Cleyton Shelton Virtual Conveyor System Capstone

Problem Domain

Modern factories rely on conveyor systems to move products efficiently, but **real-world testing and training is costly and risky**.

There is a need for a **fully virtual conveyor system** that allows users to:

- Control conveyors safely via virtual control stations
- Monitor system status in real time through an HMI
- Simulate complex conveyor interactions without physical equipment
- Test, optimize, and train operators before deploying in a real factory

Features & Requirements

Key Features (5 Total)

1. Conveyor Emulation

- Model the conveyor system in Emulate3D
- Simulate motor behavior, sensors, and material flow
- Synchronize emulation with PLC ladder logic

2. Real-Time HMI Dashboard

- Display conveyor states using Ignition
- Show motor status, sensor readings, and alarms
- Provide a visual overview of the system

3. Conveyor Sequencing

- Implement multiple conveyor lines and junctions
- Automate routing of products between conveyors
- Test sequencing logic in Emulate3D simulation

4. System Integration

- Synchronize PLC ladder logic, Emulate3D simulation, FactoryTalk controls, and Ignition HMI
- Ensure real-time updates across all platforms
- Test reliability under different scenarios

5. Documentation & Reporting

- Maintain full project documentation
- Include PLC logic diagrams, HMI screenshots, and simulation results
- Prepare presentation/demo materials for final review

Development Roadmap

Product Development Roadmap

Sprint 1 Deliverables

1. **Emulate3D Conveyor Model**

- Build initial 3D conveyor model
- Connect motors, sensors, and PLC I/O
- Run first simulations to test basic logic

Sprint 2 Deliverables

2. **Real-Time HMI Dashboard**

- Design Ignition dashboard for conveyor overview
- Connect to PLC or Emulate3D tags
- Display motor and sensor status

3. **Full System Integration**

- Ensure PLC, Emulate3D, FactoryTalk, and Ignition are fully synchronized
- Test end-to-end conveyor operations
- Debug communication issues and timing discrepancies

4. **Testing, Documentation & Final Polishing**

- Perform complete system testing
- Fix bugs and optimize performance
- Prepare documentation, diagrams, and presentation/demo materials

Questions?