

Development of an Internet-Based Process Control Trainer Kit for Educational Purposes

Dr. Sajitha Varghese¹, Pradeep Kumar²

Professor¹, Student²

Department of Mechanical Engineering

BTC College of Engineering and Technology Koothattukulam

Corresponding Author's Email: - kumarpradeep225@gmail.com

Abstract

This paper presents the design and development of a remote process control trainer kit for educational purposes. The trainer kit is intended for use in teaching process control principles to students in engineering and related fields. The trainer kit is designed to be remote-controlled, allowing students to access and control it from any location with an internet connection. The trainer kit includes a range of process control devices such as sensors, actuators, and controllers, which are integrated into a control system. The paper details the design of the trainer kit, including the hardware and software components. The paper also outlines the development process, which involved designing, building, and testing the trainer kit. The paper concludes by discussing the potential uses of the trainer kit and the benefits it offers for students in learning process control principles.

Keywords: *Remote process control trainer kit, Process control education Control systems, Sensors, Actuators, Controllers, Modular design, Internet-based control, Control algorithms*

INTRODUCTION

Process control is an important field of study in engineering and related fields. It involves the use of sensors, actuators, and controllers to regulate the performance of

a process. Process control is widely used in industries such as manufacturing, chemical processing, and power generation. As such, it is important for students in engineering and related fields

to have a good understanding of process control principles.

One of the challenges in teaching process control is the need for practical experience. While theoretical knowledge is important, it is essential to have hands-on experience in designing and implementing control systems. This is where the remote process control trainer kit comes in.

The remote process control trainer kit is designed to provide students with practical experience in designing and implementing control systems. The trainer kit is designed to be remote-controlled, allowing students to access and control it from any location with an internet connection. This means that students can work on the trainer kit from home or from any other location, without the need for expensive laboratory equipment.

Design

The remote process control trainer kit is designed to include a range of process control devices, such as sensors, actuators, and controllers. The trainer kit is also designed to be modular, allowing additional devices to be added as required. The hardware components of the trainer kit include:

Sensors: The trainer kit includes a range of sensors, such as temperature sensors, pressure sensors, and flow sensors. These sensors are used to measure process variables and provide feedback to the control system.

Actuators: The trainer kit includes a range of actuators, such as motors, valves, and pumps. These actuators are used to control process variables and regulate the performance of the process.

Controllers: The trainer kit includes a range of controllers, such as PID controllers, which are used to control the actuators and regulate the performance of the process.

Interface: The trainer kit includes an interface, which allows students to access and control the trainer kit from any location with an internet connection.

The software components of the trainer kit include:

Control software: The trainer kit includes control software, which is used to implement control algorithms and regulate the performance of the process.

User interface: The trainer kit includes a user interface, which allows students to access and control the trainer kit from any location with an internet connection.

Development

The development process involved designing, building, and testing the trainer kit. The first step was to design the hardware and software components of the trainer kit. This involved selecting the appropriate sensors, actuators, and controllers, as well as designing the control software and user interface.

The second step was to build the trainer kit. This involved assembling the hardware components, such as mounting the sensors and actuators, and wiring the control system. The software components were also installed, including the control software and user interface.

The final step was to test the trainer kit. This involved running a range of experiments to ensure that the trainer kit was functioning correctly. The experiments included testing the sensors, actuators, and controllers, and running different process control scenarios to evaluate the performance of the trainer kit. The results of the experiments were

analyzed to ensure that the trainer kit was meeting the desired specifications.

RESULTS AND DISCUSSION

The remote process control trainer kit provides a range of benefits for students in learning process control principles. By allowing students to access and control the trainer kit remotely, the trainer kit provides greater flexibility in terms of learning opportunities. This means that students can work on the trainer kit from home or from any other location, without the need for expensive laboratory equipment.

The trainer kit also provides hands-on experience in designing and implementing control systems. By integrating a range of process control devices, such as sensors, actuators, and controllers, into a control system, the trainer kit provides a comprehensive platform for learning process control principles. The modular design of the trainer kit also allows additional devices to be added as required, providing greater flexibility in terms of the range of experiments that can be performed.

The user interface of the trainer kit is also designed to be user-friendly, allowing students to easily access and control the trainer kit from any location with an

internet connection. The control software is also designed to be flexible, allowing students to implement a range of control algorithms and evaluate the performance of the process.

CONCLUSION

This paper has presented the design and development of a remote process control trainer kit for educational purposes. The trainer kit provides a comprehensive platform for learning process control principles, integrating a range of process control devices, such as sensors, actuators, and controllers, into a control system. The modular design of the trainer kit allows additional devices to be added as required, providing greater flexibility in terms of the range of experiments that can be performed. The remote-controlled nature of the trainer kit also provides greater flexibility in terms of learning opportunities, allowing students to access and control the trainer kit from any location with an internet connection. Overall, the remote process control trainer kit offers a valuable tool for students in learning process control principles.

REFERENCES

1. Bequette, B. W. (2010). Process control: modeling, design and simulation. Prentice Hall.
2. Seborg, D. E., Edgar, T. F., & Mellichamp, D. A. (2010). Process dynamics and control. John Wiley & Sons.
3. Luyben, W. L. (2007). Process modeling, simulation, and control for chemical engineers. McGraw-Hill.
4. Ogata, K. (2010). Modern control engineering. Prentice Hall.
5. Dorf, R. C., & Bishop, R. H. (2011). Modern control systems. Prentice Hall.
6. Phillips, C. L., & Nagle, H. T. (2012). Digital control system analysis and design. Pearson Education.
7. Franklin, G. F., Powell, J. D., & Emami-Naeini, A. (2014). Feedback control of dynamic systems. Pearson Education.
8. Jastrzębski, R. (2007). Virtual instruments in university laboratories: case studies. Springer.
9. Giri, R., & Chakraborty, S. (2012). A low cost PLC trainer kit for

educational purposes. International Journal of Scientific and Engineering Research, 3(6), 1-5.

10. Palma, L. A., & Silva, P. R. (2015). A remote laboratory for teaching process control. Computers & Chemical Engineering, 78, 83-90.