IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 4, March 2026
Impact Factor: 8.2

GPS Tracker Using Arduino

Shruti Singh
Student, Diploma in Computer Engineering
Vishweshwarayya Institute of Engineering and Technology, Almala, Maharashtra, India

Abstract: *The advancement of embedded systems and Internet of Things (IoT) technologies has significantly improved real-time monitoring and tracking systems. This paper presents the design and implementation of a GPS tracker using Arduino, aimed at providing accurate location tracking with minimal cost and complexity. The system integrates a GPS module to acquire geographic coordinates and a communication module (GSM/Wi-Fi) to transmit the data to users. The proposed system is efficient, portable, and highly scalable for various applications such as vehicle tracking, personal safety, and smart agriculture. The project demonstrates how low-cost hardware and open-source platforms can be used to build reliable tracking solutions, making it suitable for both urban and rural deployments.*

Keywords: Arduino, GPS Tracker, IoT, Embedded System, Real-Time Tracking, GSM Module, Location Monitoring

I. INTRODUCTION

In today's fast-paced world, tracking systems have become essential for ensuring safety, improving logistics, and enhancing operational efficiency. The Global Positioning System (GPS) is a satellite-based navigation system that provides location and time information anywhere on Earth. When combined with microcontroller platforms like Arduino, GPS can be used to develop compact and efficient tracking systems.

Arduino is an open-source electronics platform based on easy-to-use hardware and software. It allows developers to interface various modules such as GPS, GSM, and sensors to create innovative solutions. This project focuses on developing a GPS tracker using Arduino that can capture real-time location data and transmit it to a user via mobile or web interface.

The system is particularly useful in sectors like transportation, agriculture, security, and emergency services. With the integration of IoT, such systems can be further enhanced for remote monitoring and data analytics.

II. LITERATURE SURVEY

Various researchers and developers have explored GPS-based tracking systems over the years:

Early GPS tracking systems were bulky, expensive, and limited to military or high-end industrial applications.

With the introduction of microcontrollers like Arduino, the cost and complexity of such systems have reduced significantly.

Studies show that combining GPS with GSM modules enables real-time tracking through SMS or internet-based applications.

IoT-based tracking systems provide cloud storage and remote accessibility, enhancing usability.

Research in agriculture highlights the use of GPS tracking for precision farming, including monitoring equipment and land boundaries.

Several projects have demonstrated the effectiveness of GPS tracking in vehicle theft prevention and fleet management.

The literature indicates a growing trend toward low-cost, portable, and efficient tracking solutions using embedded systems.

DOI: 10.48175/IJARSCT-31826

ISSN 2581-9429 IJARSCT

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 4, March 2026
Impact Factor: 8.2

III. SCOPE OF THE PROJECT

• Functional Scope

The functional scope defines what the system is capable of doing:
Acquire real-time location data (latitude and longitude) using GPS module
Process data using Arduino microcontroller
Transmit location information via GSM or Wi-Fi module
Provide tracking information to users through mobile or web platforms
Enable continuous monitoring and updates
Optional integration with sensors for extended functionality

• Non-Functional Scope

The non-functional scope defines system performance and quality attributes:
Reliability: System should work continuously without failure
Accuracy: GPS data should be precise within acceptable limits
Performance: Quick data processing and transmission
Scalability: Ability to expand with additional modules
Cost Efficiency: Affordable for common users
Usability: Easy to operate and maintain
Power Efficiency: Low energy consumption for longer operation

IV. METHODOLOGY / APPROACH

Step 1: Problem Analysis & Requirement Gathering

The first step involves identifying the need for a GPS tracking system. Requirements such as tracking accuracy, communication method (GSM/Wi-Fi), power supply, and cost constraints are analyzed. User needs such as real-time monitoring and ease of access are also considered.

Step 2: System Architecture & Design

The system consists of the following components:
Arduino microcontroller (central unit)
GPS module (for location tracking)
GSM/Wi-Fi module (for communication)
Power supply unit
The architecture is designed such that the GPS module sends location data to Arduino, which processes and forwards it to the communication module for transmission.

Step 3: Development & Modular Implementation

This phase involves hardware and software development:
Connecting GPS module to Arduino
Writing code to read GPS data
Interfacing GSM/Wi-Fi module
Programming data transmission logic
Testing individual modules separately
Integrating all modules into a complete system

Step 4: Testing & Quality Assurance

Testing ensures system reliability and performance:

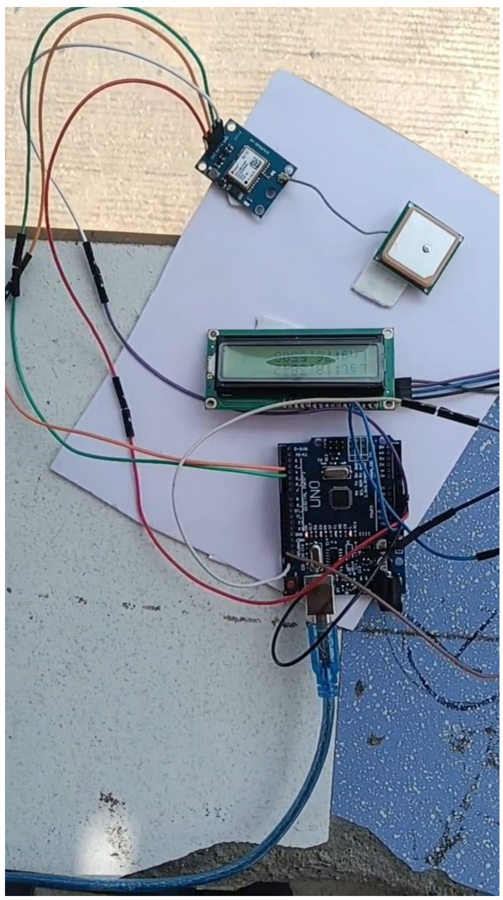
IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 4, March 2026
Impact Factor: 8.2

Checking GPS signal accuracy in different locations
Verifying communication module functionality
Debugging software errors
Ensuring stable operation under various conditions
Conducting real-time tracking tests

Step 5: Implementation & Deployment

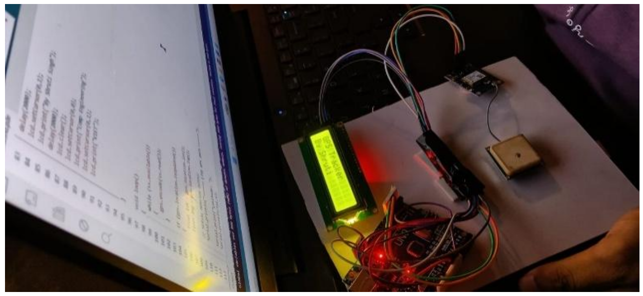
The final system is deployed in real-world scenarios:
Installed in vehicles or portable devices
Connected to mobile or web application
Monitored for performance and accuracy
Adjustments made based on feedback

V. OUTPUT



DOI: 10.48175/IJARSCT-31826

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 4, March 2026
Impact Factor: 8.2



VI. ADVANTAGES

Easy Access to Information:
Users can easily access real-time location data through mobile devices or web applications, improving monitoring efficiency.
Time-Saving:
Reduces time spent locating vehicles, assets, or individuals, especially in emergency situations.
Government Scheme Awareness:
The system can be extended to track resources distributed under government schemes, ensuring transparency and proper utilization.
Digital Empowerment:
Encourages adoption of digital technologies in rural and urban areas, bridging the digital divide.
Smart Crop Selection:
In agriculture, GPS data can help farmers analyze land location and choose suitable crops based on geographic conditions.
Risk Management:
Improves safety by enabling continuous monitoring, reducing risks related to theft, loss, or accidents.
Highly Accessible:
Low-cost components make the system affordable and accessible to a wide range of users.

VII. APPLICATIONS

Precision Nutrient Management:
GPS tracking helps farmers monitor field locations and apply fertilizers accurately, improving crop yield.
Strategic Crop Selection:
Location-based data assists in selecting crops suitable for specific regions and soil conditions.
Weather-Responsive Farm Operations:
Integration with weather systems allows farmers to plan activities based on environmental conditions.
Direct Access to Financial Aid:
Tracking agricultural assets ensures proper distribution of government subsidies and financial support.
Accessible Agricultural Education:
Provides practical learning tools for students and farmers to understand modern farming technologies.
Additional Applications:
Vehicle tracking and fleet management
Personal safety and emergency tracking
Logistics and supply chain monitoring
Wildlife tracking and research

VIII. CONCLUSION

The GPS tracker using Arduino is an efficient, low-cost, and reliable solution for real-time location tracking. The system demonstrates how embedded systems and IoT technologies can be combined to create practical and scalable solutions. It is suitable for a wide range of applications including transportation, agriculture, and personal safety. Future improvements may include cloud integration, mobile applications, and AI-based analytics for enhanced functionality.

IX. ACKNOWLEDGMENT

We express our sincere gratitude to our professors, mentors, and institution for their continuous support and guidance throughout this project. Their encouragement and valuable suggestions played a vital role in the successful completion of this work. We also thank our peers and technical staff for their assistance.

REFERENCES

Arduino Official Documentation
https://www.arduino.cc
– Provides detailed information on Arduino hardware, programming, and libraries.
NEO-6M GPS Module Datasheet
– Contains specifications, pin configuration, and working principles of the GPS module.
SIM800/SIM900 GSM Module Documentation
– Includes AT commands and communication protocols for GSM-based data transmission.
Electronics Hub
https://www.electronicshub.org
– Tutorials and project guides on embedded systems and GPS tracking.
IEEE Xplore Digital Library
https://ieeexplore.ieee.org
– Research papers on GPS tracking systems and IoT applications.
DC Motor Working and Specifications, Available in Electronics Tutorials and Technical Manuals.
Paul Scherz and Simon Monk, *Practical Electronics for Inventors*, McGraw-Hill Education, 4th Edition, 2016.
Michael Margolis, *Arduino Cookbook*, O'Reilly Media, 2nd Edition, 2012.
Simon Monk, *Programming Arduino: Getting Started with Sketches*, McGraw-Hill Education, 2nd Edition, 2016.
John Boxall, *Arduino Workshop: A Hands-On Introduction with 65 Projects*, No Starch Press, 2013