**Comparison between Codesys and OpenPLC as a Modbus TCP Protocol Integrated Development Environment (IDE)**

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Abstract

Modbus TCP Protocol is one of the protocols which it is applicated in many industrial applications systems that are used to make a system communicate with one another. One of the uses of this Modbus TCP protocol is acting as the bridge of communication between a Programmable Logic Controller (PLC), Human Machine Interface (HMI), the controlled machine, and the integrated development environment (IDE).

The term of the PLC IDE that can work with the Industrial Standard is often associated with exclusive or expensive software/equipment. This can be a challenge for the first-time learner for the new generations of automation engineers learning the basics of automation programs.

This paper aims to compare two of the most popular, free-to-use programmable logic controller IDE that is popularly used to connect with the Modbus TCP Protocol. Codesys and OpenPLC are the two software that is popular in terms of making industrial automation programming system. Both are also capable of establishing a Modbus communication that let IDE, Human Machine Interface (HMI), PLC, and the automated machine communicate with each other by using an ethernet-based network.

This paper will provide a comprehensive analysis of the two IDEs, including their advantages and disadvantages, to help readers make an informed decision when selecting an IDE for their automation program and their integrated development through the Modbus protocol.

*Keywords: Modbus TCP, Industrial Internet of Things, Programmable Logic Controller, Automation, Ladder Logic Diagram, FactoryIO*

**Chapter 1 Introduction**

* 1. **Background**

The Manufacturing Industry in the 21st century relies on certain things. The combination of substantial human resources, computer-oriented integration, and automation. Making the manufacturing operation a sustainable and optimized operation in the company. The main backbone for the machine to be able to be working as it was intended to is the Automation Scripts that run in the background.

There are many languages that can be used for making automation scripts. Such as the Ladder Logic Diagram (LLD/LD) that uses a ladder diagram as the name suggests. with a “rung” in each ladder that represents a rule or a logic that a machine should follow in a specific way. Another language is Structured Text (ST) which is a high-level programming language that is similar to traditional computer programming language for example Pascal which uses text for each iteration. The other commonly used language is the Function Block Diagram (FBD) which uses traditional logic operations and arrows to make the correlations between one variable with the others.