LILYGO RS1833

LILYGO LoRa32 868Mhz ESP32 TTGO Development Board User Manual

Model: LoRa32 RS1833

Introduction   Product Overview   Setup Guide   Operating
Instructions   Maintenance   Troubleshooting   Specifications   Support

1. INTRODUCTION

This manual provides comprehensive instructions for the LILYGO LoRa32 868Mhz ESP32 TTGO Development Board. This versatile module integrates an ESP32 microcontroller with LoRa communication capabilities, a 0.96-inch OLED display, and an SD card slot, making it suitable for a wide range of IoT and wireless communication projects. Please read this manual carefully to ensure proper setup, operation, and maintenance of your device.

2. PRODUCT OVERVIEW

2.1. Key Features

- **Microcontroller:** ESP32 (CH9102 chip)
- **Wireless Connectivity:** Wi-Fi, Bluetooth V4.2, BLE, LoRa (868Mhz)
- **Display:** 0.96-inch SSD1306 OLED (128x64 resolution, I2C interface)
- **Storage:** Support for TF (SD) Card
- **Power Management:** USB/3.7V LiPo battery power supply, integrated TP4054 for charging, power switch for battery control.
- **Antenna:** SMA connector for external antenna, enhancing signal transmission.
- **Applications:** Ideal for Paxcounter, LoRaWAN, MQTT over TCP/IP, and serial data transmission.

2.2. Package Contents

The standard package includes the following items:

- 1 x LILYGO LoRa32 Development Board (868Mhz variant)
- 1 x LoRa Antenna
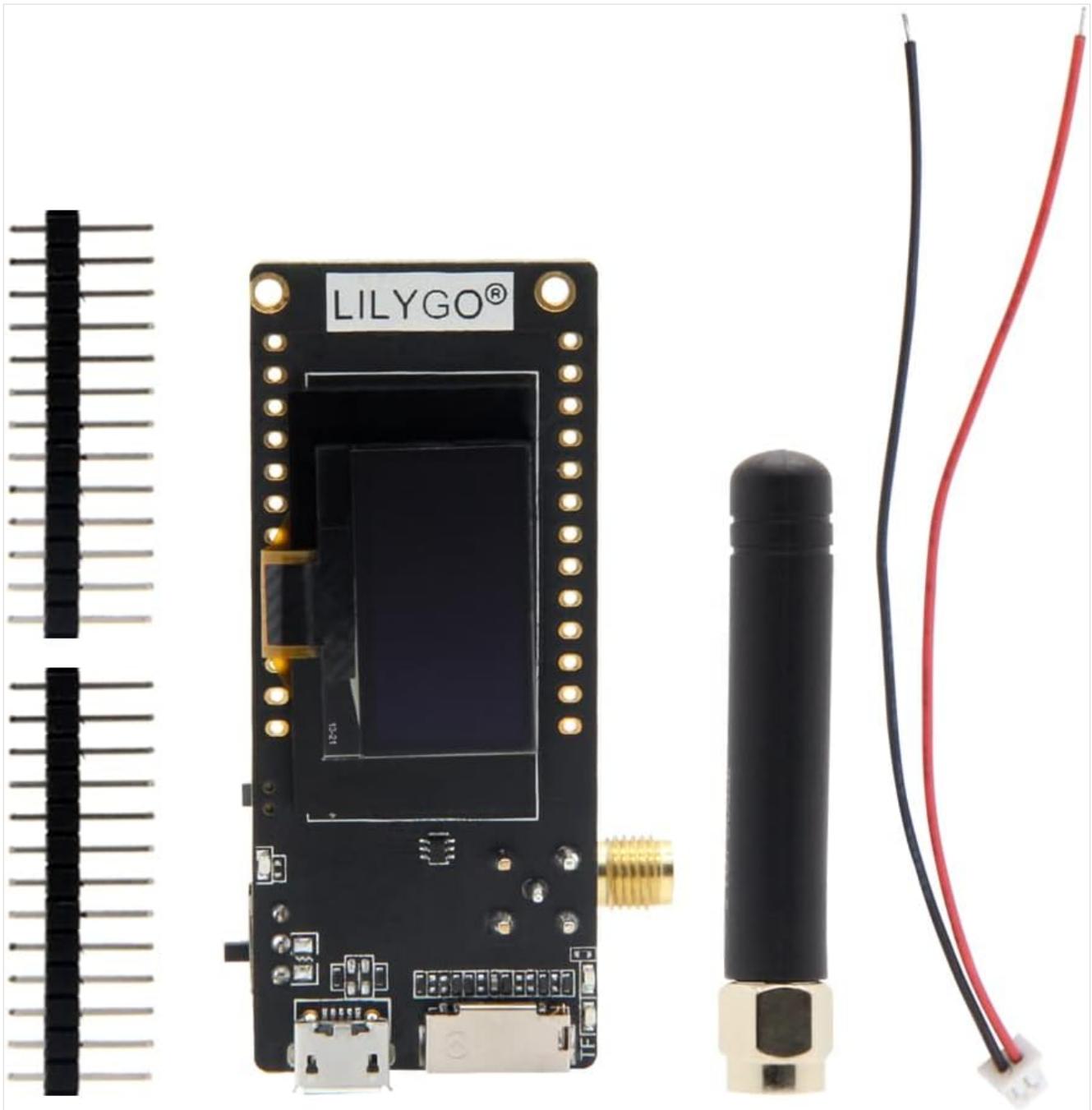- 2 x Pin Headers (for soldering)

- 1 x Battery Cable

Figure 2.2.1: Contents of the LILYGO LoRa32 Development Board package.

Figure 2.2.2: Illustrated diagram of included components.

2.3. Board Layout and Components

Familiarize yourself with the key components and interfaces on the LILYGO LoRa32 board:
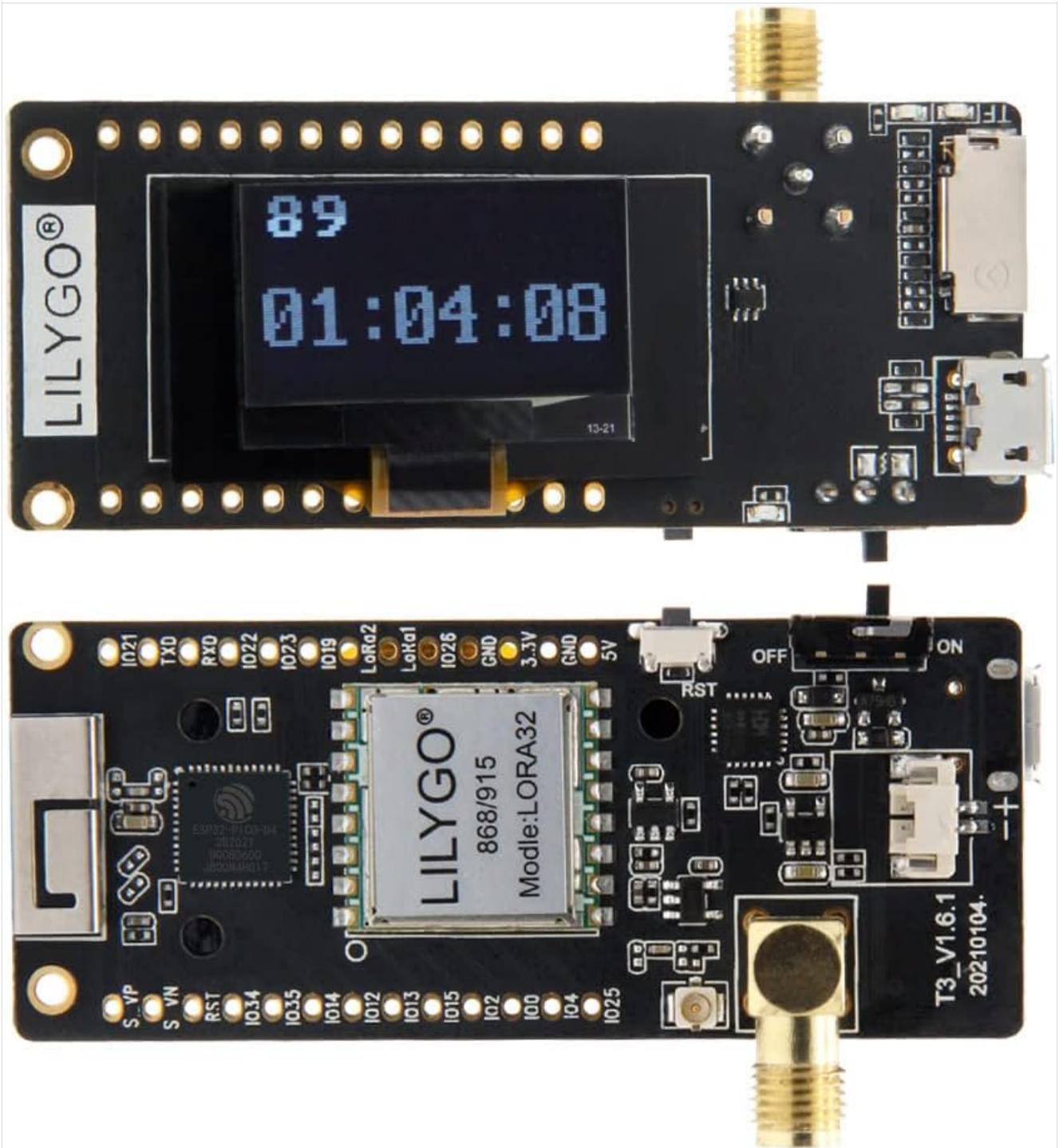

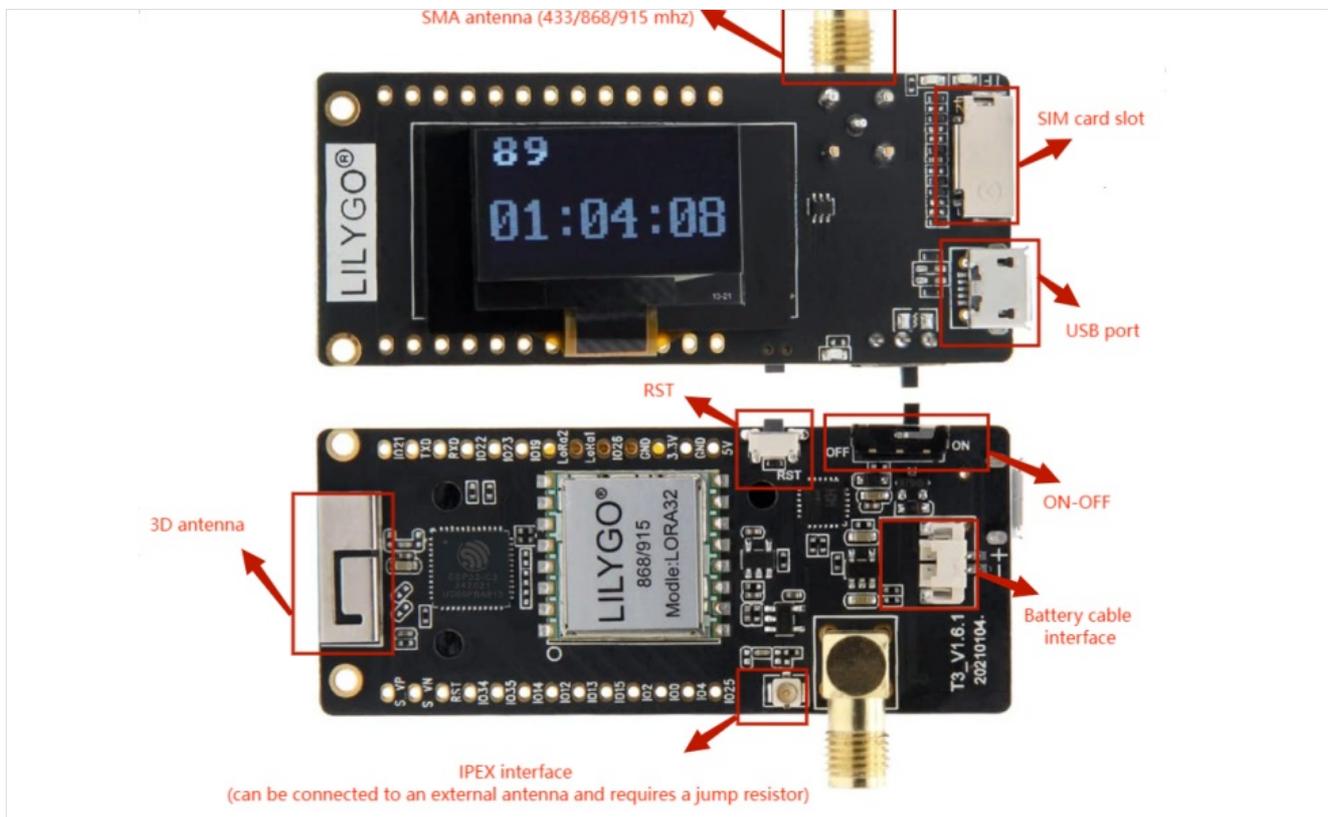Figure 2.3.1: Front and back view of the LILYGO LoRa32 board.

Figure 2.3.2: Component identification on the LILYGO LoRa32 board.

- **OLED Display:** 0.96-inch screen for displaying information.

- **USB Port:** Micro USB for power and data communication.

- **SD Card Slot:** For external data storage.

- **SMA Antenna Connector:** For connecting the external LoRa antenna.

- **Battery Connector:** JST connector for 3.7V LiPo battery.

- **Power Switch:** Controls power to the board when using battery.

- **Reset Button:** Resets the ESP32 microcontroller.

- **GPIO Pins:** Various General Purpose Input/Output pins for connecting peripherals.
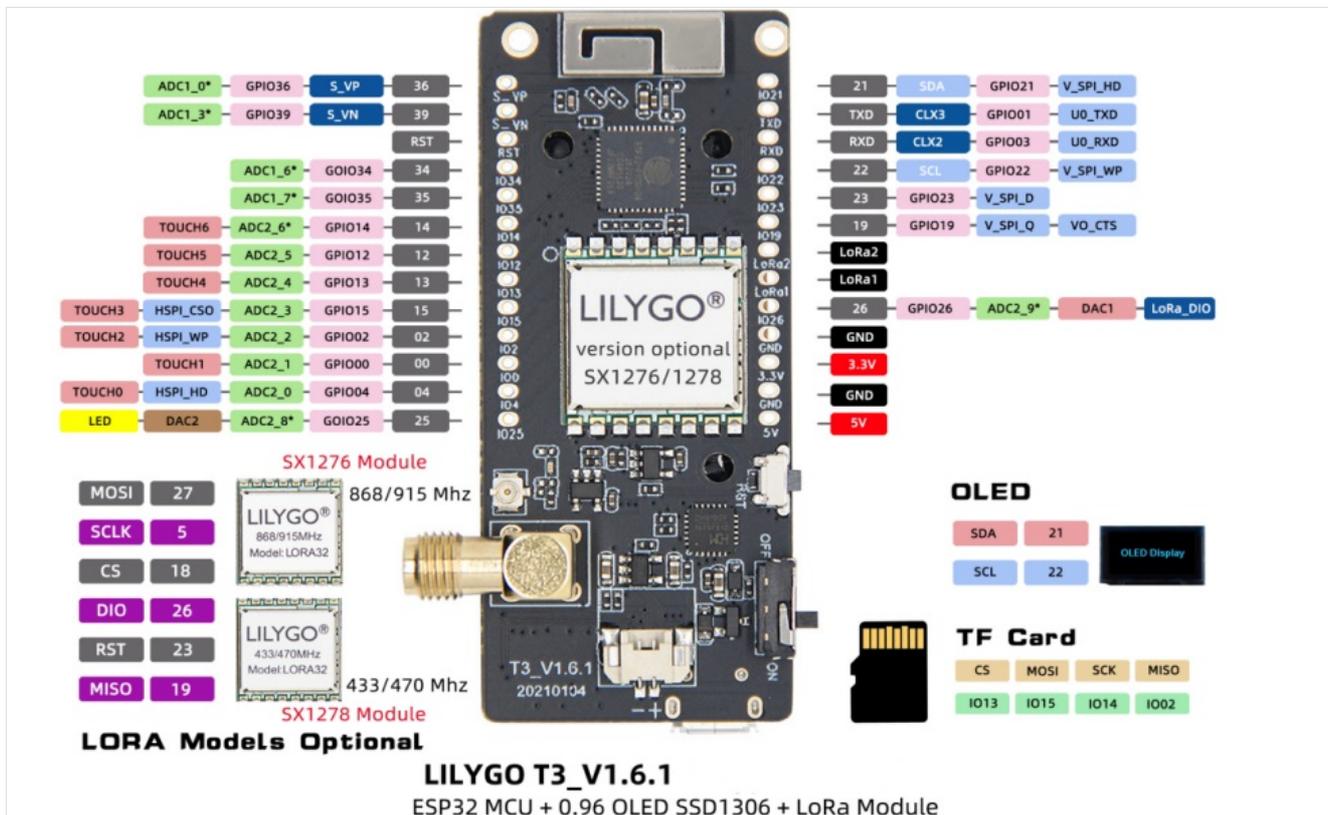
Figure 2.3.3: Pinout diagram of the LILYGO LoRa32 board.

3. Setup Guide

3.1. Hardware Connection

1. **Attach LoRa Antenna:** Carefully screw the provided LoRa antenna onto the SMA connector on the board. Ensure it is finger-tight to avoid damage.

2. **Power Supply:**

   - **USB Power:** Connect the board to a computer or a 5V USB power adapter using a Micro USB cable.
   - **Battery Power:** If using a 3.7V LiPo battery, connect it to the JST battery connector. Ensure the power switch is in the "OFF" position before connecting, then switch to "ON" to power the board.

3. **SD Card (Optional):** Insert a formatted TF (Micro SD) card into the SD card slot if your application requires local data storage.

4. **Pin Headers (Optional):** Solder the included pin headers if you plan to use the GPIO pins for external connections on a breadboard or custom PCB.
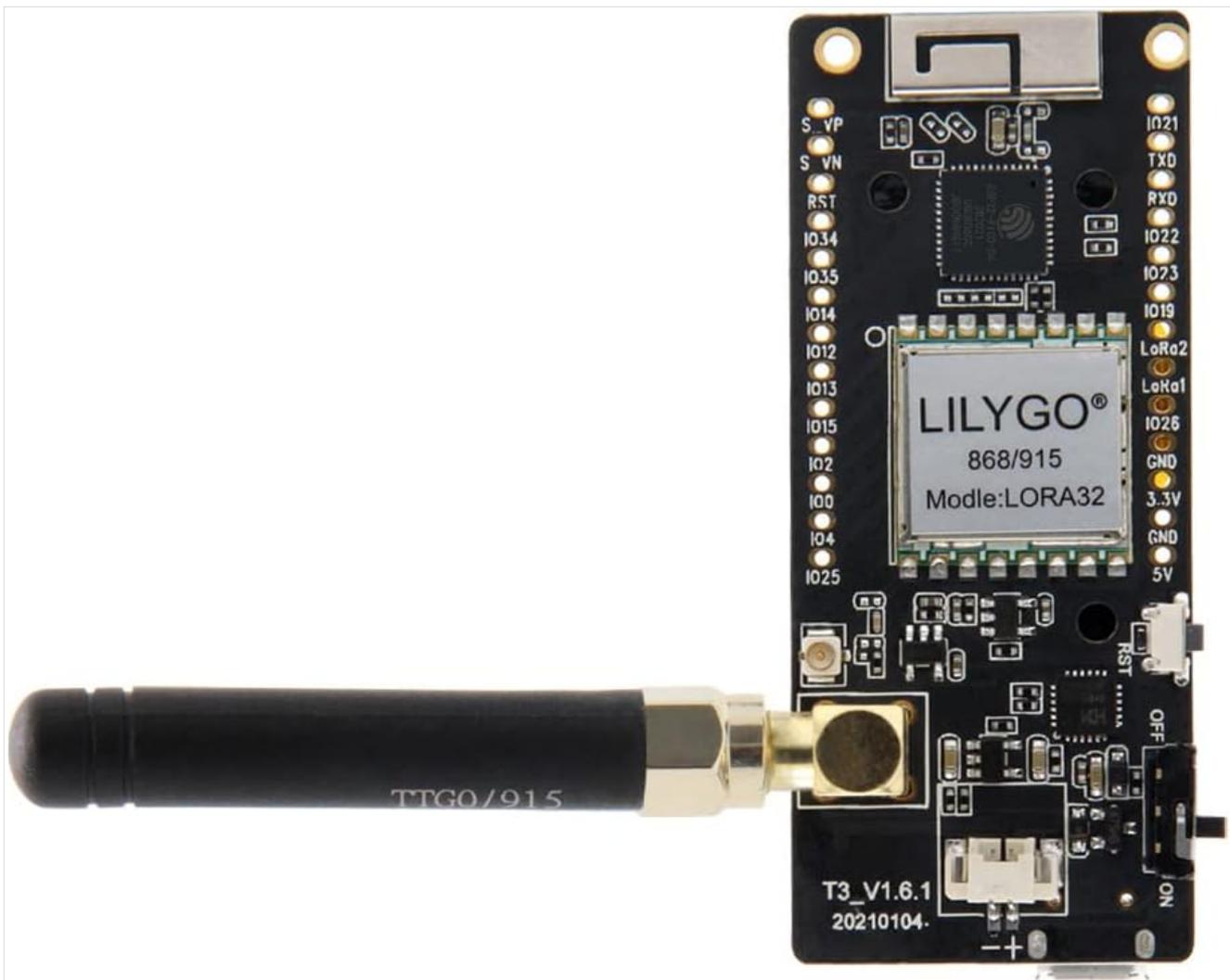
Figure 3.1.1: LILYGO LoRa32 board with antenna connected.

3.2. Software Environment Setup

To program the LILYGO LoRa32 board, you will typically use the Arduino IDE or PlatformIO. Follow these general steps:

1. **Install Arduino IDE:** Download and install the latest version of the Arduino IDE from the official website (arduino.cc/en/software).

2. **Add ESP32 Board Support:**

   - Go to **File > Preferences** in the Arduino IDE.
   - In the "Additional Boards Manager URLs" field, add:
     https://raw.githubusercontent.com/espressif/arduino-esp32/gh-pages/package_esp32_index.json
   - Go to **Tools > Board > Boards Manager...** Search for "esp32" and install the "esp32 by Espressif Systems" package.

3. **Install USB Driver:** The board uses a CH9102 USB-to-Serial chip. You may need to install the appropriate driver for your operating system. Search for "CH9102 driver" online.

4. **Select Board:** In the Arduino IDE, go to **Tools > Board** and select the appropriate ESP32 board, often "ESP32 Dev Module" or a specific TTGO LoRa32 board if available in the list.

5. **Install Libraries:** Depending on your project, you will need to install libraries for LoRa communication (e.g., **LoRa by Sandeep Mistry**), OLED display (e.g., **Adafruit SSD1306**, **Adafruit GFX Library**), and SD card functionality. These can be installed via **Sketch > Include Library > Manage Libraries...**

6. **Upload Code:** Connect the board via USB, select the correct COM port under **Tools > Port**, and then upload

your sketch.

4. OPERATING INSTRUCTIONS

4.1. Basic Operation

- **Power On/Off:** If using battery power, use the slide switch on the board to turn it on or off. When powered via USB, the board will turn on automatically.
- **OLED Display:** The 0.96-inch OLED display will show information as programmed. This can include sensor readings, network status, or other application-specific data.
- **Reset:** Press the "RST" button to perform a hardware reset of the ESP32 microcontroller.

4.2. Data Transmission

The LILYGO LoRa32 board supports various data transmission methods:

- **LoRaWAN Network:** For long-range, low-power communication, data can be transmitted to a LoRaWAN gateway and then to a cloud-based network server.
- **MQTT over TCP/IP:** Utilize the ESP32's Wi-Fi capabilities to send data to an MQTT broker over a local network or the internet.
- **Serial (SPI) Interface:** Data can be transmitted to a local host device via the serial peripheral interface.
- **SD Card Storage:** For applications requiring local data logging, data can be written directly to an inserted TF (Micro SD) card.

4.3. Paxcounter Functionality

The LILYGO LoRa32 board is commonly used for Paxcounter applications. A Paxcounter is an ESP32-based device designed to detect and count nearby mobile devices (via Wi-Fi and Bluetooth probes) in real-time. This provides an estimation of the number of people in an area.

Figure 4.3.1: Paxcounter application examples.

To implement Paxcounter functionality, specific firmware needs to be flashed onto the ESP32. Refer to community resources and project repositories for detailed instructions on flashing and configuring Paxcounter firmware.

5. MAINTENANCE

- **Cleaning:** Use a soft, dry cloth to clean the board. Avoid using liquids or abrasive cleaners.
- **Storage:** Store the board in a dry, anti-static environment when not in use. The provided protective case is suitable for storage.
- **Handling:** Handle the board by its edges to avoid touching components, especially when powered. Static electricity can damage electronic components.
- **Firmware Updates:** Regularly check for updated firmware or libraries from the LILYGO community or relevant project repositories to ensure optimal performance and access to new features.
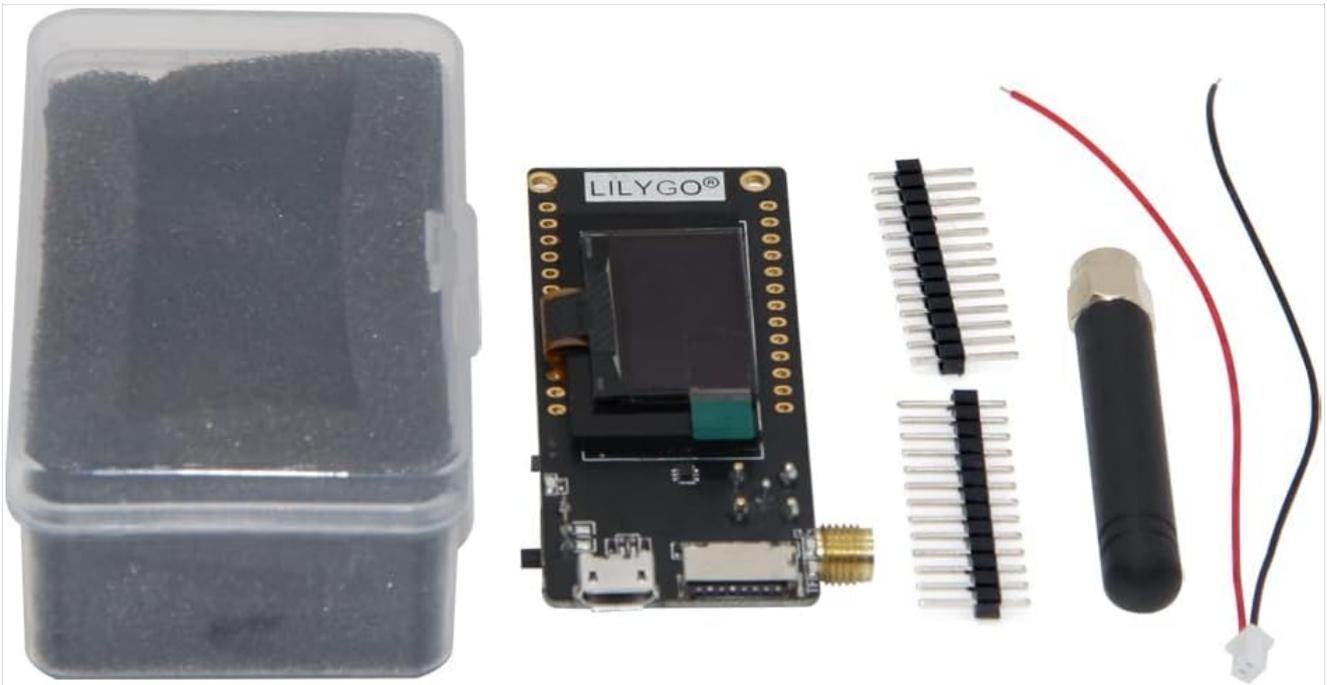

Figure 5.1.1: Board stored in its protective case.

6. TROUBLESHOOTING

Issue	Possible Cause	Solution
Board not powering on	Incorrect USB connection, faulty cable, battery switch off, discharged battery.	Check USB cable and port. Ensure battery is charged and power switch is "ON". Try a different power source.
Upload errors in Arduino IDE	Incorrect board selection, wrong COM port, missing USB driver, firmware flashing issues.	Verify board and port selection. Install CH9102 driver. Ensure proper firmware flashing procedure, sometimes requiring erasing flash before re-uploading.
OLED display not working	Incorrect wiring (if external), incorrect library, I2C address mismatch, faulty display.	Check I2C connections (SDA to GPIO21, SCL to GPIO22). Ensure correct OLED library is installed and initialized with the right I2C address.

Issue	Possible Cause	Solution
LoRa communication issues	Antenna not connected, incorrect frequency, power settings, interference, range limitations.	Ensure antenna is securely attached. Verify LoRa frequency (868Mhz for this model) and power settings in code. Test in an open environment.
SD card not detected	Incorrect wiring, card not formatted, incompatible card, incorrect library.	Ensure SD card is properly inserted and formatted (FAT32). Check SD card library usage and pin assignments.

7. TECHNICAL SPECIFICATIONS

Figure 7.1.1: Overview of technical specifications.

Feature	Detail
Brand	LILYGO
Model Name / Series	LoRa32 RS1833
Microcontroller	ESP32 (CH9102 chip)
Flash Memory	4MB
RAM	LPDDR (integrated with ESP32)
Operating System	FreeRTOS (typical for ESP32 development)
Connectivity Technology	Wi-Fi, Bluetooth V4.2, BLE, LoRa
LoRa Transceiver	SX1276 (for 868/915/923Mhz variants)
LoRa Frequency Band	868Mhz (for this specific product variant)

Feature	Detail
OLED Display	0.96 inch SSD1306, 128x64 resolution, I2C interface (SDA-GPIO21, SCL-GPIO22)
SD Card Support	Yes (TF Card)
Power Supply	USB (5V) / 3.7V LiPo battery
Battery Charging	Integrated TP4054
Dimensions (approx.)	6.4cm (H) x 2.7cm (W)

Figure 7.1.2: Approximate dimensions of the LILYGO LoRa32 board.

8. WARRANTY AND SUPPORT

LILYGO products are designed for hobbyists and developers. While specific warranty details may vary by region and retailer, LILYGO generally provides support through its official website and community forums.

- **Online Resources:** For technical documentation, example code, and community support, please visit the official LILYGO website or relevant GitHub repositories for the LoRa32 series.
- **Community Forums:** Engage with other users and developers in online forums dedicated to ESP32 and LoRa development for assistance and project ideas.
- **Contact Manufacturer:** For direct support inquiries, refer to the contact information provided on the LILYGO official website.

Please note that modifications to the board or improper use may void any implied warranty.

Related Documents - RS1833

T-Display User Guide **LILYGO®** Version 1.1 Copyright © 2021	[LILYGO T-Display User Guide](#) A user guide for the LILYGO T-Display development board, covering setup, Arduino integration, and basic commands for ESP32 module development.
T-BEAM-S3 User Guide **LILYGO®** Version 1.0 Copyright © 2026	[LILYGO T-BEAM-S3 User Guide: Setup and Development](#) This user guide provides comprehensive instructions for setting up the LILYGO T-BEAM-S3 development board. Learn how to configure the software environment using Arduino IDE, connect the board, and utilize its Wi-Fi, BLE, GPS, and LoRa capabilities for IoT projects.
T-Deck User Guide **LILYGO®** Version 1.0 Copyright © 2024	[LILYGO T-Deck ESP32-S3 User Guide for Arduino Development](#) Comprehensive user guide for the LILYGO T-Deck development board, detailing setup of the Arduino IDE, ESP32-S3 configuration, Wi-Fi and LoRa functionality, and SSC command reference for IoT applications.
Mini E-Paper-S3 User Guide **LILYGO®** Version 1.0 Copyright © 2024	[LILYGO Mini E-Paper-S3 User Guide](#) Comprehensive user guide for the LILYGO Mini E-Paper-S3 development board. Covers setup, Arduino IDE integration, firmware development, and Wi-Fi command reference for IoT applications.

T-WATCH-V3 User Guide **LILYGO®** Version 1.0 Copyright © 2023	[LILYGO T-WATCH-V3 User Guide](#) A comprehensive user guide for the LILYGO T-WATCH-V3 development board, detailing setup, software development, and SSC command reference for ESP32 applications.
T-Embed User Guide **LILYGO®** VVersion 1.0 Copyright 2023	[LILYGO T-Embed User Guide](#) A comprehensive user guide for the LILYGO T-Embed development board, covering setup, Arduino IDE integration, and Wi-Fi command reference.