GNSS TRACKER USER MANUAL

[A structured reference for user operation]
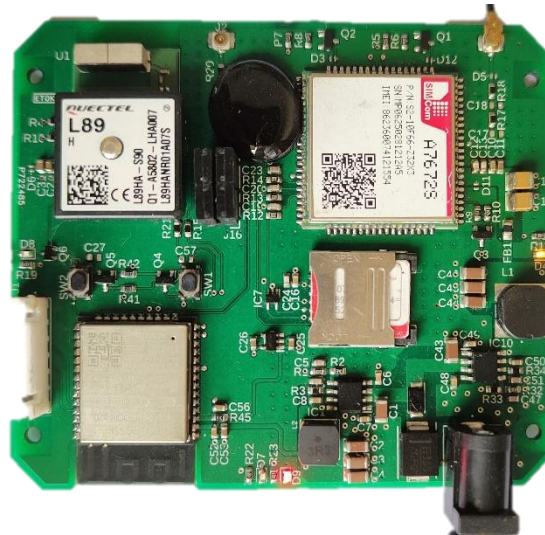
EthicsTech Embedded Solutions Pvt Ltd IOT GNSS Tracker User Manual

Product Features

➢ ESP32 Dual Core Microcontroller

➢ A7672S LTE Modem connected via UART2

➢ L89HA GNSS Module (configured to IRNSS/NaVIC mode only) connected via UART1

➢ Power Supply: 12V to 24V DC input

➢ Built-in Web Server hosted by ESP32

➢ Web Page configuration for all the parameter

➢ Two Antenna Ports:
  • L5 GNSS Antenna @1176.45 MHz for IRNSS (mandatory for GNSS functionality)
  • GSM Antenna for LTE connectivity

➢ 4 Enable Pins (removal disables modem functionality)

➢ 4 LEDs for visual status indication:
  • RED: Power indicator
  • YELLOW: LTE Modem (blinking indicates activity)
  • GREEN: GNSS Lock (ON indicates satellite signal acquired)
  • BLUE: Data Transmission (blinking indicates data being sent to server)

Getting Started

Materials Required:
➢ GNSS Tracker Board
➢ 12V–24V DC Power Supply (12V Recommended)
➢ Active L5 GNSS Antenna
➢ GSM Antenna
➢ 4G-enabled SIM Card

Assembly Instructions (Step-by-Step)

Step 1: Insert SIM Card
➢ Gently insert a 4G-enabled SIM card with valid data plan into the SIM card slot provided on the board. Ensure proper orientation as marked near the slot.

Step 2: Connect GSM Antenna
➢ Attach the GSM antenna to the port labelled for LTE or GSM. Make sure it is tightly secured to ensure stable network connectivity.

Step 3: Connect L5 GNSS Antenna
➢ Connect an L5-band GNSS antenna (centered at 1176.45 MHz) to the designated GNSS port.
⚠ *Note: The GNSS module will not function without this antenna connected.*

Step 4: Connect Power Supply
➢ Provide a DC power supply in the range of 5V to 24V using the power connector (12V recommended for optimal performance).
➢ Ensure correct polarity: connect the positive (+) and negative (–) terminals properly to avoid damage.
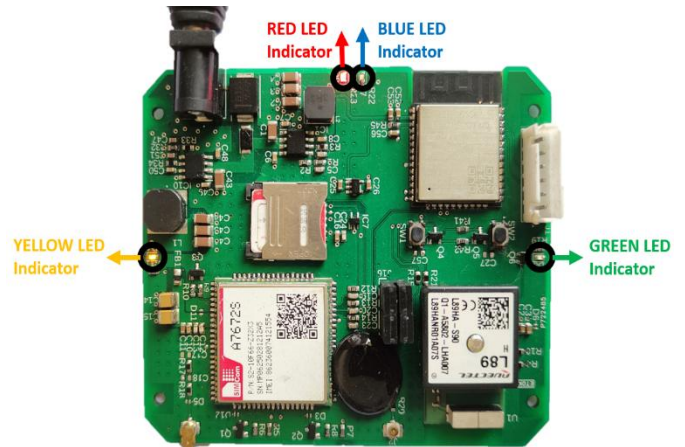
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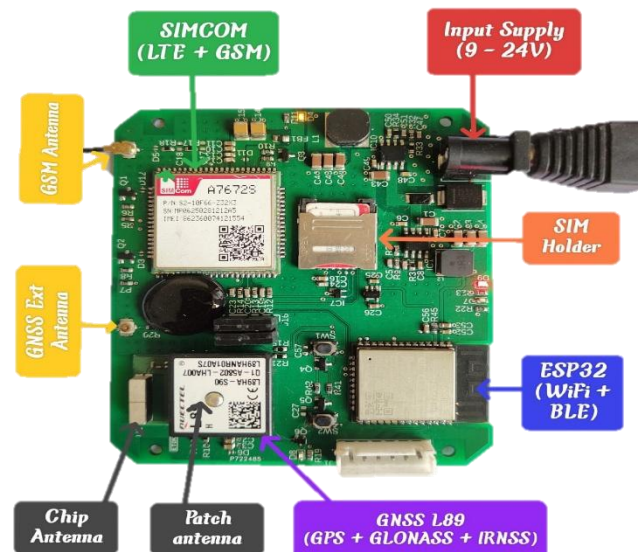
Step 5: Observe LED Indicators

➢ After powering up, monitor the four status LEDs on the board for initialization:

- 🔴 **RED LED**: Indicates power is ON
- 🟡 **YELLOW LED (blinking)**: LTE modem is initialized and active
- 🔵 **BLUE LED (blinking)**: Data is being transmitted to the server
- 🟢 **GREEN LED (ON)**: GNSS module has acquired IRNSS satellite lock

Testing Instructions

1. Power the board with a 12V DC supply.
2. Observe the RED LED (Power).
3. Wait for YELLOW LED to start blinking (LTE Modem active).
4. Observe BLUE LED blinking (data being sent to server).
5. Wait for the GNSS module to acquire IRNSS satellite signals (GREEN LED ON).
6. Once all LEDs indicate proper operation, the board is functioning correctly.
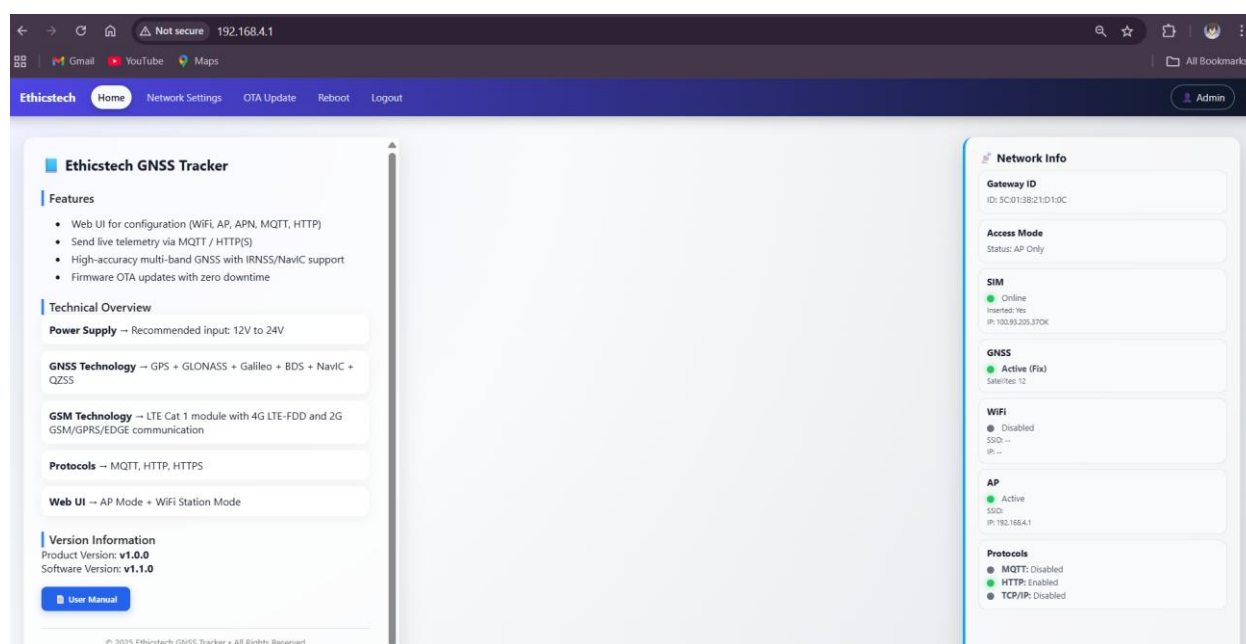
Web User Interface Access:

➢ The ESP32 hosts a built-in web server for device configuration.
➢ Connect your computer or mobile device to the Wi-Fi network named: "GNSS Tracker"
   • Password: admin123
➢ Open any browser and enter the IP address: 192.168.4.1
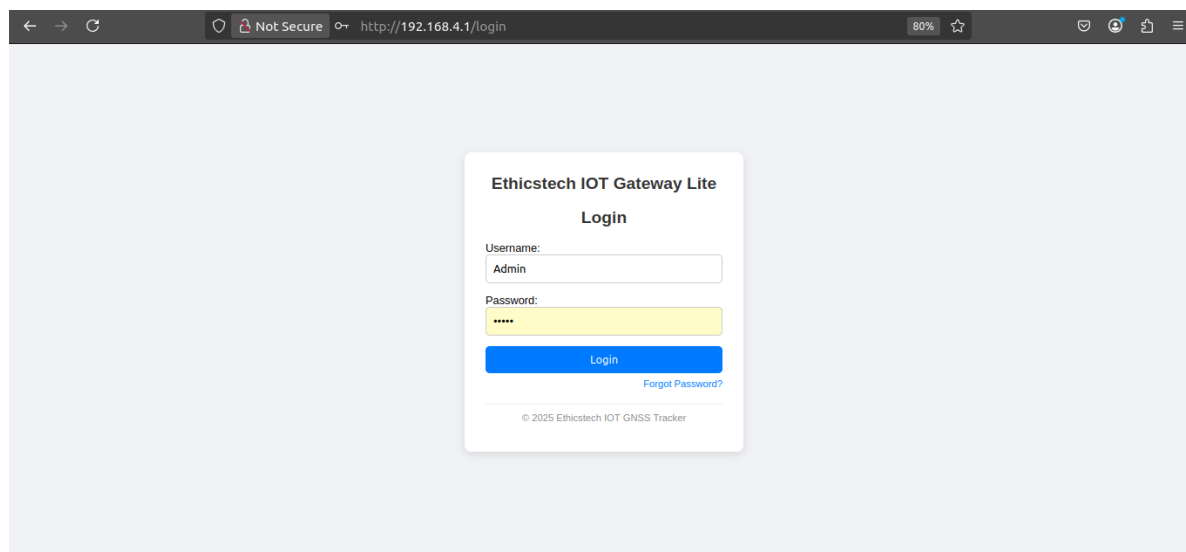
➢ You will be prompted to log in:
  • Username: Admin
  • Password: admin

Once logged in, the homepage displays general information about the product and the currently connected APN.

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➤ Change the network settings.

If you want to change the network mode (AP or Wi-Fi), select the desired option and enter the SSID and password for that mode. The module will then reboot with the new settings applied.

If you choose **MQTT**, enter the broker address, port, client ID, username and password (if required), and the topic you want to publish to.

If you choose **HTTP**, enter the server URL, port number, and any required authentication details.

Once all fields are completed, the module will use the selected protocol to send data.

Additional Features via Web Interface:

➢ OTA Update: Update the device to the latest firmware directly from the web interface.

Firmware OTA Update

Auto Firmware Update

Auto-check & install updates hourly

⚠ **Do not turn off or disconnect during update!**

Browse... No file selected.

Upload Firmware

➢ Reboot: Reset the board using the reboot option.

➢ Profile: Modify configuration settings through the Profile page.

➢ Network Configuration: This feature is under development and will be available in a future firmware update.

IMPORTANT NOTES

➢ GNSS (L89HA) works ONLY if an L5 antenna is connected and has line-of-sight.
➢ IRNSS satellite acquisition may take several minutes after startup.
➢ Removal of any enable pin disables LTE modem functionality.
➢ Ensure voltage input is within range. Over-voltage may damage the board.
➢ Network configuration features will be available in upcoming firmware versions.

ABBREVIATIONS

IRNSS → India's regional satellite navigation system

GNSS → Global Navigation Satellite System

NAVIC → Navigation with Indian Constellation

Test Results:

L5 NAVIC Antenna and IRNSS Satellite Performance on the Quectel QGNSSV2.1 Tool

This section presents the test results obtained using an L5 NAVIC antenna to evaluate IRNSS (Indian Regional Navigation Satellite System) satellite performance on the Quectel **QGNSSV2.1** evaluation tool.

The objective of the test was to verify satellite visibility, signal quality, and overall positioning performance when operating in the L5 frequency band.

Note: NAVIC is recommended to be used together with GPS.

NAVIC has a limited number of satellites, it may take longer to get a fix, and using NAVIC alone is not advised.