

# MY TB3

SEP 16, 2021

SYSTEM & SOLUTION TEAM-IIBU GLOBAL SALES  
RENESAS ELECTRONICS





# Press Released for Robotics Applications on RA MCUs Sep 2<sup>nd</sup>

About Renesas > Press Room > News > Renesas and eProsima Simplify Development Of Professional Robotics Applications On RA MCUs With micro-ROS Development Framework

## Renesas and eProsima Simplify Development Of Professional Robotics Applications On RA MCUs With micro-ROS Development Framework

Agreement Facilitates Adoption of Robotics in Industrial and IoT Sectors; EK-RA6M5 Evaluation Kit Now Officially Supported micro-ROS Development Board

September 2, 2021

# micro-ROS on RA by eProsima!!

micro-ROS Framework for RA MCUs  
Simplifies Robotics Design



Micro-ROS Framework for RA MCUs  
Simplifies Robotics Design

TOKYO, Japan and MADRID, Spain — Renesas Electronics Corporation (TSE:6723), a premier supplier of advanced semiconductor solutions, and eProsima, an SME company specialized in middleware solutions, today announced that the Renesas EK-RA6M5 Evaluation Kit for RA MCUs is the official supported hardware platform of the micro-ROS development framework. micro-ROS is the industry's robotics operating system for MCUs. Renesas teamed with eProsima, the main developer of the micro-ROS framework, to port micro-ROS into the RA MCUs, easing development of professional robotics applications for IoT and industrial systems.

The micro-ROS framework allows a standardized integration of MCUs into the Robot Operating System (ROS) 2 data space. It provides an established application development framework based on standard communication middleware to the embedded world. Porting micro-ROS into the Renesas RA MCUs facilitates the adoption of this robotic framework in Industry 4.0 and Industrial IoT applications.





# Officially Supported RA6M5 on micro-ROS

The screenshot shows the micro-ROS website home page with the following sections:

- Mission:** Bridging the gap between resource-constrained microcontrollers and larger processors in robotic applications that are based on the Robot Operating Systems.
- Key Features:**
  - ✓ Microcontroller-optimized client API supporting all major ROS concepts
  - ✓ Seamless integration with ROS 2
  - ✓ Extremely resource-constrained but flexible middleware
  - ✓ Multi-RTOS support with generic build system
  - ✓ Permissive license
  - ✓ Vibrant community and ecosystem
  - ✓ Long-term maintainability and interoperability
- Architecture:** The architecture of the micro-ROS stack follows the ROS 2 architecture. Dark blue components are developed specifically for micro-ROS. Light blue components are taken from the standard ROS 2 stack.
- Why Microcontrollers?:**
  - Hardware access
  - Hard, low-latency real-time
  - Power saving

Another important reason is safety, but note that micro-ROS is not developed according to any safety standard.
- News:** Read about the latest developments in our blog or attend the next ROS 2 Embedded Working Group Meeting, which take place online on a monthly basis. The meeting link can be found in the ROS 2 Events calendar.
- Questions:** We are looking forward to answer your questions on concepts and development You have the choice:
  - ROS Discourse (in category "embedded")
  - ROS Answers (tag with "embedded")
  - micro-ROS Stack Channel


The screenshot shows the 'Supported Hardware' page with the following content:

- Supported Hardware:** Micro-ROS aims to bring ROS 2 to a wide set of microcontrollers to allow having first-class ROS 2 entities in the embedded world.
- Main targets:** The main targets of micro-ROS are mid-range 32-bits microcontroller families. Usually, the minimum requirements for running micro-ROS in an embedded platform are memory constraints. Since memory usage in micro-ROS is a complex matter we provide a complete article describing it and a tutorial on how to tune the memory consumption in the micro-ROS middleware.
- General requirements:** In general micro-ROS will need MCUs that have tens of kilobytes of RAM memory and communication peripherals that enable the micro-ROS Client to Agent communication.
- Hardware support categories:** The micro-ROS hardware support is divided into two categories:
  - Officially supported boards
  - Community supported boards
- Checklist:** In order to check the most recent hardware support visit the [micro\\_ros\\_setup repo](#).
- Officially supported boards:** The officially supported boards are those which have been carried out or tested officially, and to which LTS is guaranteed.

**Renesas EK RA6M5 and e2studio**

- ✓ **Key features:**
  - MCU: ARM Cortex M-33 core @ 200 MHz
  - RAM: 512 kB
  - Flash: up to 2 MB
  - Peripherals: Ethernet, SCI, SPI, I2C, I2S, UART, USB, SDIO, CAN, GPIO, ADC/DAC, PWM
- ① **Resources:**
  - Official website
  - Datasheet
  - HW support information
- ② **Supported platforms:**
  - RTOSes: FreeRTOS, ThreadX and Bare-metal
- ③ **Supported transports:** UDP, UART, USB-CDC

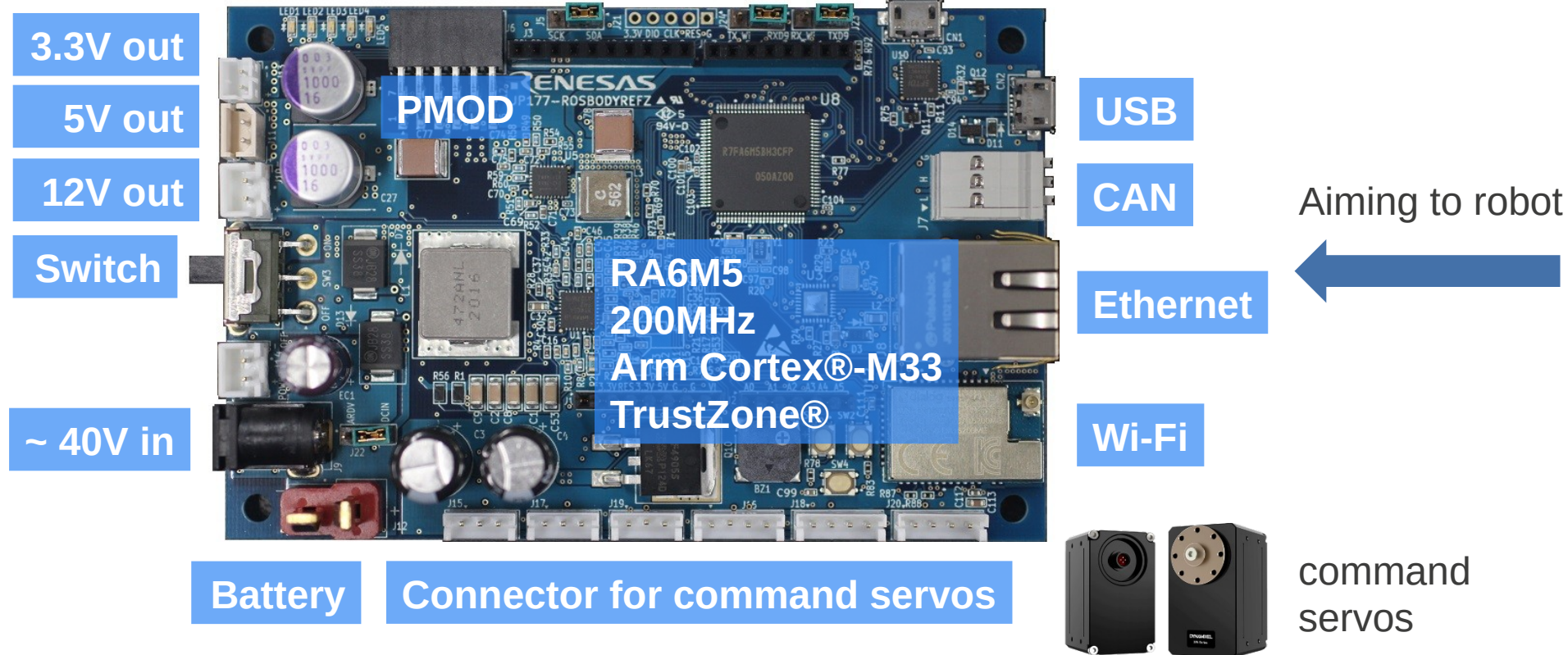
**micro-ROS recommended board and SW IDE**





# POC BOARD : ROS-BASED ROBOT BODY CONTROLLER

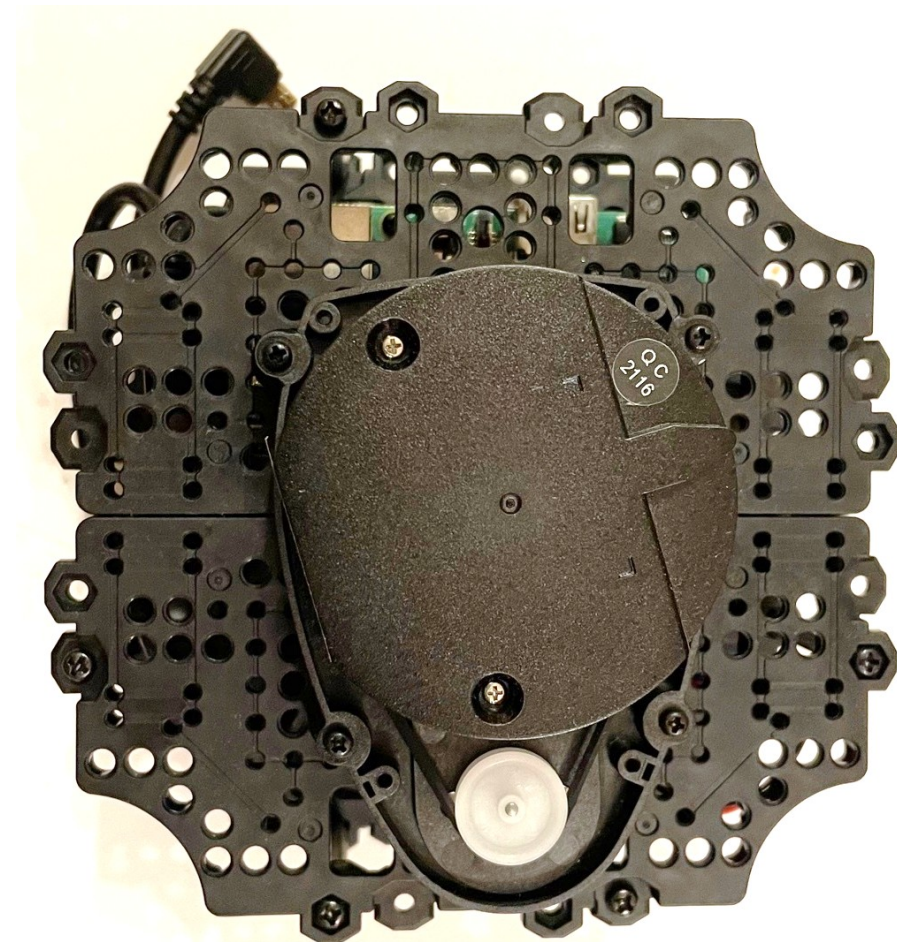
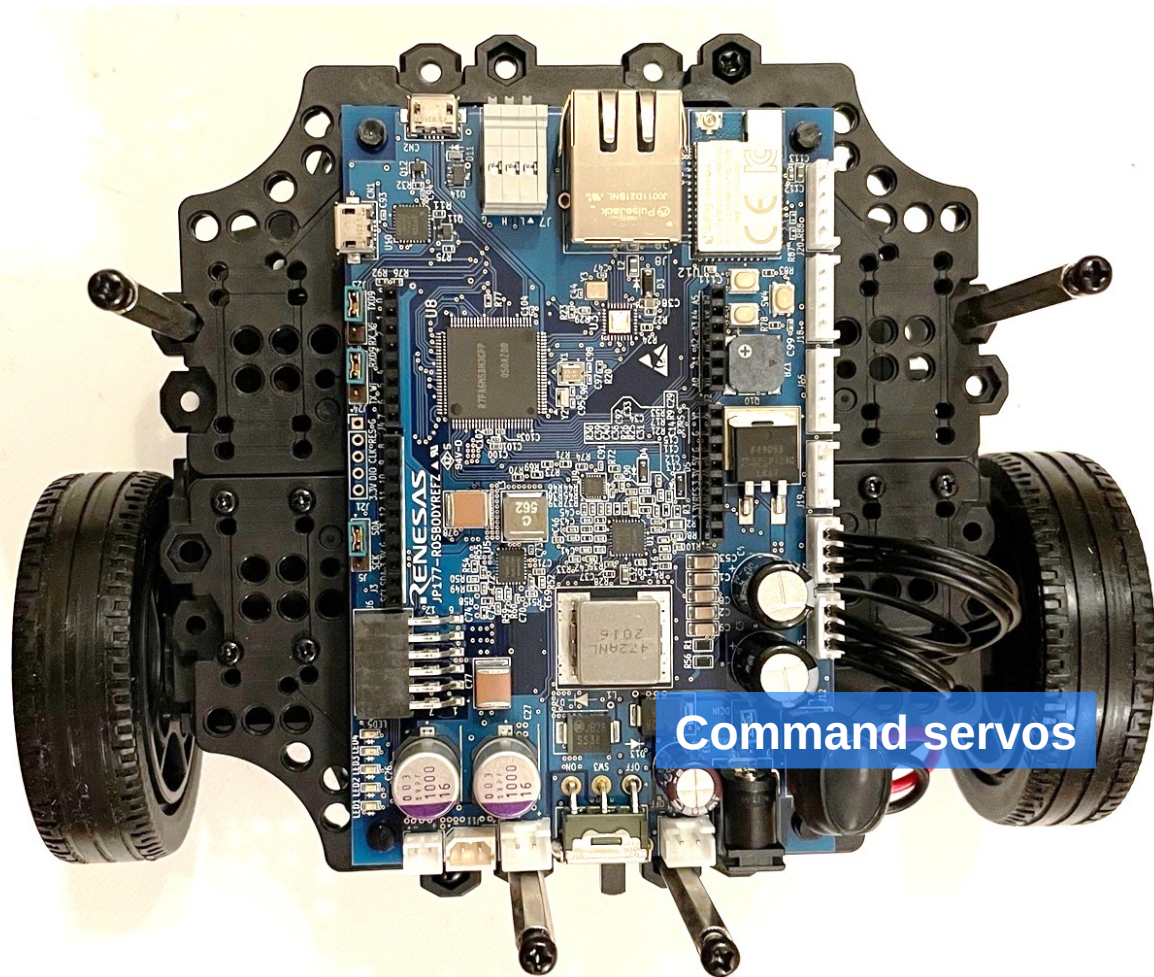
- Can control **multiple servos** via 1-wire UART and RS-485
- Supports **Pub/Sub communication** via Ethernet, USB and Wi-Fi modules
- Wide range supply voltage up to **40V**







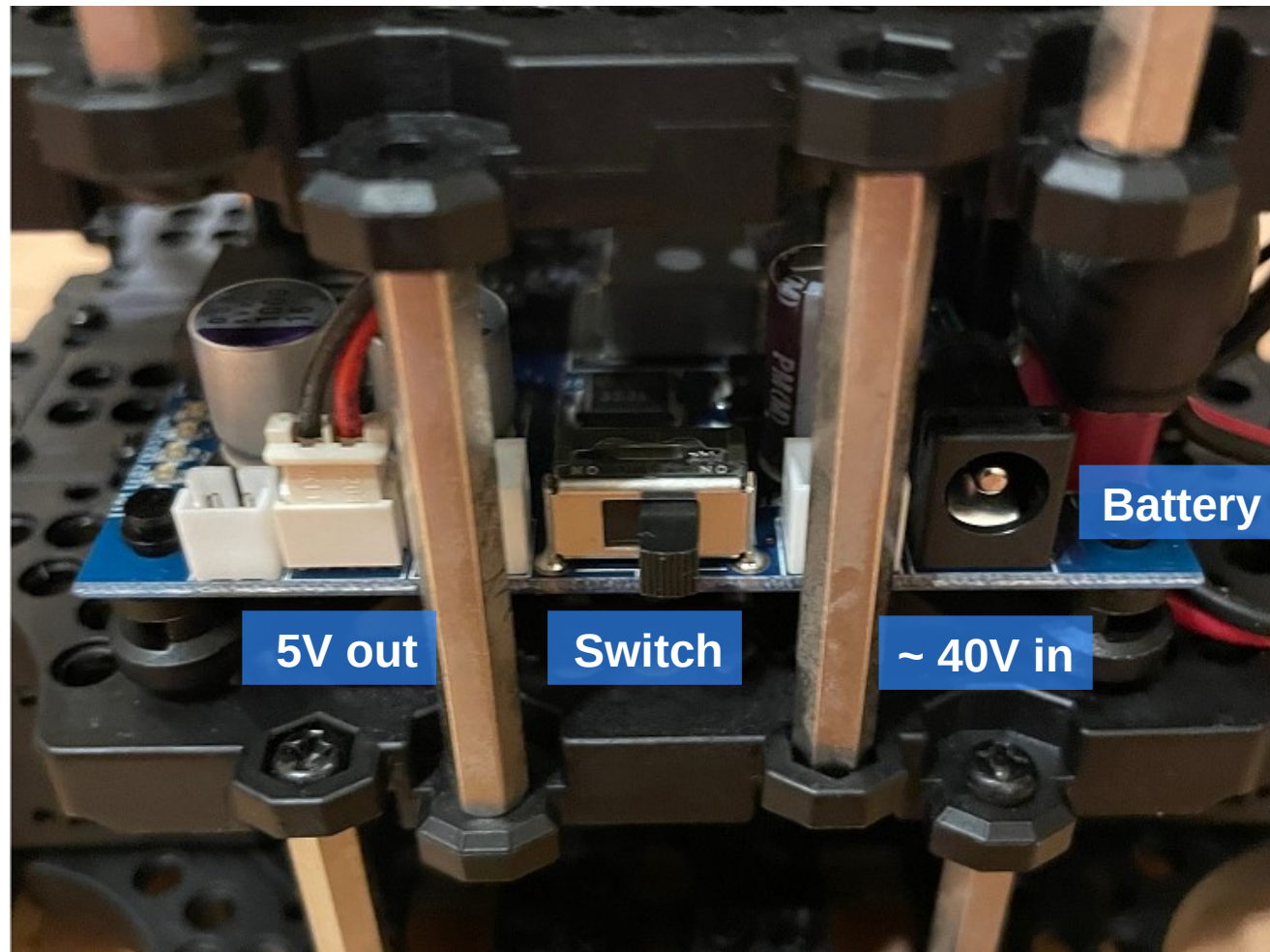
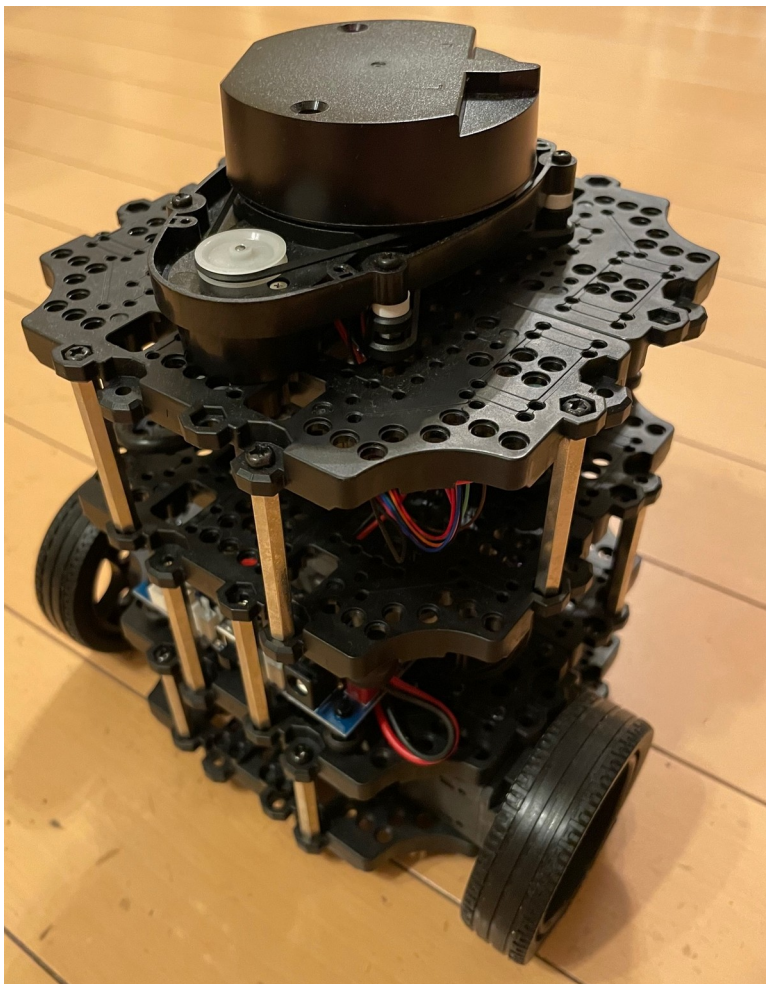
# MY TurtleBot (TB3) CHANGES







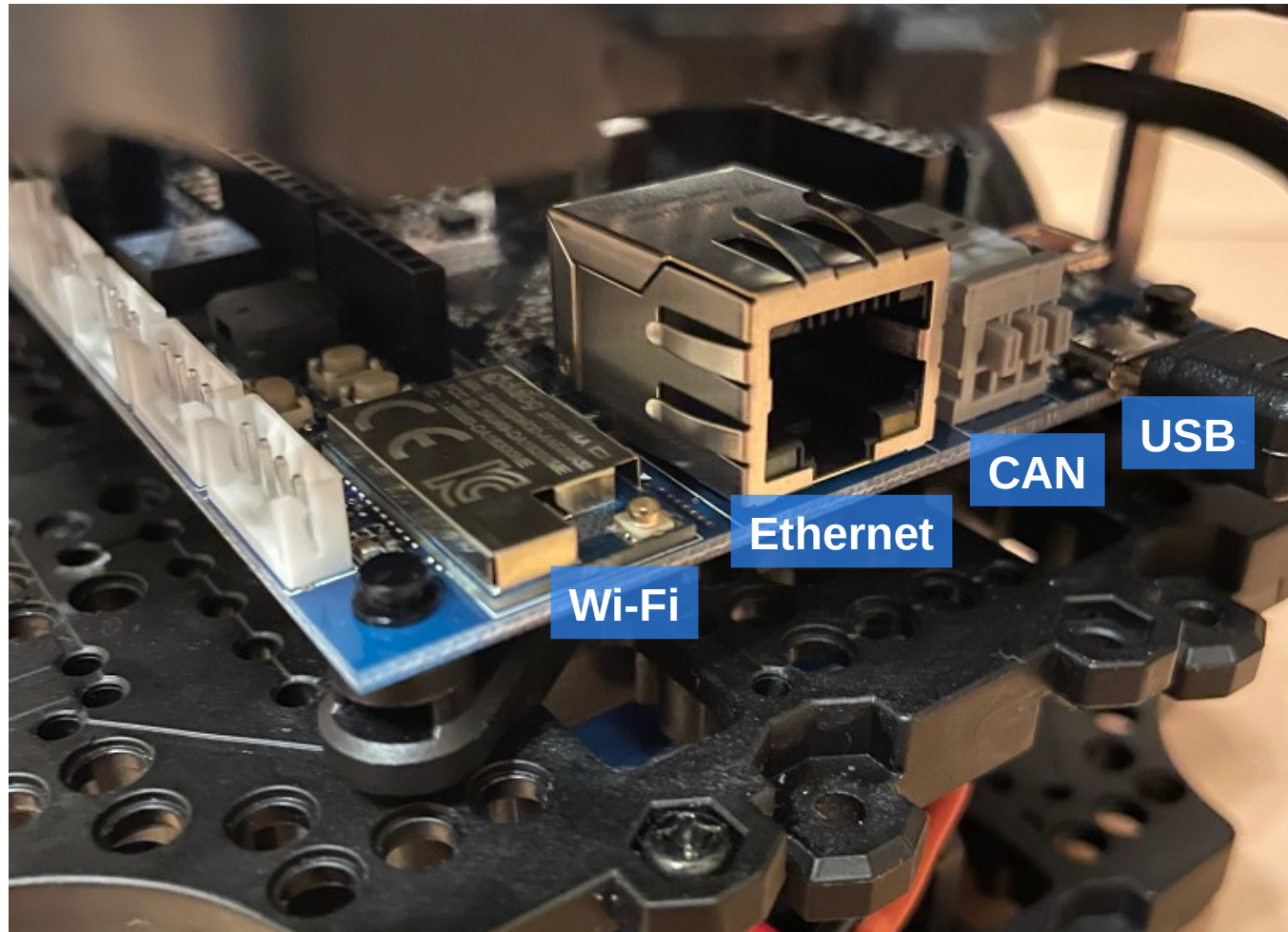
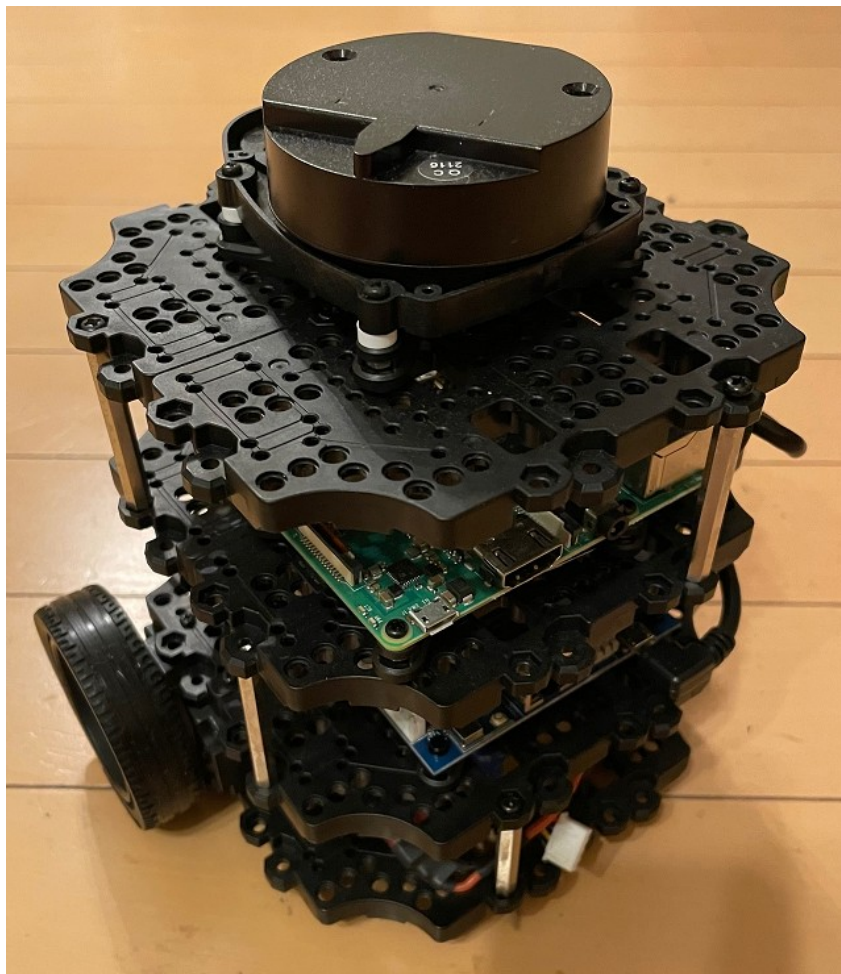
# BACK OF MY TB3







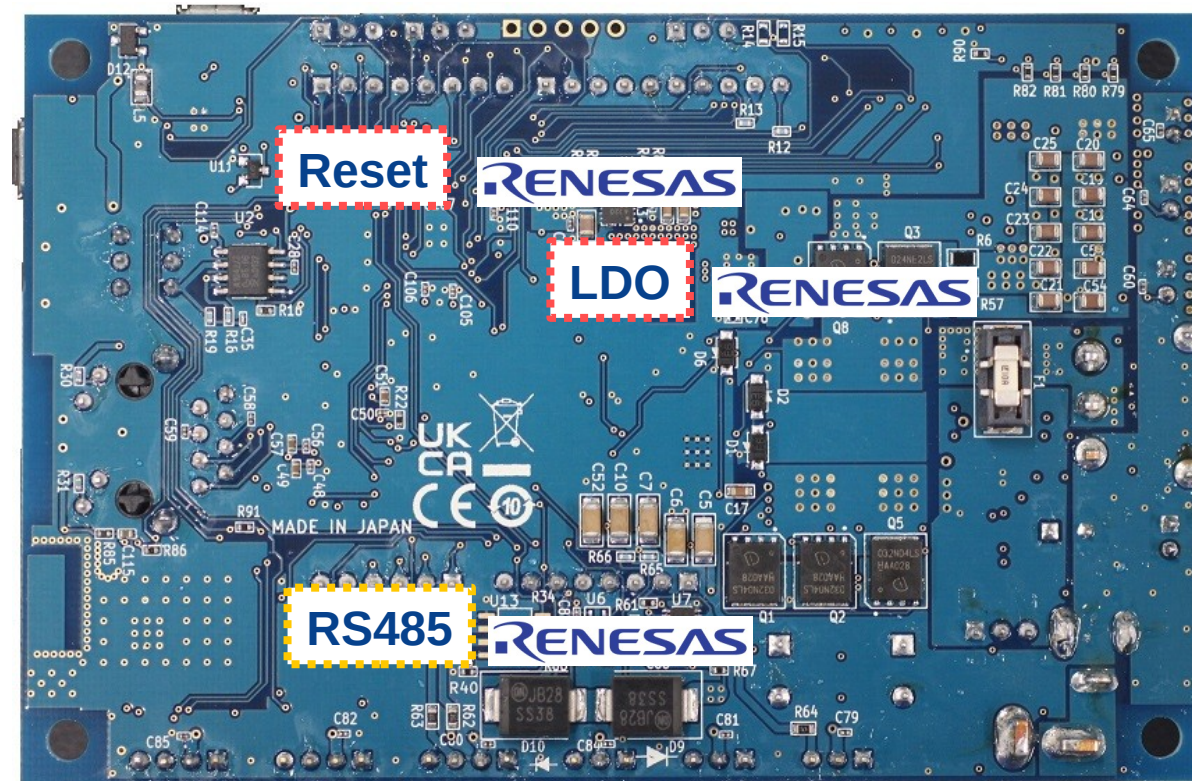
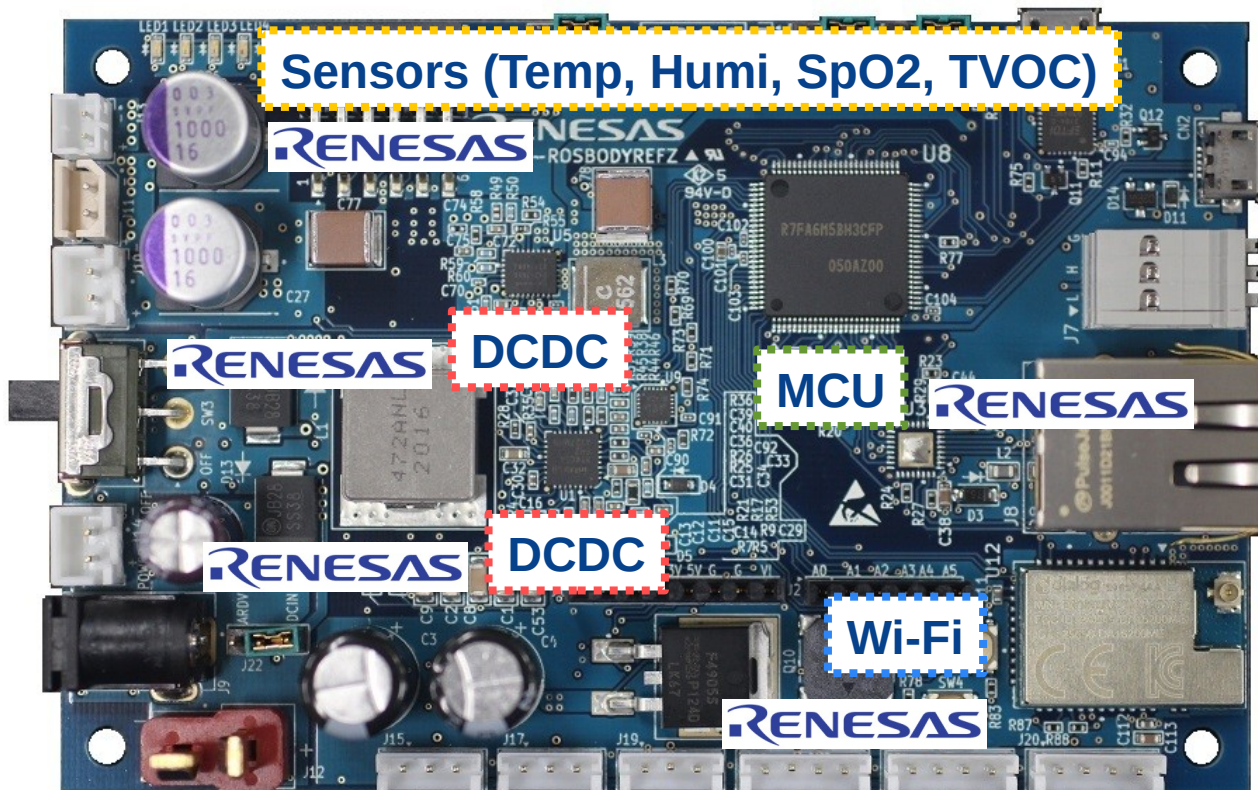
# FRONT OF MY TB3





# Winning Combos

Analog + Power + Embedded Processing + Connectivity





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[Renesas.com](https://www.renesas.com)