Product Developer

Spiro Control develops real-time control and advanced analytics solutions to be deployed in various industries, including sectors as diverse as oil & gas, petrochemicals, micro-grids, and building control.

About the opportunity

This is an opportunity to make a significant contribution to our ambitious R&D program. Examples of the types of technology development projects being run at Spiro Control are provided at the end of this application document.

Spiro Control has a proven track-record in helping the world's leading refining and petrochemical producers to improve the efficiency of their operations. Applicants should therefore have a strong interest in industrial control and the mathematics associated with this area of engineering.

To succeed in this role, you will be confident in most of the following:

- Applied control theory
- Machine learning
- Mathematical optimization algorithms
- Linear algebra
- Matlab, Python, or a similar programing environment

We are open to taking on someone in a more senior role if they can demonstrate an ability to make a significant contribution to the growth of the company.

Desired profile

- MSc. in control related discipline;
- or a PhD with an affinity for process control;
- An aptitude for software development;
- Proficient in English;
- A strong commitment to quality, and the satisfaction that can be gained from a professionally engineered solution.

Benefits

- A competitive compensation package;
- The opportunity to contribute to a new and dynamic company at the early stage of its development;
- Flexible work hours;
- Five weeks paid vacation;
- Opportunity for complete end-to-end ownership of a product;
- Conference visits with all expenses paid;
- An environment that supports and nurtures further professional development, creativity and innovation;
- The opportunity for worldwide travel.

Example technology development projects being run at Spiro Control

Cooperative Distributed Control
Cooperative Distributed Control is a patent pending technology developed by Spiro Control. This innovation considers a new way to optimise performance of distributed systems. Cooperation is defined as 'groups working or acting together for common or mutual benefit, as opposed to working for selfish benefit'. With this definition in-mind, Cooperative Distributed Control is a technology able to achieve optimal control of a large-scale system by enabling multivariable controllers to work cooperatively towards a common goal or objective.

Taking the example of a chemical plant, significant efficiency gains can be made by optimising how process operations interact. The limitation of traditional technology for plant-wide optimisation is that it involves complex mega projects where you look to optimise an entire plant with one centralised controller. The game-changing element of our technology is we remove the need for a centralised controller. Instead the solution consists of edge devices distributed throughout a plant. Each edge device is programmed to control a specific process operation but then shares real-time data with other edge devices. This sharing of information enables the edge devices to cooperate and account for process interactions to solve a plant-wide objective function. The key is that each module added is aware of the global objective function and works towards this goal. The unique and revolutionary capability this gives us is that we can continuously build towards plant-wide optimisation in a simple modular fashion; starting with one edge device and continuously building in a plug & play fashion.

Additional application opportunities include smart grids/microgrids, building control, solar farms, and utility network optimisation. In each of these examples it is possible to build a convincing business case based on the common themes of better cybersecurity protection, reduced complexity, improved fault tolerance, and increased optimisation over current centralised control solution.

A webinar delivered on Cooperative Distributed Control is available at:
http://www.spirocontrol.com/introduction-cooperative-distributed-control-webinar/.

Machine Learning Applications in Industrial Process Control
This project involves applying machine learning techniques to improve the operation and safety of process plants. The initial focus is the monitoring, diagnostics, and tuning of control loops. PID control loops are ubiquitous throughout the process industry. A typical process plant can have thousands of PID loops whose performance has a direct and measurable effect on process variability, product quality, energy consumption, plant emissions and raw material usage.

Given an accurate mathematical model of a process, it is relatively simple to develop a combination of PID tuning constants that optimize controller performance. However, for most industrial processes it is impossible or at least uneconomic to derive those models analytically, even developing regressed models from plant data can be time-consuming and require undesirable interventions like putting the loop into manual mode for the test. An experienced control engineer will often tune the loop by trial and error using process knowledge and heuristics to determine the correct adjustments combined with feedback based on loop performance. The machine learning equivalent of this trial and error approach is reinforcement learning. The technique has been applied

successfully to areas such as game strategy and autonomous vehicles. This project considers the development of a general purpose tool for automated tuning of previously unseen PID loops. As the techniques evolve, it is envisaged that the algorithm itself will interact directly with the simulation tools to generate new learning cases and therefore extend its capability range.

The project extends to applying machine learning techniques for PID loop diagnosis and tuning to the context of multivariable control.

Keen to join us? Send in you CV to
patrick.thorpe@spirocontrol.com