemcu for that purpose use this code.

```
#include <TinyGPS++.h>
#include <SoftwareSerial.h>
#include "ThingSpeak.h"
#include <ESP8266WiFi.h>
static const int RXPin = 4, TXPin = 5;
static const uint32_t GPSBaud = 9600;
float latitude , longitude;
String  lat_str , lng_str;
// repace your wifi username and password
const char* ssid     = "Mamameya";
const char* password = "244466666";
unsigned long myChannelNumber = 991048;
const char * myWriteAPIKey = "RX9R15V8GH3941CK";
// The TinyGPS++ object
TinyGPSPlus gps;
WiFiClient  client;
// The serial connection to the GPS device
SoftwareSerial ss(RXPin, TXPin);
void setup()
{
  Serial.begin(115200);
  ss.begin(GPSBaud);
  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.println("IP address: ");
  Serial.println(WiFi.localIP());
  Serial.print("Netmask: ");
  Serial.println(WiFi.subnetMask());
  Serial.print("Gateway: ");
  Serial.println(WiFi.gatewayIP());
  ThingSpeak.begin(client);
}
void loop()
{
  while (ss.available() > 0){
    if (gps.encode(ss.read()))
    {
      if (gps.location.isValid())
      {
        latitude = gps.location.lat();
        lat_str = String(latitude , 6);
        longitude = gps.location.lng();
        lng_str = String(longitude , 6);
        Serial.print("Latitude = ");
        Serial.println(lat_str);
        Serial.print("Longitude = ");
        Serial.println(lng_str);
        ThingSpeak.setField(1, lat_str);
        ThingSpeak.setField(2, lng_str);
        ThingSpeak.writeFields(myChannelNumber, myWriteAPIKey);
      }
     delay(1000);
     Serial.println();
    }
  }
}
```

## *CODE FOR THINGSPEAK.*

- It read the data from the gps

```
lat = thingSpeakRead(******,'Fields',1,'ReadKey','****************','NumPoints',10
,'Timeout',50);

lon = thingSpeakRead(******,'Fields',2,'ReadKey','****************','NumPoints',10
,'Timeout',50);
```

The below code pinpoints the location on the map using the latitude and longitude, which are provided by the nodeMCU.

```
geoscatter(lat,lon,'h');
geobasemap('streets');
```

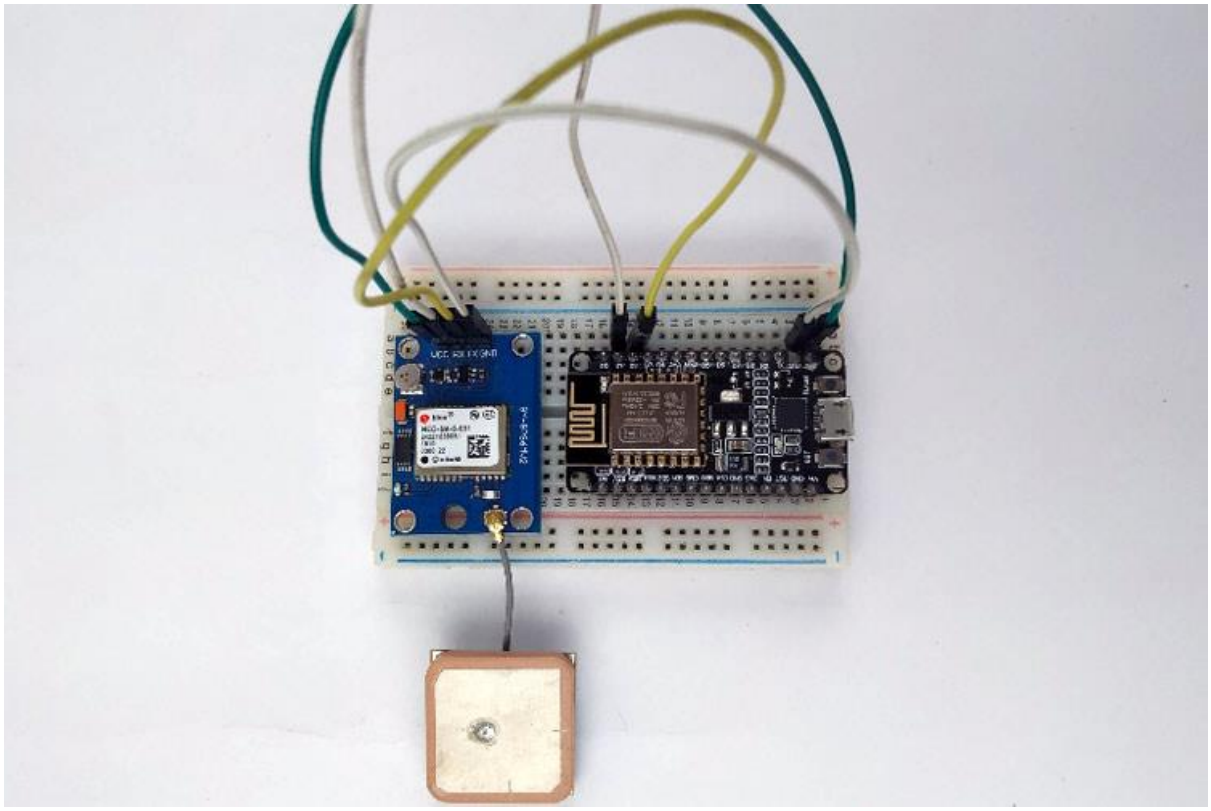
## ALGORITHM

The algorithm for GPS tracking using the NEO-6M GPS module and ESP8266 can be summarized as follows:

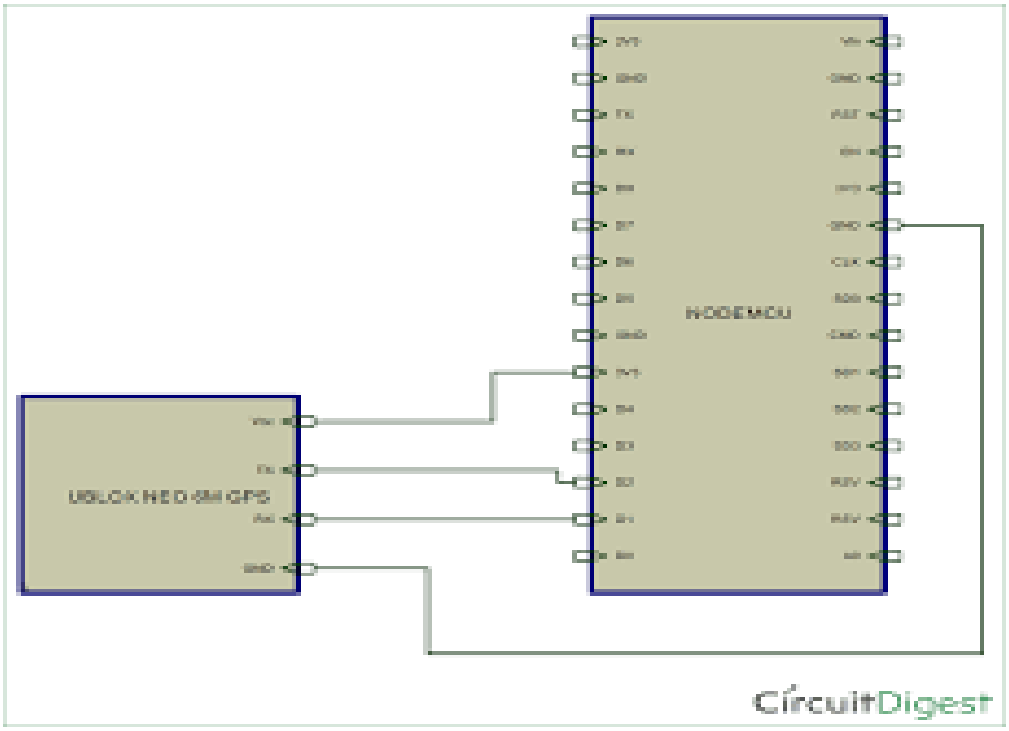
1. Initialize the GPS module and ESP8266.
2. Set the baud rate for the serial communication between the GPS module and ESP8266.
3. Configure the GPS module to output NMEA data.
4. Set up the ESP8266 to connect to a Wi-Fi or cellular network.
5. Continuously read the GPS data from the GPS module via the serial interface.
6. Process the GPS data to extract the location information, such as latitude and longitude.
7. Send the location data to a server or web interface via a Wi-Fi or cellular connection.
8. Repeat steps 5 to 7 at a predefined interval to continuously track the location of the device.
9. Optionally, add additional features such as real-time tracking, alerts, and geofencing.
10. Shut down the system when not in use to conserve power.

The above algorithm is a basic outline and can be further customized based on the specific application and requirements. The implementation details of the algorithm can vary depending on the programming language and the development platform used

## CIRCUIT CONNECTION.



## BLOCK DIAGRAM




## WORKING PROCESS:

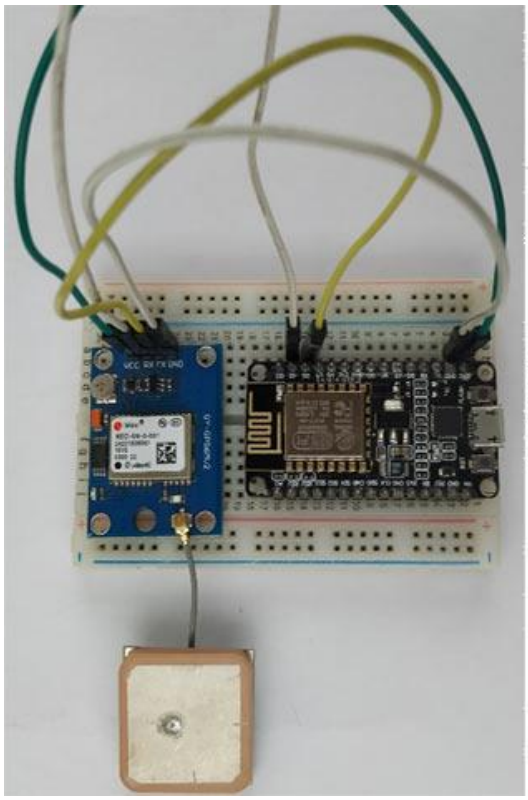
To implement GPS tracking using the NEO-6M GPS module and ESP8266, the following working process can be followed:

1. The GPS module and ESP8266 are connected via the UART interface. The TX pin of the GPS module is connected to the RX pin of the ESP8266, and the RX pin of the GPS module is connected to the TX pin of the ESP8266.
2. The ESP8266 is programmed to read the GPS data from the GPS module via the serial interface.
3. The GPS data received by the ESP8266 is then processed to extract the location information, such as latitude and longitude.
4. The ESP8266 then sends the location data to a server or a web interface using a Wi-Fi or cellular connection.
5. The server or web interface receives the location data and stores it in a database or displays it on a map.
6. The user can then access the location data from the server or web interface to track the location of the device.

Overall, the NEO-6M GPS module and ESP8266 can be used together to implement a simple GPS tracking system that is easy to set up and use. The system can be

customized to suit different applications and requirements by modifying the code and adding additional features, such as real-time tracking and alerts.

## OUTPUT :




## APPLICATIONS:

1. Vehicle tracking: GPS tracking can be used to track the location of vehicles such as cars, trucks, and buses. This can help fleet managers to monitor the location and movement of vehicles in real-time, optimize routes, and improve the efficiency of their operations.
2. Asset tracking: GPS tracking can be used to track the location of valuable assets such as machinery, equipment, and containers. This can help businesses to monitor their assets, prevent theft, and improve asset utilization.
3. Personal tracking: GPS tracking can be used to track the location of people, such as children, elderly individuals, and workers in remote locations. This can help to ensure their safety and provide peace of mind to their family members or employers.

4. Geotagging: GPS tracking can be used to tag photos and videos with the location information. This can be useful for photographers, vloggers, and social media influencers who want to document their travels and experiences.
5. Wildlife tracking: GPS tracking can be used to track the location and movement of wildlife such as birds, mammals, and fish. This can help conservationists and researchers to study the behavior and migration patterns of different species.

## REFRENCES:

Here are some references for GPS tracking using the NEO-6M GPS module and ESP8266:


1. "GPS Tracking using ESP8266 and NEO6MV2 GPS Module" by Circuit Digest - https://circuitdigest.com/microcontroller-projects/gps-tracking-using-esp8266-and-neo6mv2-gps-module
2. "ESP8266 GPS Tracker with Neo-6M and OLED Display" by Random Nerd Tutorials - https://randomnerdtutorials.com/esp8266-gps-neo-6m-oled-display/
3. "GPS Tracking System using ESP8266 and Neo-6M GPS Module" by Electronic Clinic - https://electronicclinic.com/gps-tracking-system-using-esp8266-and-neo-6m-gps-module/
4. "Real-Time GPS Tracking System Using ESP8266-01, Neo 6M and Adafruit.IO" by Instructables - https://www.instructables.com/Real-Time-GPS-Tracking-System-Using-ESP8266-01-Ne/


## FUTURE SCOPE:

The future scope of GPS tracking using the NEO-6M GPS module and ESP8266 is promising, with the potential for further advancements and applications. Some of the future developments in this technology could include:

1. Integration with other sensors: The GPS tracking system could be integrated with other sensors such as accelerometers, temperature sensors, and humidity sensors to provide additional information about the environment and the conditions of the device being tracked.

2. Improved accuracy: Future developments in GPS technology could lead to improved accuracy, which could enable more precise tracking and location information.
3. Real-time tracking and analytics: Real-time tracking and analytics could provide businesses with valuable insights into the movement of their assets and vehicles, allowing them to optimize their operations and improve their efficiency.
4. Machine learning and artificial intelligence: The integration of machine learning and artificial intelligence could enable the GPS tracking system to learn from past data and make predictions about future movements and locations.
5. Increased security and privacy: Advances in encryption and security protocols could help to improve the security and privacy of GPS tracking systems, ensuring that location data is only accessible to authorized individuals.

Overall, the future scope of GPS tracking using the NEO-6M GPS module and ESP8266 is vast, and there is the potential for further advancements and applications in various industries and fields.

## CONCLUSION:

In conclusion, GPS tracking using the NEO-6M GPS module and ESP8266 is a versatile technology with various applications in different industries and fields. It enables the tracking of the location and movement of assets, vehicles, and people, and provides valuable information for businesses, individuals, and researchers.

The technology has a straightforward working process, and with the right hardware components and algorithm, it can be easily implemented. Moreover, the technology is continuously evolving, with promising future developments such as integration with other sensors, improved accuracy, real-time tracking and analytics, and machine learning and artificial intelligence.

Overall, GPS tracking using the NEO-6M GPS module and ESP8266 is a valuable tool that can help to optimize operations, improve asset utilization, ensure safety, and provide valuable insights into the movement and behavior of various entities.