Realtime Analytics

Application Examples for Use with Reality AI Tools

Introduction

Reality AI Tools is a comprehensive, self-guided evaluation sandbox and allows engineers to generate and build TinyML/Edge AI models based on advanced signal processing. Users can automatically explore sensor data and generate optimized models. It contains analytics to find the best sensor or combination of sensors, locations for sensor placement, and automatic generation of component specs and includes fully explainable model functions in terms of time/frequency domains, and optimized code for Arm® Cortex® M/A/R implementations.

This application note outlines the various real-life application examples available within the Reality AI Tools, combined usage with Reality AI Utilities and e² studio.

Contents

1. Benefit

- Straightforward and Minimal for developers to generate AI models.
- Experience simple AI model generation workflow using **Reality AI Tools** on Renesas hardware.

2. Project Workflow

Any Edge AI project consists of a set of iterative points that can be described as follows:

1. First, collect dataset from the sensors placed in the environment.
    - To do so, plug the sensor into a PC and use Renesas e2studio with plug in Reality AI Utilities to collect data and send it to Reality AI cloud.
2. Then, login to Reality AI Tools to train an AI model based on the uploaded data, the model is tested and validated.
3. Finally, once the accuracy of the model is met the specified criteria, the model is optimized for a specific hardware and deployed on the hardware. Real time model testing using hardware in the loop is also possible using the Reality AI Live Monitor plugin in e2studio (Reality AI Utilities).

Data was gathered using Reality AI Tools integrated into e2 studio, enabling efficient model training and deployment with minimal memory usage. The AI-enhanced system improves real-time detection of startup issues, enhancing motor reliability and performance. This innovation integrates Edge AI into motor firmware for smarter, more responsive BLDC motor control.

Data Storage Tool

3. Motor Control: Startup Anomaly Detection

Brushless DC (BLDC) motors are efficient and reliable due to their lack of mechanical brushes though on the other hand, they require precise control algorithms. Renesas offers advanced motor control solutions, including sensorless approaches such as Field Oriented Control (FOC). While sensorless methods reduce mechanical complexity and cost, they pose challenges during motor startup.

To address this, Renesas developed an AI model to detect startup anomalies.

Renesas designed the motor bench that contains two motors.

1. First motor being used to create the statuup anomaly

2. Second motor simply acting as a load.

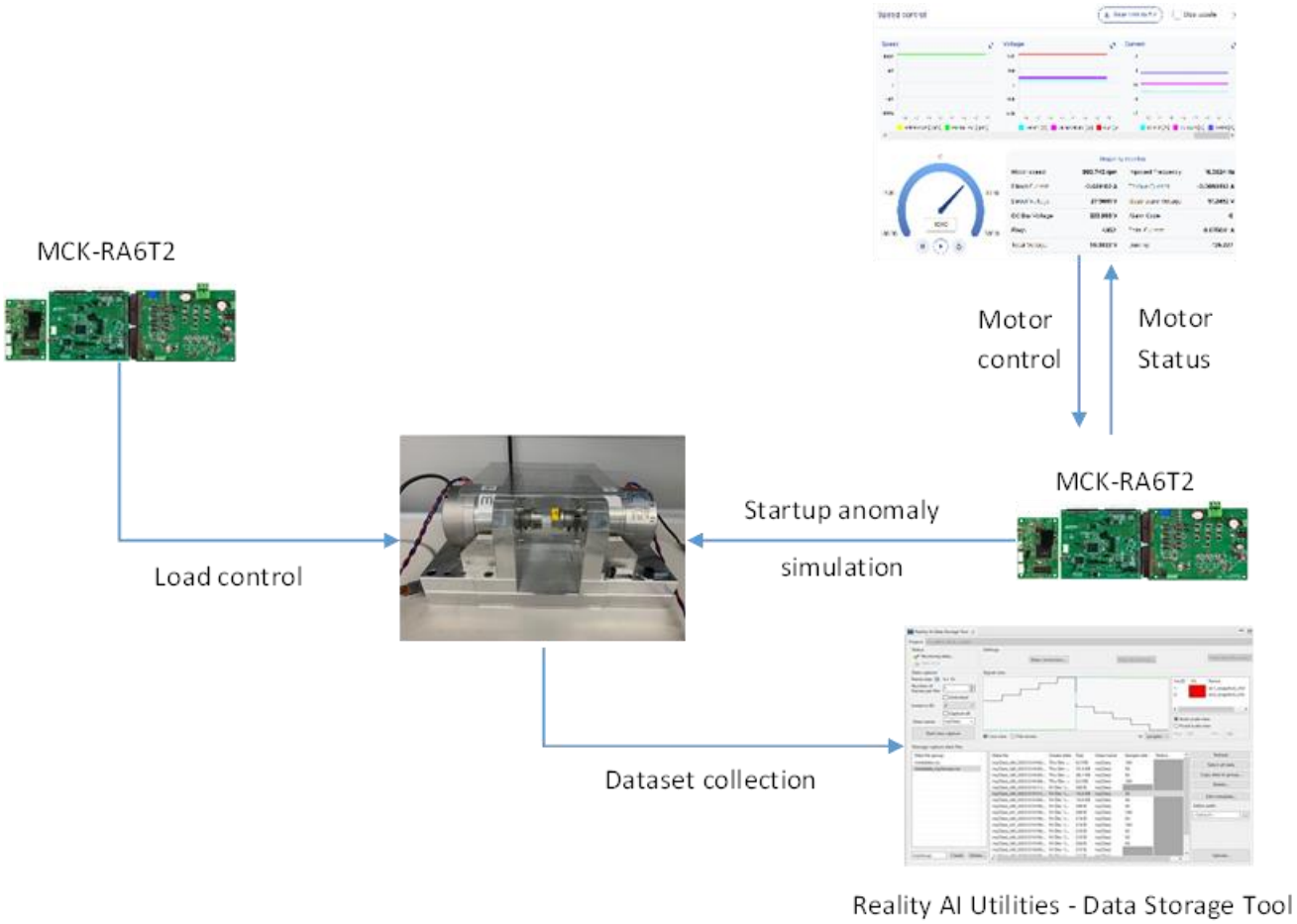
What you will see is the capacity to change the load that is being applied to the motor in realtime.

Our goal: to use an AI model to solve anomaly relevant to the BLDC motor startup sequence

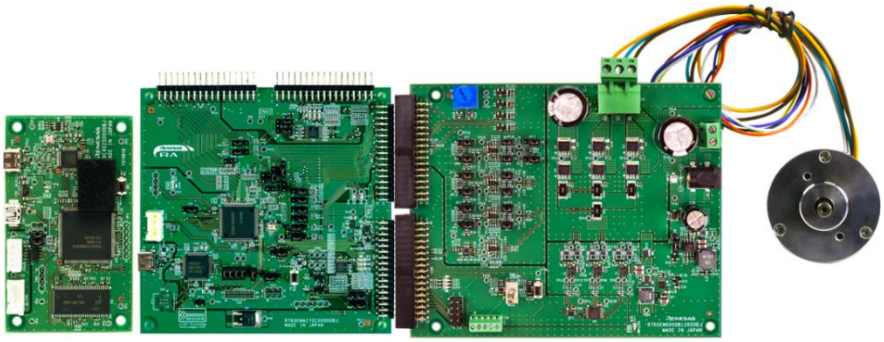
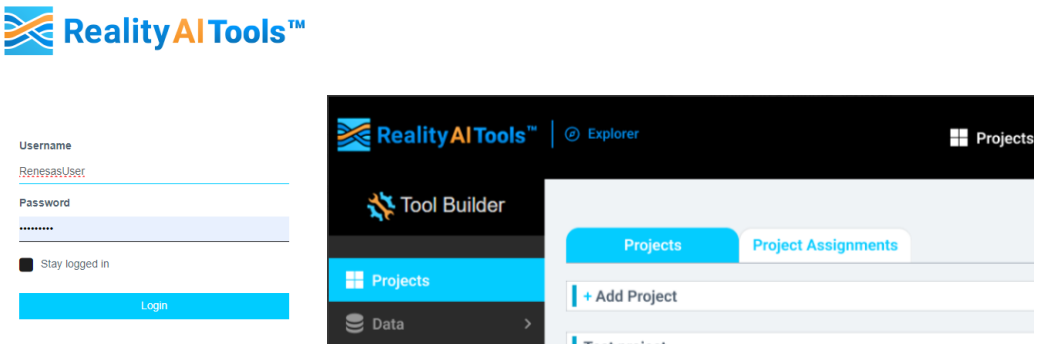
Set up:

Bench is controlled by a Graphical User Interface from a local PC that is connected to the MCK-RA6T2. When the motor parameters are not correct, the motor will try to start but it will stall if there is a connected load. However, in this case the GUI does not show that the motor has stopped, but instead it gets the feedback that the motor is always running.

1. Using a test bench with two motors and the MCK-RA6T2 control kit, data on voltage and current was collected.
2. The AI model was trained to identify four scenarios of normal and anomalous behavior with and without load.
    a. Normal behavior when the motor has a load attached to it
    b. Anomaly behavior when the motor has a load attached to it
    c. Normal behavior when the motor with no load
    d. Anomaly behavior when the motor with no load



4. Set Up Prerequisites

1	**Hardware: MCK-RA6T2 Renesas Flexible Motor Control Kit for RA6T2** • Request for free purchase from: **MCK-RA6T2** 
2	**Renesas E2-Studio IDE 2024-07 or newer with FSP 5.6.** • Platform installer available here • Take note of where e2studio is installed.
3	**Account on the Reality AI Tools** Login to Reality AI Tools using the username and password provided. Or input the request form for 1month free access to Explorer Tier from Reality AI Explorer.  Leave the browser open in the background.
	You are ready to start!

5. Contact

For more information and support, please visit Reality AI Explorer and/or request a demo.

6. Revision History

Revision	Date	Description
1.00	Jun 25, 2025	Initial release.