Wonrabai ESP32-S3-Touch-AMOLED-1.75

Wonrabai ESP32-S3-Touch-AMOLED-1.75 Development Board User Manual

Model: ESP32-S3-Touch-AMOLED-1.75

Brand: Wonrabai

1. Introduction

The Wonrabai ESP32-S3-Touch-AMOLED-1.75 is a high-performance development board designed for various embedded applications. It integrates an ESP32-S3R8 Xtensa 32-bit LX7 dual-core processor, a 1.75-inch AMOLED capacitive touch display, and features for AI speech interaction. This manual provides essential information for setting up, operating, and maintaining your development board.

Key features include:

- **Processor:** ESP32-S3R8 Xtensa 32-bit LX7 dual-core processor, up to 240MHz.
- **Connectivity:** 2.4GHz Wi-Fi (802.11 b/g/n) and Bluetooth 5 (LE) with onboard antenna.
- **Memory:** 512KB SRAM, 384KB ROM, 8MB PSRAM, and 16MB external Flash memory.
- **Display:** 1.75-inch AMOLED capacitive touch display, 466 × 466 resolution, 16.7M colors, 178° wide viewing angle.
- **Audio:** Onboard audio codec, dual digital microphone array for noise reduction and echo cancellation, and support for AI speech interaction.
- **Sensors:** QMI8658 6-axis IMU (3-axis accelerometer and 3-axis gyroscope).
- **Power Management:** AXP2101 IC for efficient power management, 3.7V MX1.25 Lithium battery recharge/discharge header, and PCF85063 RTC chip.
- **Interfaces:** Type-C connector, TF card slot, 8PIN 2.54mm header for GPIO/UART, and reserved I2C/expanded IO interfaces.

2. Package Contents

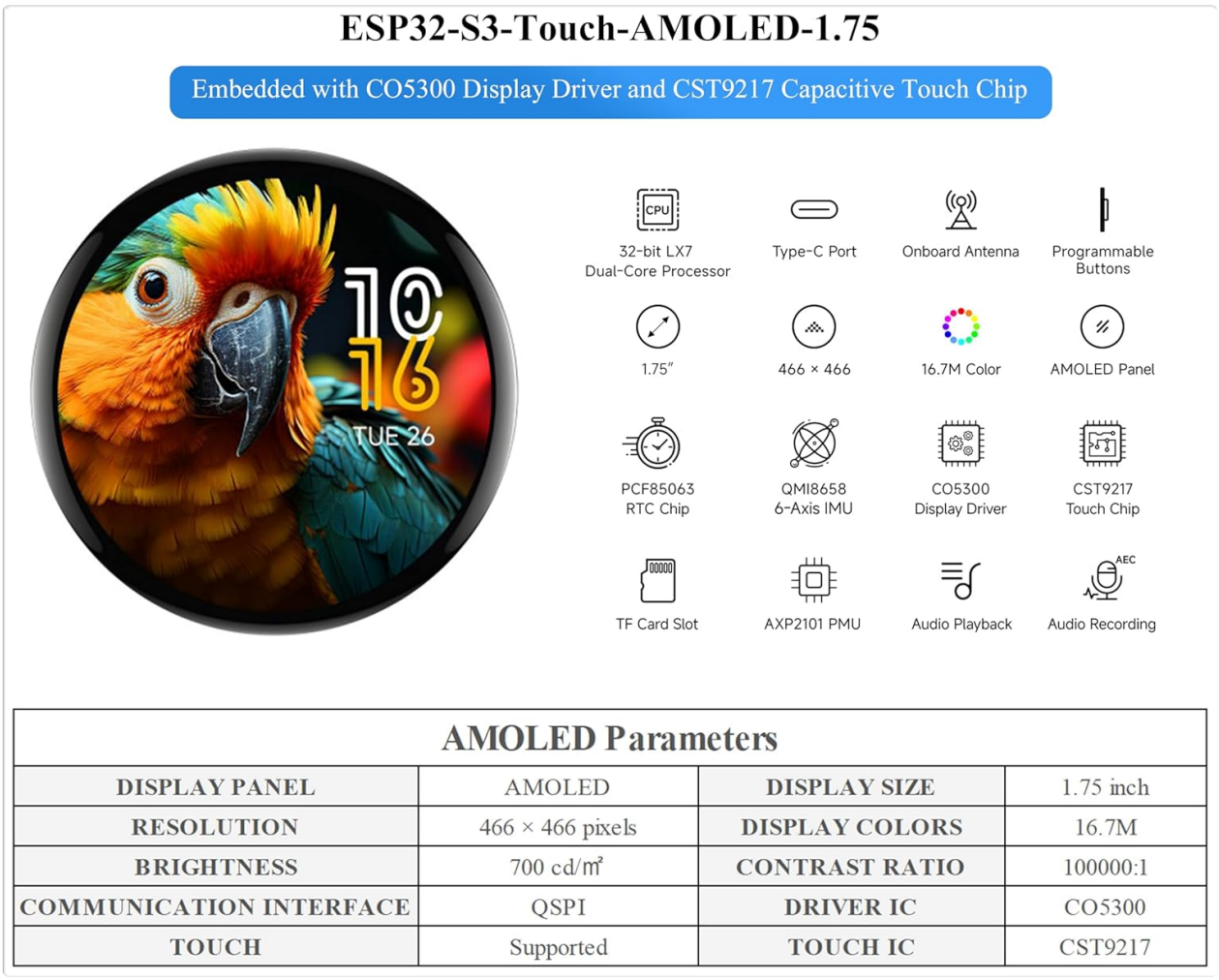
Verify that all items are present in your package:

- 1x ESP32-S3-Touch-AMOLED-1.75 Development Board
- 1x 8Ω 2W Speaker

Figure 2.1: This image displays the items included in the product package: one ESP32-S3-Touch-AMOLED-1.75 development board and one 8Ω 2W speaker.

3. Product Overview

The ESP32-S3-Touch-AMOLED-1.75 board combines powerful processing with a vibrant display and advanced audio capabilities, making it suitable for a wide range of smart device and AI-driven projects.



AMOLED Parameters			
DISPLAY PANEL	AMOLED	DISPLAY SIZE	1.75 inch
RESOLUTION	466 × 466 pixels	DISPLAY COLORS	16.7M
BRIGHTNESS	700 cd/㎡	CONTRAST RATIO	100000:1
COMMUNICATION INTERFACE	QSPI	DRIVER IC	CO5300
TOUCH	Supported	TOUCH IC	CST9217

Figure 3.1: An overview of the ESP32-S3 development board, highlighting its 1.75-inch AMOLED display, dual-core processor, Type-C port, onboard antenna, programmable buttons, RTC chip, IMU, display driver, touch chip, TF card slot, power management IC, audio playback, and audio recording capabilities. The image also details AMOLED parameters such as resolution (466x466 pixels), color depth (16.7M), brightness (700 cd/m²), contrast ratio (100000:1), QSPI communication, and CO5300/CST9217 driver/touch ICs.

3.1. Display and Touch Capabilities

The 1.75-inch AMOLED capacitive touch display offers a clear and vibrant visual experience with 466x466 pixels resolution and 16.7 million colors. Its wide 178° viewing angle ensures excellent visibility from various perspectives. The AMOLED technology provides high contrast, fast response times, and low power consumption.

Figure 3.2: This image emphasizes the compact size and versatile touch capabilities of the ESP32-S3 board, suitable for various smart device developments. It highlights the benefits of the AMOLED screen, such as high contrast, rich colors, fast response, and low power consumption, compared to traditional LCDs. The image also visually demonstrates the impressive 178-degree wide viewing angle of the display.

3.2. Audio and AI Speech Interaction

The board includes an onboard audio codec for high-quality audio processing, supporting both input and output. Equipped with a dual digital microphone array, it facilitates advanced audio algorithms like noise reduction and echo cancellation, crucial for accurate speech recognition and voice wake-up applications. It supports AI speech interaction, allowing integration with online large model platforms such as DeepSeek, Doubao, and GPT.

Figure 3.3: This image illustrates the board's high-quality audio processing capabilities, supporting both audio playback and input. It also demonstrates the AI Speech Interaction feature, showing how the device can access online large model platforms like DeepSeek, Doubao, and GPT for voice commands and responses, utilizing its built-in microphone and external speaker.

3.3. Development Environment Support

The ESP32-S3-Touch-AMOLED-1.75 development board is compatible with popular development environments, including ESP-IDF (Espressif IoT Development Framework) and Arduino IDE. These platforms provide comprehensive SDKs, development resources, and tutorials to assist users in getting started with their projects.

Figure 3.4: This image highlights the development board's compatibility with popular development environments like ESP-IDF (Espressif IoT Development Framework) and Arduino IDE, offering comprehensive SDKs, resources, and tutorials for easy setup. It also emphasizes the board's integrated 2.4GHz Wi-Fi (802.11 b/g/n) and Bluetooth Low Energy (BLE 5) support, including Bluetooth Mesh.

4. Board Layout and Pinout

Understanding the board's layout is crucial for proper connection and development. Refer to the diagram below for component identification.

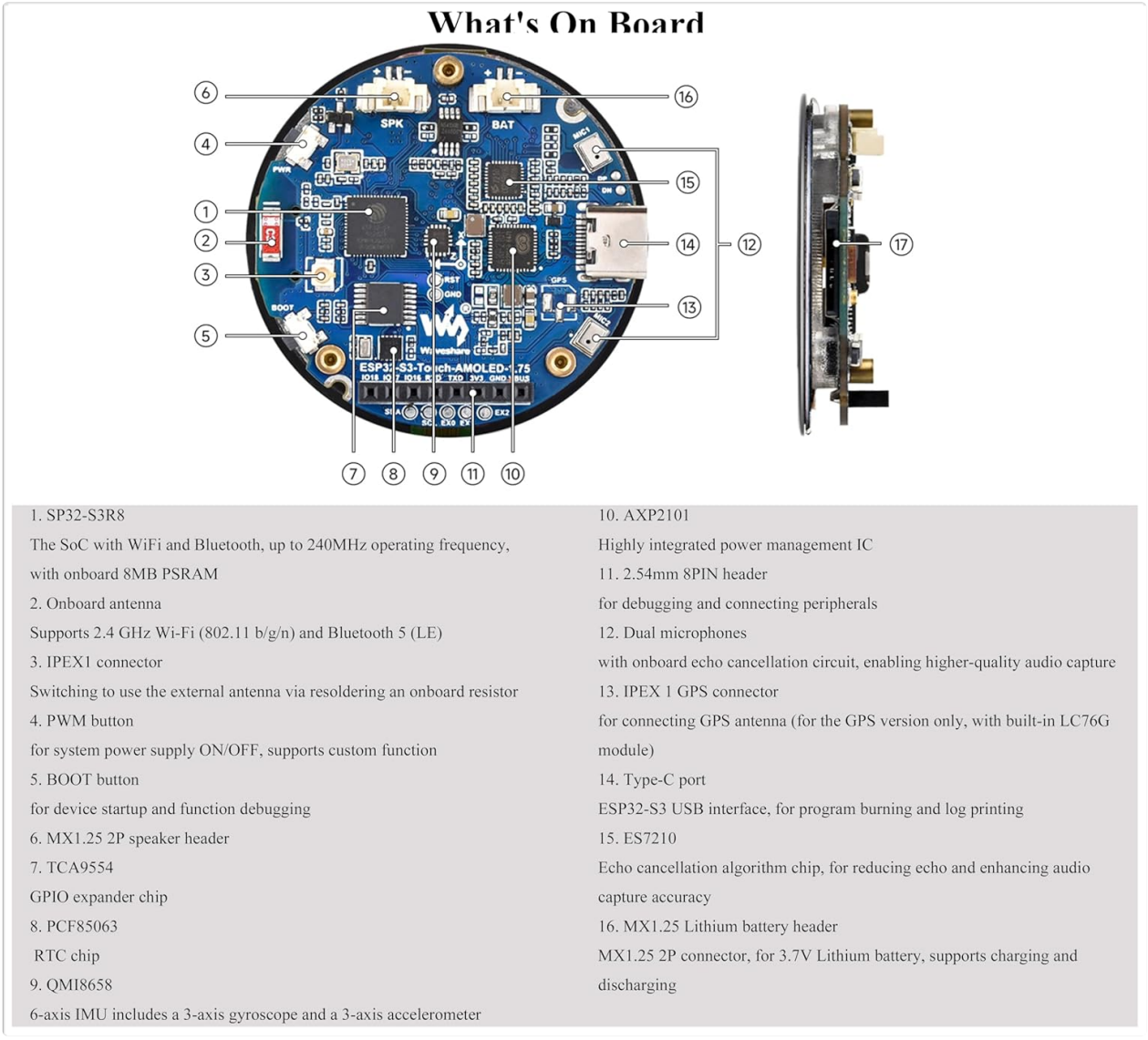


Figure 4.1: A comprehensive diagram labeling the key components of the ESP32-S3-Touch-AMOLED-1.75 board. Numbered labels point to specific parts such as the ESP32-S3R8 SoC, onboard antenna, PWR button, BOOT button, MX1.25 2P speaker header, TCPA9554 GPIO expander chip, PCF85063 RTC chip, QMI8658 6-axis IMU, AXP2101 power management IC, 2.54mm 8PIN header, dual microphones, IPEX1 connector, Type-C port, ES7210 echo cancellation chip, and MX1.25 Lithium battery header. This diagram is essential for understanding the board's layout and connections.

1. **ESP32-S3R8:** The SoC with Wi-Fi and Bluetooth, up to 240MHz operating frequency, with onboard 8MB PSRAM.
2. **Onboard antenna:** For 2.4 GHz Wi-Fi (802.11 b/g/n) and Bluetooth 5 (LE).
3. **PWR button:** For system power ON/OFF, supports custom function.
4. **BOOT button:** For device startup and function debugging.
5. **MX1.25 2P speaker header:** For connecting the included 8Ω 2W speaker.
6. **TCPA9554:** GPIO expander chip.
7. **PCF85063:** RTC chip.
8. **QMI8658:** 6-axis IMU (3-axis accelerometer and 3-axis gyroscope).
9. **AXP2101:** Highly integrated power management IC.
10. **2.54mm 8PIN header:** Adapting 3 × GPIO and 1 × UART, for debugging and connecting peripherals.
11. **Dual microphones:** For audio input and speech recognition.
12. **IPEX1 connector:** For connecting GPS antenna (for GPS version only, with built-in LC76G module).
13. **Type-C port:** For power supply, program burning, and log printing.
14. **ES7210:** Echo cancellation algorithm chip.

15. **MX1.25 Lithium battery header:** For 3.7V Lithium battery, supports charging and discharging.

5. Setup

Follow these steps to set up your ESP32-S3-Touch-AMOLED-1.75 development board:

1. **Connect the Speaker:** Connect the provided 8Ω 2W speaker to the MX1.25 2P speaker header (labeled 5 in Figure 4.1).
2. **Power Supply:** Connect the board to a power source using the Type-C USB port (labeled 13 in Figure 4.1). You can use a standard USB power adapter or connect it to your computer.
3. **Battery Connection (Optional):** If using a Lithium battery, connect it to the MX1.25 Lithium battery header (labeled 15 in Figure 4.1). The AXP2101 power management IC will handle charging and discharge.
4. **TF Card Insertion (Optional):** Insert a TF card into the onboard TF card slot for extended storage or data transfer.
5. **Initial Programming:** Connect the Type-C USB port to your computer. The board supports ESP-IDF and Arduino IDE for programming. Refer to the online tutorial usage guide for detailed programming instructions.
6. **Peripheral Connections (Optional):** Utilize the 2.54mm 8PIN header (labeled 10 in Figure 4.1) for connecting external peripherals via GPIO or UART. Reserved I2C and expanded IO interfaces are also available.

6. Operation

Once the board is set up and programmed, you can begin operating its various features:

- **Power On/Off:** Use the PWR button (labeled 3 in Figure 4.1) to power the system on or off.
- **Display Interaction:** The 1.75-inch AMOLED display is capacitive touch-enabled. Interact with the display using touch gestures as programmed in your application.
- **Audio Input/Output:** The onboard dual digital microphones capture audio, while the connected speaker provides audio output. Ensure your application utilizes the audio codec for processing.
- **AI Speech Interaction:** If programmed, use voice commands through the microphones to interact with online large model platforms.
- **Motion Sensing:** The QMI8658 6-axis IMU can detect motion gestures, count steps, and provide orientation data, depending on your application's implementation.
- **Data Storage:** Utilize the TF card slot for data logging, media playback, or other storage-intensive applications.

7. Maintenance

To ensure the longevity and optimal performance of your development board, follow these maintenance guidelines:

- **Cleaning:** Gently clean the display and board surfaces with a soft, dry, anti-static cloth. Avoid using liquid cleaners or abrasive materials.
- **Storage:** Store the board in a cool, dry environment, away from direct sunlight, extreme temperatures, and humidity.
- **Handling:** Handle the board by its edges to avoid touching sensitive components. Use anti-static

precautions when working with the board.

- **Firmware Updates:** Regularly check for and apply firmware updates from the manufacturer or community to ensure the latest features and bug fixes.

8. Troubleshooting

If you encounter issues with your ESP32-S3-Touch-AMOLED-1.75 board, consider the following troubleshooting steps:

- **No Power:** Ensure the Type-C USB cable is securely connected to a working power source. If using a battery, check its charge level.
- **Display Not Working:** Verify that the display is properly connected and that your code initializes the display driver correctly.
- **Programming Errors:** Double-check your code for syntax errors and ensure the correct board and port are selected in your IDE. Refer to the online documentation for specific programming examples.
- **Wi-Fi/Bluetooth Connectivity Issues:** Ensure your antenna is properly connected (if external) and that your code correctly configures the Wi-Fi or Bluetooth module. Check for interference from other devices.
- **Audio Problems:** Confirm the speaker is correctly connected. Verify that the audio codec is initialized and configured in your software.
- **Unresponsive Touch:** Ensure the CST9217 capacitive touch chip is correctly initialized and that your application handles touch input.
- **Board Not Detected by PC:** Try a different Type-C USB cable or port. Ensure necessary drivers are installed on your computer.

9. Technical Specifications

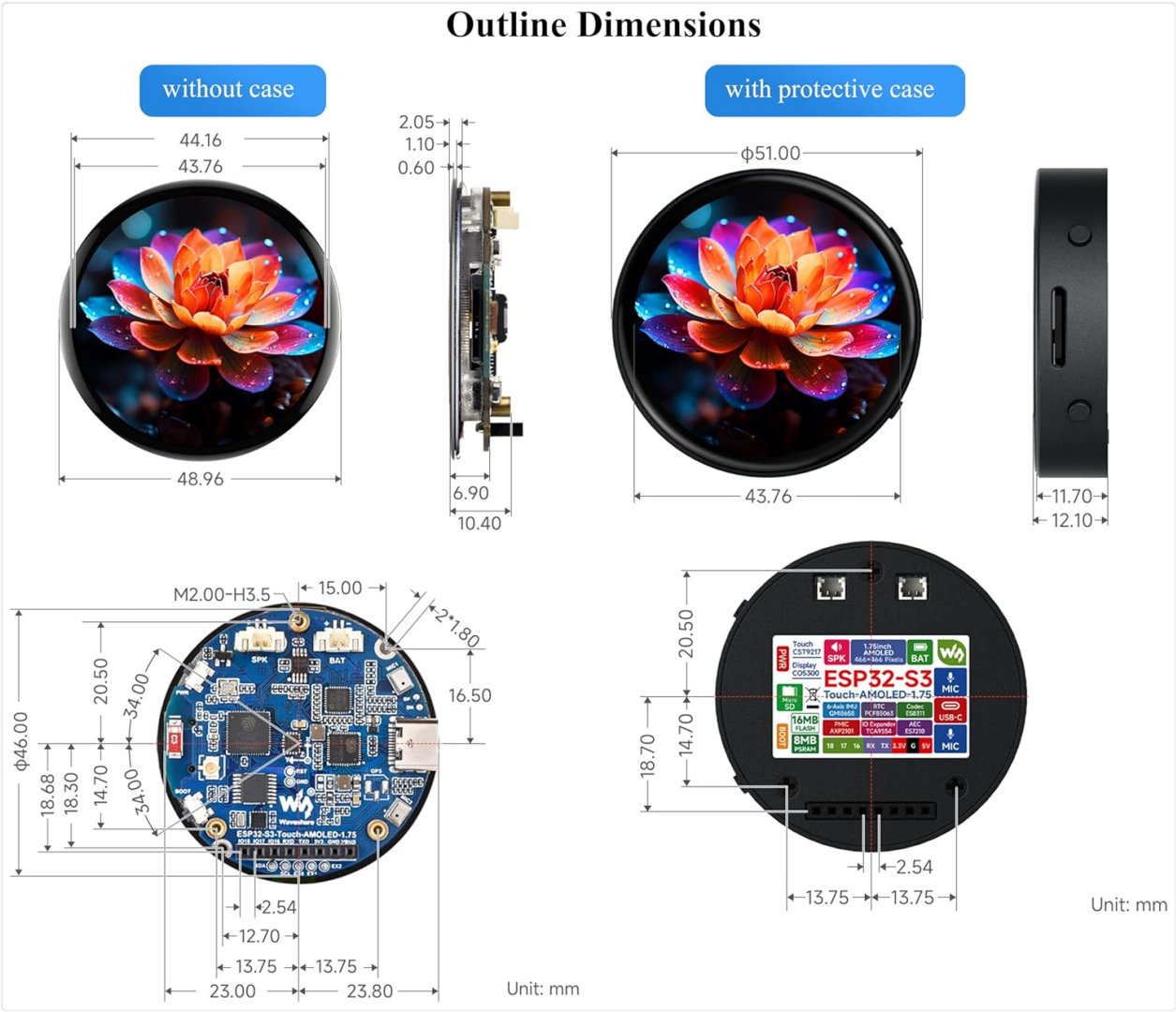


Figure 9.1: This image provides precise measurements and outline dimensions of the ESP32-S3-Touch-AMOLED-1.75 development board. It includes diagrams showing the board's dimensions without a case and with a protective case, detailing various lengths, widths, and heights in millimeters, crucial for integration into custom projects.

Feature	Specification
Processor	ESP32-S3R8 Xtensa 32-bit LX7 dual-core, up to 240MHz
Memory	512KB SRAM, 384KB ROM, 8MB PSRAM, 16MB Flash
Display	1.75-inch AMOLED, 466×466 pixels, 16.7M colors, 178° viewing angle
Display Driver	CO5300 (QSPI communication)
Touch Controller	CST9217 (I2C communication)
Wireless Connectivity	2.4GHz Wi-Fi (802.11 b/g/n), Bluetooth 5 (LE)
Audio	Onboard audio codec, Dual digital microphone array, 8Ω 2W speaker
IMU	QMI8658 6-axis (3-axis accelerometer, 3-axis gyroscope)
Power Management	AXP2101 IC, 3.7V MX1.25 Lithium battery header
RTC Chip	PCF85063

Feature	Specification
Interfaces	Type-C USB, TF card slot, 8PIN 2.54mm header (GPIO, UART), I2C, expanded IO
Dimensions (without case)	44.16mm x 43.76mm x 6.90mm (approx.)
Dimensions (with protective case)	51.00mm diameter (approx.)

10. Support

For further assistance, online tutorials, usage guides, and development resources, please refer to the official documentation provided by Wonrabai. If you have any questions or require support, please contact the manufacturer.

Online Tutorial Usage Guide and Development Resources: n9.cl/rr145