ROS2 implementation for MCUs

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Worldwide MCU Market Share (CY2016)

Renesas 20%

NXP

STMicroelectronics

Texas Instruments

Infineon Technologies

Others

Chart created by Renesas based on Gartner Research, Source: Gartner, Market Share: Semiconductor Devices and Applications, Worldwide, 2016, 30 March 2017
ROS2 Implementation to MCU DEMO

Sensor node (publisher)
- Joystick shield
- GR-SAKURA II
- FreeRTPS

Actuator node (subscriber)
- Pan-tilt unit
- GR-SAKURA II
- FreeRTPS
GR-SAKURA II board powered by RX MCU

Microcontroller: RX63N
Operating Voltage: 5V
Clock Speed: 96MHz
Digital I/O Pins: 55
Analog Input Pins: 16
Flash Memory: 1MB
RAM: 256KB
Peripherals: Ethernet, USB, Micro SD I/F

http://int.rsdelivers.com/productlist/search?query=GR-SAKURA&tag=&family=9584
Software Architectural Overview

To be uploaded at GitHub

- Joystick / Motor Application
- FreeRTPS
- Abstraction layer
- TCP/IP(Renesas)
- BSP(Renesas)

Code Size and RAM Usage

<table>
<thead>
<tr>
<th>Component</th>
<th>ROM(KB)</th>
<th>RAM(KB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joystick / Motor App</td>
<td>3.3</td>
<td>0.3</td>
</tr>
<tr>
<td>FreeRTPS</td>
<td>14.9</td>
<td>31.4</td>
</tr>
<tr>
<td>Abstraction layer</td>
<td>2.0</td>
<td>15.2</td>
</tr>
<tr>
<td>TCP/IP</td>
<td>31.9</td>
<td>3.5</td>
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<tr>
<td>BSP</td>
<td>17.1</td>
<td>1.5</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>69.2KB</strong></td>
<td><strong>51.9KB</strong></td>
</tr>
</tbody>
</table>
What’s Next?

- Implement ROS2 under FreeRTOS using lwip stack
- Expand ROS2 support to other Renesas MCU line-ups
- Code size optimization and improve execution time
- Improve features and interoperability of FreeRTPS
- Support rmw and rcl layer for user application

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