An Industry 4.0 Solution to KPI Monitoring

B.Sc. (Honours) in Applied Physics and Instrumentation

Department of Physical Sciences

Dion Burke

Anthony Grant

Introduction to Project & Motivation

What is Siemens Industrial Edge

- It is a software platform which is designed for industries wanting to create more efficient production lines.
- It provides:
  - Centralized monitoring delivery.
  - Edge Device management.
  - Application Management
- Benefits of using Siemens Industrial Edge:
  - Full control over your data.
  - Reduced storage and transmission costs.

Terminology

- **TIA Portal** is the Siemens software to create Ladder Logic which can be downloaded to the PLC.
- **Industrial Edge Management (IEM) System** is a webpage which stores all the information about an Edge Device used by a customer.
- **Virtual Industrial Edge Device (vIED)** is the term given to the Edge Device which is stored inside the IEM.
- **KPI Monitoring** is stands for "Key Performance Indicators". It converts raw numeric data into easily readable charts and dashboards.
- **Performance Insight** is a Siemens application which will be used to monitor the process.

Brief Introduction

- The project is designing and configuring a KPI monitoring setup which can be used on a production line.
- Siemens Industrial Edge Software is used to help create a powerful KPI monitoring setup and get the most up to date information on the production line.
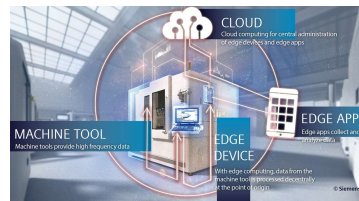
Motivation for Project

The reasons for this project is:

- Gain insight into working with new types of technologies in the automation sector.
- Simplifying the operation of creating a KPI monitoring system on a production line.
- Become familiar with Siemens Edge technologies which is currently a piloted project.

Equipment

IR Photelectric Proximity Sensor

This Photelectric type sensor transmits IR light and detects reflected IR light by each passing product.

Stepper Motor

A Stepper Motor is used to power the CD which will be used to bounce the signal back and fort to the Sensor.

The image show the sensor and motor in action.

PLC: S7-1200

The PLC which is used for this project is a S7-1200. This PLC is compatible with the Siemens Edge technology.

However, in the later stages of the project a firmware upgrade on the PLC would have been more beneficial.
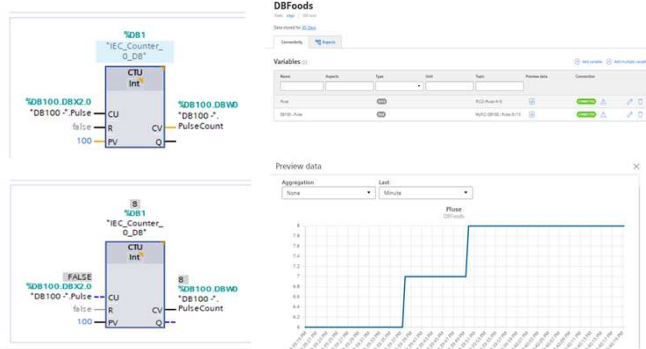

Performance Insight

Siemens application which displays:

- Machine Status – Running / Stopped
- Production output quantity (total number of tubs produced every hour, day and week)
- Production output speed/rate (tubs per hour).
- Scrap – no. of tubs rejected due to faults.

Work Carried Out

Data Collection

Success/Challenges

Challenges:

- There has been many challenges encountered throughout this project, one such challenge would be constant networking problems encountered with the PLC and the Industrial Edge system.

Successes:

- Getting the IEM system installed myself. Usually this install is done by Siemens but NeoDyne wanted me to be able to grasp the concepts involved which will be useful for the company in the future.
- Getting the PLC and vIED communicating with each other to gather useful information.

Conclusion and Improvements

The installation of the Siemens Industrial Edge system along with connecting to the PLC took much longer than expected. This is due to having an older firmware of PLC and installing these systems with little to no pervious documentation proved difficult.

An improvement I would make to my project would be to have started on the installation side of the project sooner as it caused many delays. I would also asked to work alongside a Siemens tech so that problems encountered could have been fixed much quicker.

References

[1] 'Industrial Edge', *siemens.com Global Website*. https://new.siemens.com/global/en/products/automation/topic-areas/industrial-edge.html (accessed Apr. 25, 2022).

[2] 'Photoelectric sensors SICK'. https://www.sick.com/ag/en/photoelectric-sensors/c/g172752?q=:Def_Type:Product (accessed Apr. 25, 2022).

[3] 'SIMATIC S7-1200 -Take control of communication', *siemens.com Global Website*. https://new.siemens.com/global/en/products/automation/systems/industrial/plc/s7-1200.html (accessed Apr. 25, 2022).