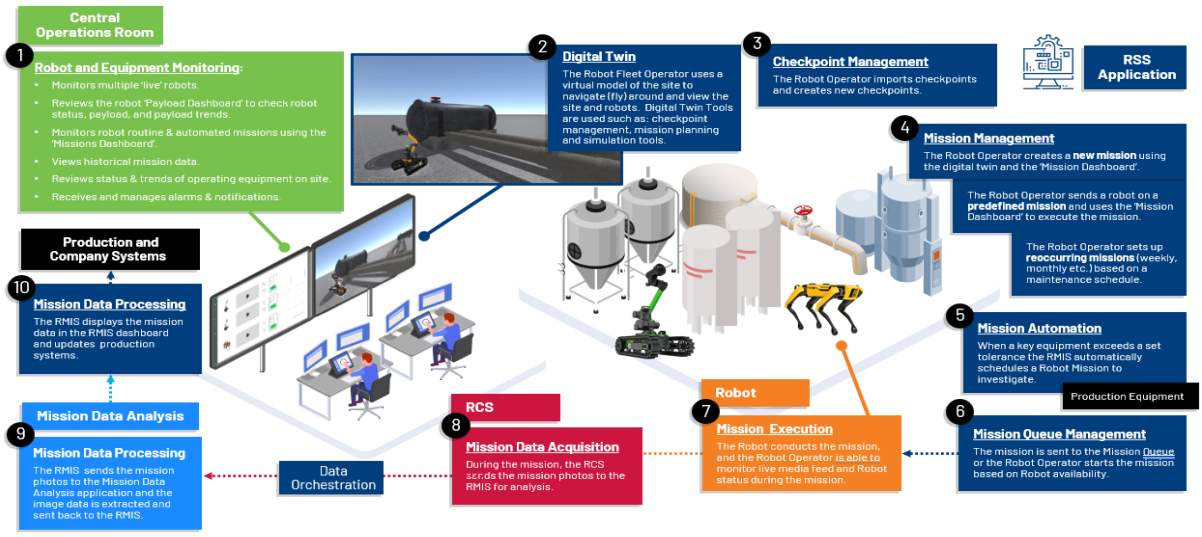
RMIS AI ANALYTICS

Abstract

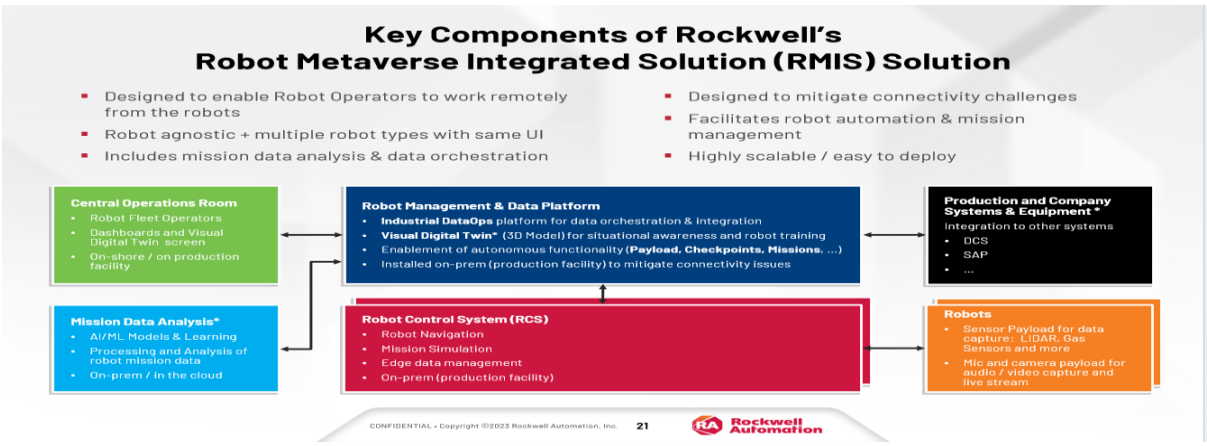
The Robot Metaverse Integrated Solution (RMIS) is an application that enables robotic automation and robot fleet management in operations. It is designed to enable Robot Operators to work remotely from the robots.

RMIS is a 2 screens application. As it is robot agnostic it allows the control and monitoring of various robot type coming from different providers. Using RMIS the robot operators can manage checkpoints and mission, orchestrate data, automate missions and much more using a Metaverse and traditional dashboard.

Use Case View of RMIS



Key Components of RMIS



Purpose

The purpose of this document is to focus on the Mission Data Analytics Component of RMIS which is responsible for extracting Analog Pressure Gauge Value out of Pictures produced by the robot using Computer Vision.

Technologies Used

- **Grounding Dino Model (For Object Detection)**
- **Grounded Sam Model (For Segmentation)**
- **Paddle OCR Model (For text data extraction)**

Hardware Used

- **For execution environment**: -
  Ubuntu 22.04 LTS / RHEL 8/9 server with 32 GB RAM, 12 cores i7 or i9 CPU, 8 GB GPU (E.g. RTX4060), 200 GB SSD

Provided Solution

An API through which the Analog Pressure Gauge image data from the robot will be sent in the form of Base64 and in return it will provide the gauge value and the filename of the post-processed image.

RMIS Analytics API

Gauge Reading

- **Endpoint**: - /gauge_reading
- **Method**: - POST
- **Description**: - Endpoint to detect gauge readings from a base64-encoded image.

Request Body

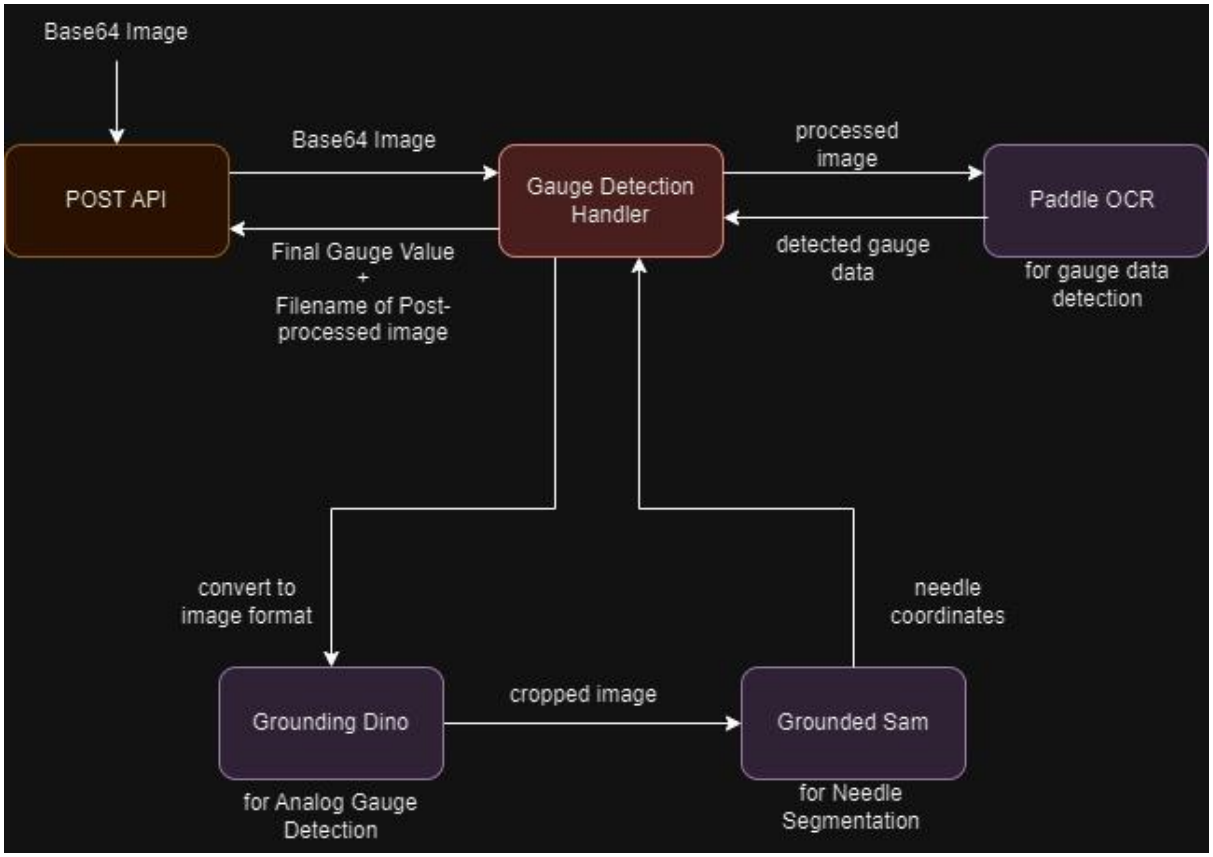
- **Image_base64**: A request object containing the base64-encoded image

Response Details

- Success Response
  {
  "status": "success",
  "Gauge Reading": 0.17 bar,
  “Post Processed Image”: “post_processed_image.jpeg”
  }

- Error Response
  {
  "status": "failed",
  "message": "Failed to do gauge detection due to <error_message>”
  }

Workflow of RMIS AI Analytics Pipeline



Viewing Post-Processed Image: -

The post-processed image contains the bounding box around the Analog gauge and show the gauge reading of that gauge.

To view this image, the directory that contains this image in the file system has been exposed as a static file directory which allows us to serve files from a specific path in our Fastapi app.

It can be accessed by typing the URL below in your browser:

http://localhost:8000/post_processed_images/post_processed_image.jpeg

where “/post_processed_images” is the base URL under which the files from the specified directory (output) will be available and “/post_processed_image.jpeg” is the file inside that directory that needs to be accessed.

Historical Dashboard

The purpose of historical dashboard is to show the historical data of the missions including gauge pictures, gauge values recognized and trend. The data can be seen at a mission level or at an equipment level.