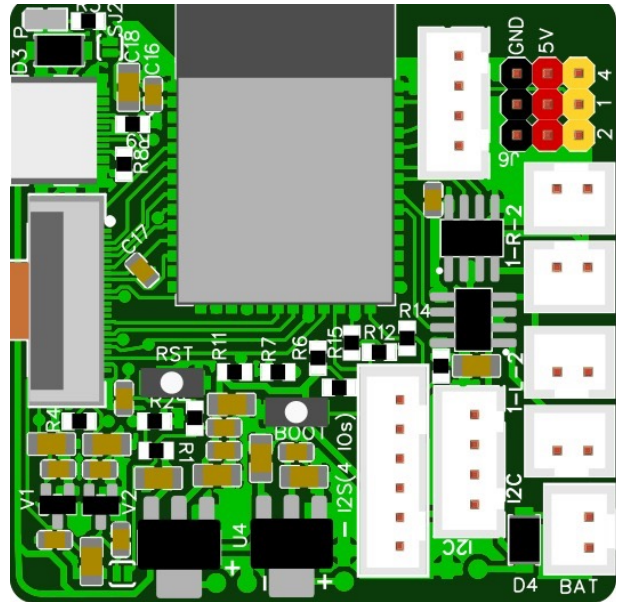


AIoT GMAC

ESP S3 based Development Board for Robots
Product Reference Manual



SKU: AT000014

Latest Release: 23 Dec 2023

Description:

The AIOT GMAC ESP32 S3 N4 R2 SoC development board is a powerful platform designed for advanced robotics and IoT applications. It features an ESP32 S3 microcontroller, which combines a dual-core processor with Wi-Fi (2.4 GHz, IEEE 802.11b/g/n) and Bluetooth (BLE 5 LE and Bluetooth® mesh) capabilities, providing robust connectivity and processing power for complex projects.

Key features of this development board include an SD card socket for 1-bit mode data storage, a 4-pin female connector for an I2C OLED display, and an in-built OV2640 2MP camera for visual input. The board is equipped with SR04-US pins (Vcc, 44-Digital IO/I2C, 43-Digital IO/I2C, Gnd) for ultrasonic sensors and dedicated pins for motor control (L1 & L2 on pins 39 and 40, R1 & R2 on pins 41 and 42).

The board supports multiple I2C configurations: a 4-pin I2C connector with Gnd, Vcc, 21-SDA, and 14-SCL, and a 6-pin I2C connector with Gnd, Vcc, 46-LRCK, 45-BLCK, 47-Din & Microphone IN, and 0-Dout for speakers. Power options include a DC jack for 7 to 9V DC, 1A input, an external battery connector for a 2-pin JST male (designed for a 7.4V Li-ion 2-cell battery), and a USB C-type port for power and programming.

The AIOT GMAC ESP32 S3 development board's combination of powerful processing, extensive connectivity, and versatile I/O options makes it an ideal choice for building sophisticated robotic systems and IoT projects.

1. Features

Processor

ESP32-S3-N4 R2 SoC

Dual-core Xtensa® 32-bit LX7 microprocessor, operating at up to 240 MHz.

Memory - 512 KB of internal SRAM, support for external flash and SRAM.

Connectivity:

Wi-Fi: 2.4 GHz, IEEE 802.11b/g/n

Bluetooth: Bluetooth 5 LE, Bluetooth mesh

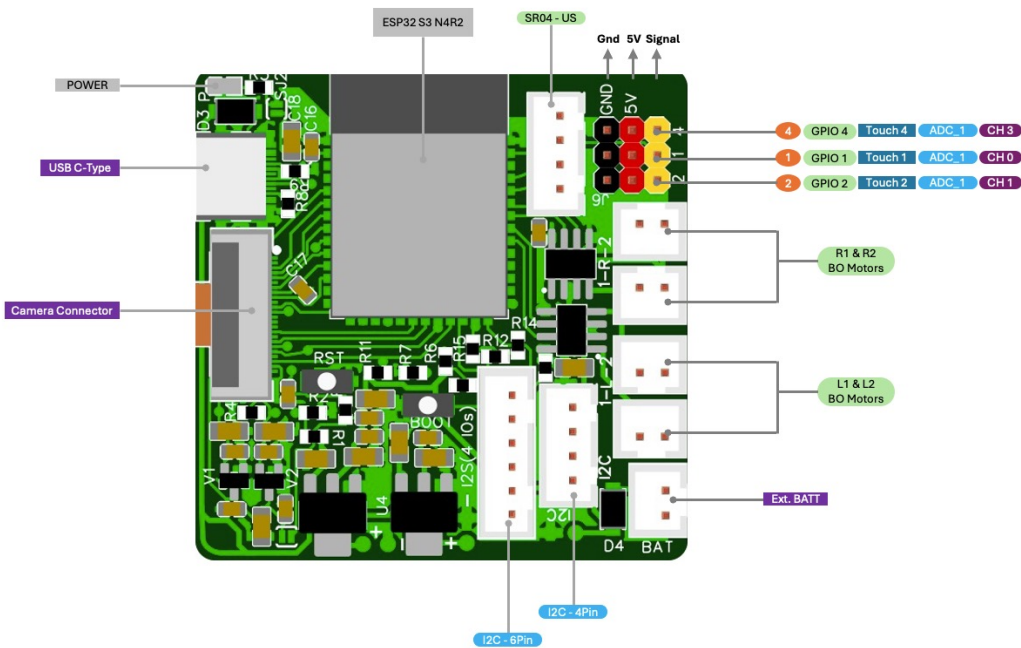
Security: Hardware encryption (AES, SHA, RSA) and secure boot

Power Management: Ultra-low-power co-processor, various power modes for energy-efficient operation.

Peripheral Interfaces - Onboard & Direct mount

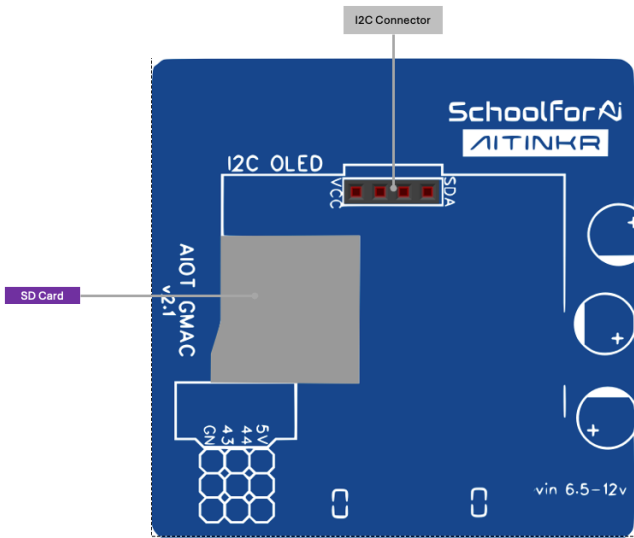
Programmable GPIOs :	10
Memory & Storage:	Integrated Memory SD card socket for the card (1-bit mode)
Digital Interfaces:	4-pin female connector for OLED display (I2C)
Camera:	Built-in OV2640 2MP camera
Sensor Interfaces:	Ultrasonic Sensor (SR04-US) [Pins: Vcc, Digital IO/I2C (Pin 44), Digital IO/I2C (Pin 43), Gnd]
Motor Control Pins:	L1 & L2 Pins: Pin 39, Pin 40. R1 & R2 Pins: Pin 41, Pin 42.
I2C Interfaces:	4-pin connector [Gnd, Vcc, Pin 21 (SDA), Pin 14 (SCL)] 6-pin connector [Gnd, Vcc, Pin 46 (LRCK), Pin 45 (BLCK), Pin 47 (Din & Microphone IN), Pin 0 (Dout for Speakers)]
General Purpose Input/Output:	Multiple GPIO pins available for various interfaces and connections
Other Interfaces:	SPI, I2S, UART
Power Supply:	DC Jack: 7 to 9V DC, 1A
Power Consumption:	Active Mode (depends on peripherals in use) Deep Sleep Mode (typically in microampere) Light Sleep Mode (typically in milliwatt range)
External Battery:	2-pin JST male connector for Li-ion, 2-cell, 7.4V battery
USB Interface:	USB C-type for power and programming.
Temperature Range:	Typically -40°C to +85°C (refer to the ESP32 S3 N4 R2 SoC datasheet)
Relative Humidity:	Typically 10% to 90% non-condensing

2. Overview - Pinout Diagram



ESP32 S3 N4 R2 SOC SD card socket for card - 1-Bit Mode OLED Display: 4-pin Female to plug - I2C	Camera: In-build, OV2640 2MP Camera SR04-US Pins: Vcc, 44-Digital IO/I2C, 43-Digital IO/I2C, Gnd L1 & L2 Pins: 39, 40 R1 & R2 Pins: 41, 42	Wi-Fi: 2.4 GHz, IEEE 802.11b/g/n, Bluetooth: BLE 5 LE and Bluetooth® mesh I2C Pins (4-pin): Gnd, Vcc, 21-SDA, 14-SCL I2C Pins (6-pin): Gnd, Vcc, 46-LRCK, 45-BLCK, 47-Din & Microphone IN, 0 - Dout for Speakers	DC JACK - 7 to 9V DC, 1A Ext. BATT - 2 PIN JST MALE - Use Li-ion, 2-Cell, 7.4V, 2 pin only. USB C-type: For Power and Programming * Please use the battery supplied by AiTinkr. * No Battery charging option	SchoolForAI AITINKR AIOT GMAC ESP S3 Development Board for Robots SKU Code: C00034 Update: 21 May 2024 Page: 1 of 2 Pinout Diagram (Top) Documentation: PDF Copyright CEDURA
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Contd..



ESP32 S3 N4 R2 SOC SD card socket for memory card - 1-Bit Mode OLED Display: 4-pin Female to plug - I2C	Camera: In-build, OV2640 2MP Camera SR04-US Pins: Vcc, 44-Digital IO/I2C, 43-Digital IO/I2C, Gnd L1 & L2 Pins: 39, 40 R1 & R2 Pins: 41, 42	Wi-Fi: 2.4 GHz, IEEE 802.11b/g/n, Bluetooth: BLE 5 LE and Bluetooth* mesh I2C Pins (4-pin): Gnd, Vcc, 21-SDA, 14-SCL I2C Pins (6-pin): Gnd, Vcc, 46-LRCK, 45-BLOCK, 47-Din & Microphone IN, 0 - Dout for Speakers I2C Connector (reverse): 1.3" OLED, direct connection	DC JACK: 7 to 9V DC, 1A Ext. BATT: 2 PIN JST MALE - Use Li-ion, 2-Cell, 7.4V, 2 pin only. USB C-type: For Power and Programming * Please use the battery supplied by AITinkr. * No Battery charging option	SchoolForAI AITINKR AIOT GMAC ESP S3 Development Board for Robots SKU Code: C00034 Update: 21 May 2024 Page: 2 of 2 Pinout Diagram (Bottom) Documentation: PDF Copyright CEDURA
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- Pin 2 :

GPIO 2 | Touch2 | ADC_1 | CH 1 | (3-pins - Signal, 5V, Gnd)
- Pin 1 :

GPIO 1 | Touch1 | ADC_1 | CH 0 | (3-pins - Signal, 5V, Gnd)
- Pin 4 :

GPIO 4 | Touch4 | ADC_1 | CH 3 | (3-pins - Signal, 5V, Gnd)
- Ultrasonic :

SR04-US
- BO Motors :

R1 & R2: 2 off Right Side Motors - 1 Channel from the motor driver shared between these two
L1 & L2: 2 off Left Side Motors - 1 Channel from the motor driver shared between these two
- I2C :

4-Pin JST
- I2C :

6-Pin JST
- BOOT :

To jump to the Microcontroller Boot Mode
- RST:

Reset the Microcontroller
- USB:

Type-C (Power & Upload)
- Ext. BATT:

3 PIN JST MALE - Use Li-ion 2Cell, 7.4V, with in-built BMS only (check the wiring on PCB)