Cybersecurity Capstone – Team One MFR

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| To: | Professor Bansley |
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| Subj: | Project Status Outline |

The initial steps were to connect to the PLC environment to configure OPTO SNAP PAC R1 devices for team needs. Team one set up the team device to pull data from various PLC nodes and convert it to machine-readable data to be utilized with higher-level services. Logging, altering/ reporting, and usable/ reformattable data transfer capabilities are provided through the OPTO22 software packaging. The R1 device uses OPTO MMP to transport the data to OPTO configuration software. From this point, analog data is set to be transported to team one’s database.

Using Snap PAC Control Basic, a logic strategy is uploaded to the R1 device and set to operate constantly using a predefined strategy provided by OPTO22 and edited by team one. The OPTO22 DataLink software is used to send data from the PLC environment to data storage or data manipulation services. This software allows for data logging via email or file storage. The data is transferred from DataLink to a SQL Server 2012 over a TCP connection. There are options for the encryption of data between these two points. However, the inclusion of device data encryption poses a major compatibility issue for authentication of most modern database software. Additional security measures such as system isolation, firewalls, access control, and external encryption mitigate this concern.

During Team One’s efforts to configure DataLink, it was discovered that for ease of set up Microsoft SQL Server 2012 was the best choice. The data is currently being funneled into a single table with a new row for the most current time stamp, and each input has its own column. As of now, the database is being hosted locally on the same Windows 10 system as the OPTO22 software; however, the team is looking into a better solution that would allow more scalability as the project grows.

Grafana connects directly to the SQL server database. From there the data is formatted into graphs that are displayed on different dashboards. The dashboard we are currently working on displays the status of the switches on the PLC, the alarm and emergency state, the temperature in both Fahrenheit and Celsius as well as the trends of temperature over time. It also shows the most recent fuel reading. We are currently working on establishing an alerting system through Grafana. Our goal with the alerting is to have alarms that would notify if the alarm state or emergency state changes, and if the temperature goes above a certain threshold, and if the fuel level drops below a certain threshold. We are also currently working on making changes to the HMI to reflect aspects of Grafana using PAC Display Configurator Basic software.

**Acronyms**

**HMI** – Human Machine Interface

**MFR** – Memorandum for Record

**MMP** – Memory Map Protocol

**PAC** – Programable Automation Controller

**PLC** – Programmable Logic Controller

**TCP** – Transmission Control Protocol