Automated Storage and Retrieval System

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Problem Statement

Design and development of Automated Storage and Retrieval System (ASRS)

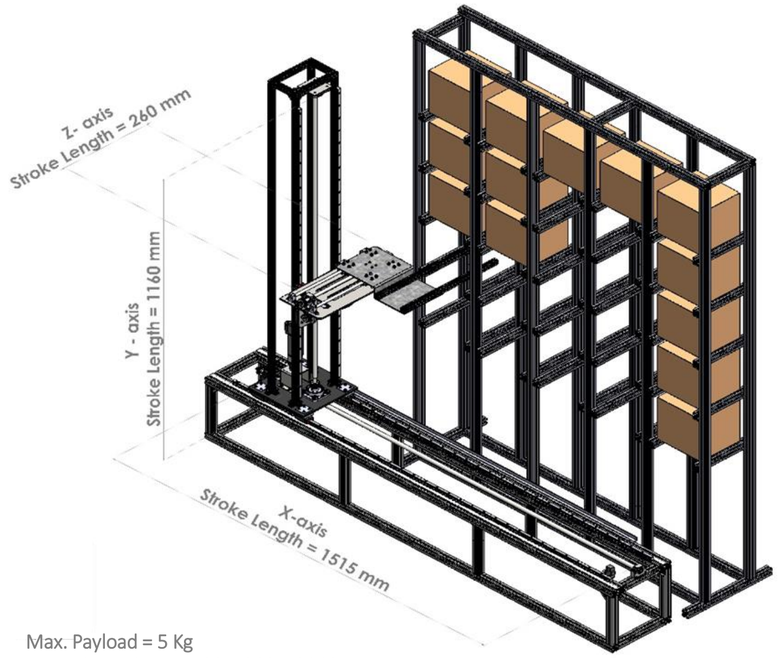
Objectives

- Planning and design of hardware components (both physical and electronic) and design of software components of ASRS
- CAD modeling, simulation and validation, manufacturing/procurement and assembly
- Automation programming and validation of ASRS
- Realization of Digital Twin

Methodology

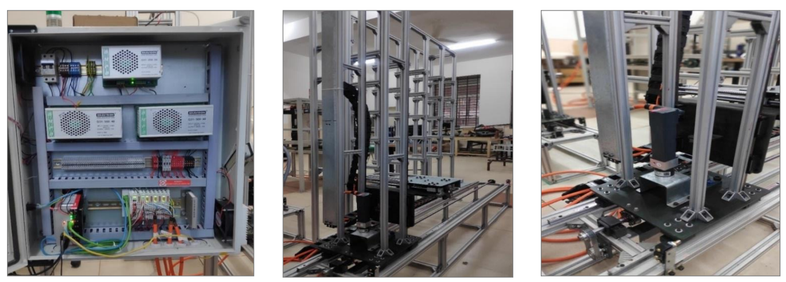
The objective of this project was to design and develop a complete automation solution that would involve user interface and database, and also simultaneously integrate the real-time automation system with the configured Digital Twin in MATLAB – Simulink. The complete process would involve a component entering the system through a conveyor-based system that would trigger the ASRS storage functionality. The storage location in the rack is calculated automatically. Additionally, customer order would trigger retrieval functionality and the component would be made available on the conveyor system. In both the scenarios, a user interface connected to database is provided to manage the automation system as well as Digital Twin to virtually visualize these functionalities.

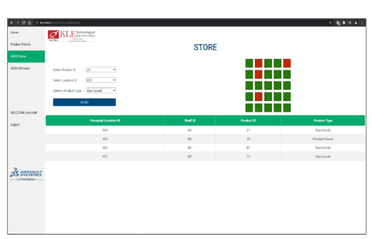
Design and Development

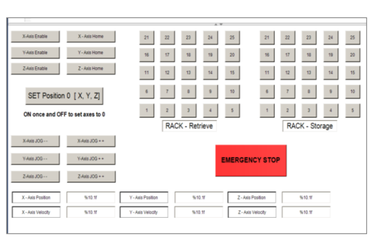


Max. Payload = 5 Kg
Rack Dimension = 1490 X 260 X 2060 mm
Shelf Dimension = 240 X 260 X 220 mm

3D Model of ASRS



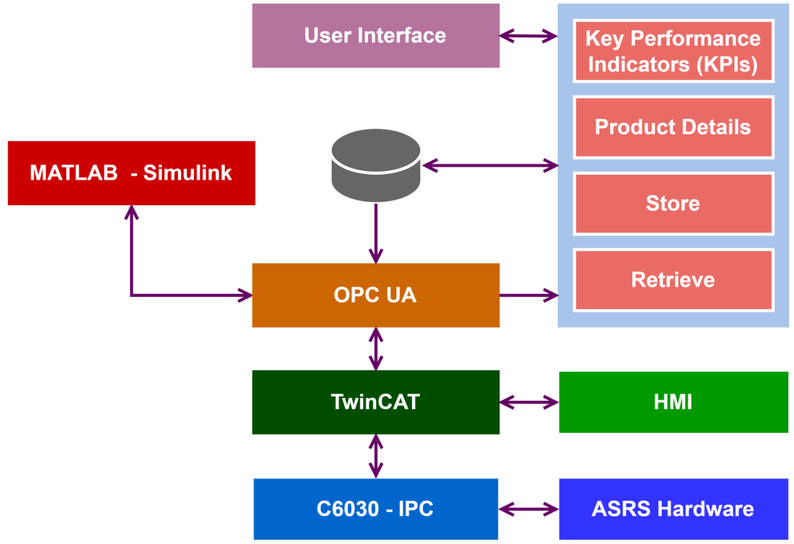




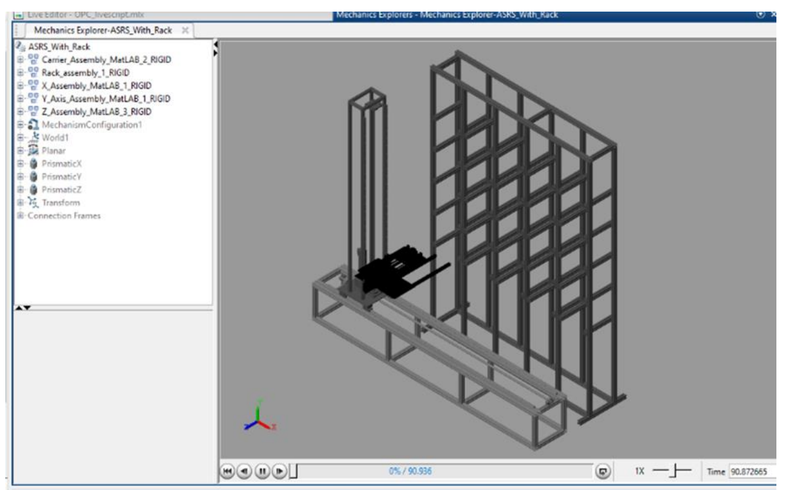
ASRS Gallery

Software Implementation and Digital Twin

Setup of Digital Twin involves the establishment of the OPC UA server, which would act as middleware between MATLAB – Simulink and automation system by pushing the data in bi-direction.



Software Architecture of ASRS



Digital Twin of ASRS in MATLAB - Simulink