

Fluid Dynamic Plant Simulation for Education using LabVIEW and Data Socket as OPC Client

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NI Product(s) Used

LabVIEW, NI Datasocket

Category

Industrial Machinery &
Control;
Electronics &
Semiconductor;
Energy;
RF, Wireless & Mobile
Communications;
Advanced Research

The Challenge

To design a simulator that accessible by students and lecturer synchronously. The PID simulator will be run on every students from students workstation while the lecturer will have the access on the same simulator to monitor system status, upstream a teaching module and controlling or setting the simulator from lecturer workstation.

The Solution

LabVIEW program was developed at server to work as an OPC Client to third party OPC Server at student's PC and lecturer's PC. Implementation was done by using Data Socket to allow easy data transfer over many different protocols.

About the Company

Virtual Instrument and System Innovation Sdn Bhd or known as VISI is NI Alliance Partner that work closely with NI and it's customer as a system integrator. Our primary capabilities are in engineering system development and integration using Virtual Instrumentation approach and tools from NI. Our people's experiences are broad, covering several industries including Industrial Automation, Offshore, Marine & Shipyard and Training & Education Research. Recently, VISI has started with it's first subsidiary naming VISITAS Sdn Bhd that focus in delivery training (mainly LabVIEW-based training) and serves academic including program development consultation and courseware development and customization.

System Overview

Initially, before the Fluid Dynamic Plant Simulator exist, the students will directly apply on job practice on the Fluid Dynamic Plant without fully understand the plant. Based on theoretical information and knowledge gained from lectures, students will apply the theoretical knowledge to the real Fluid Dynamic Plant in their laboratory session. The risk that university has to undertake is the mishandling of the system that may caused a failure to the expensive plant.

Fluid Dynamic Plant Simulator is designed to enable students to explore the system and understand the concept and theory before handling the real plant. Lecturer will assigned each students PC whether to run a fluid plant or gas plant. From lecturer PC also, lecturer able to inject failure to each of the student's PC. The selected injected failure will appear on student's PC for the student to analyze.

CASE STUDY

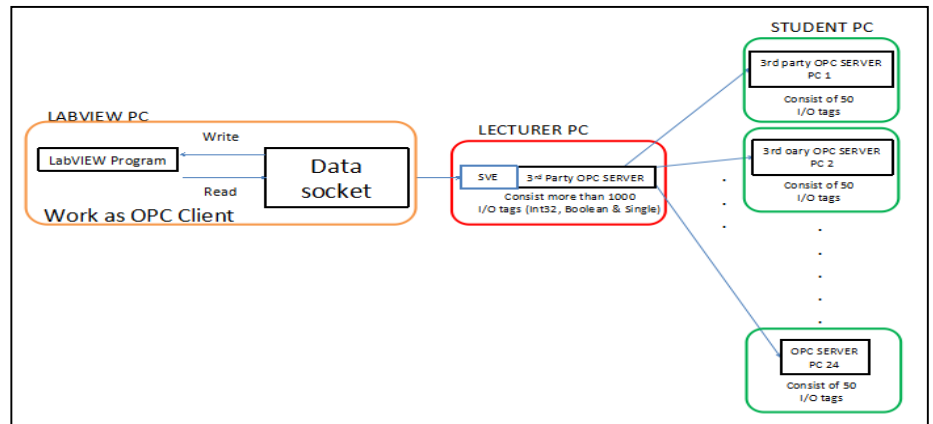
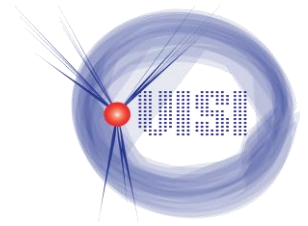


Figure 1 Fluid Dynamic Plant Simulator Setup

Figure 1 illustrate the setup of the Fluid Dynamic Plant Simulator. The system is divided into three ; Server (LabVIEW PC), Lecturer PC and Student PC. Student PC is equipped with third party OPC server that is use by student to explore the simulator.

A LabVIEW program was developed on server or LabVIEW PC to act as OPC Client. Communication with third party OPC server which Yokogawa Centum in this project is not an easy and straight forward implementation, therefore NI Data Socket is used to let LabVIEW simplifies live data exchange between Yokogawa Centum OPC server on students and lecturer PC and LabVIEW on the server.

At Lecturer PC, we have deployed network-published shared variables to a shared variable engine (SVE) that hosts the shared variable values on the network.

The SVE works as server for a shared variable and all the references (Input Output tags from Yokogawa Centum) are the clients.

How does this work?

SVE at Lecturer PC will published the Yokogawa Centrum IO tags while Data Socket at LabVIEW PC subscribes it. The OPC Server will then response to the feedback from LabVIEW program via Data Socket and distributes the signal to Yokogawa IO tags at student PCs accordingly. When lecturer set and inject failure at student's PC, this scenario is updated at student PC on the third party program that is communicate with LabVIEW via data socket.

Conclusion

By having Fluid Dynamic Plant Simulator, students can understand the process flow of the real Fluid Dynamic Plant. They can also understand and perform analysis of failure which can not be implemented on the real plant.

After the students has successfully run and understand from the simulator, then only they are allowed to handle the real-plant. This can minimize the risk of mishandling and failure on the real plant.

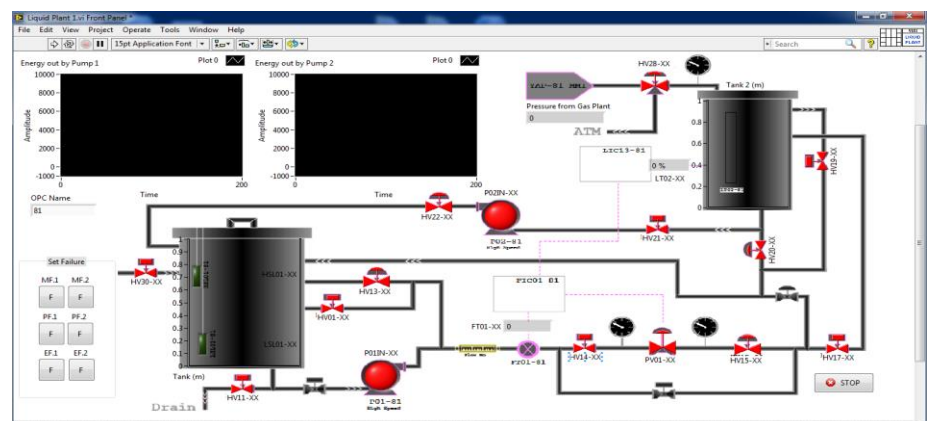


Figure 2 Fluid Dynamic Simulator GUI at Lecturer's PC

Figure 2 shows the Fluid Dynamic Simulator GUI at Lecturer's PC. Lecturer will inject or set failure from the Set Failure button. The failure will appear on student's PC for them to analyze.