INTERNATIONAL UNIVERSITY LIAISON INDONESIA

THESIS PROPOSAL

Usage of Raspberry Pi Running OpenPLC Controlling Advanced Sort by Height Scenario

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By

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1. General Statement of Problem Area

The problem to be examined involves the usage of a Raspberry Pi Substituting Programmable Logic Controller (PLC) to drive a Factory IO scenario of Advanced Sort by Height

2. Research Purpose

The Primary Purpose of this research paper is to study the compatibility of a Raspberry Pi that runs OpenPLC that is later required to drive a piece of factory machinery which in this purpose would be simulated by using the FactoryIO software. In this case, the Advanced Sort by Height Scenario is selected.

3. Research Problem

There are several facets of the research problems:

3.1) The increasingly rare and expensive actual Programmable Logic Controller (PLC) that can be devastating for use by small to medium businesses.

3.2) The older, currently installed PLC system usually requires programming on-site which isn't practical in this new era.

4. Significance of Study

The study is significant for several reasons:

4.1) First, substituting a real PLC with the Raspberry Pi is cheaper and can help many businesses to continue their work.

4.2) Second, the Internet of Things can be applied since the programming and redownloading of the program is easier since the process can be done remotely without being physically available on-site.

5. Theoretical Perspective

The Theoretical perspective for the proposed study is the Internet of Things (IoT). Since it basically can be found everywhere. From simple things such as home automation to a large-scale industrial system. The Internet of Things has been utilized by many businesses and factories, and has been proven to be reliable and could replace some work.

There are two types of the Internet of things that are common nowadays:

1. CIoT (Consumer Internet of Things)
2. IIoT (Industrial Internet of Things)

For IIoT, the scope is more about utilizing the internet to transform a Standard Factory into a Smart Factory. It can transform 'dumb' machines into 'intelligence' machines that can communicate with each other in the same factory site

The benefits using of the Industrial Internet of Things that has to be seen from time to time such as:

1. Increased overall efficiency of the production
2. Lower the Human Factor related errors and manual labor
3. Improved customer satisfaction with the output product
4. Better for Quality Control and Maintenance

6. Research Question and Hypothesis

6.1 Questions

Question #1: Can a Raspberry Pi process an automation script?

Question #2: Can the whole process be done by using not just a single computer, e.g., the Programming is on the Laptop and the FactoryIO program is on the computer?

6.2 Hypothesis

Hypothesis #1: Raspberry Pi can actually ***completely take over*** from the actual PLC as a processor of Automation scripts

7. Research Methodology

The study will investigate the use of Raspberry Pi running OpenPLC as a substitute for Physical or Virtual genuine PLC machines. On top of that the list of software that is used for the investigation:

- OpenPLC Editor
- OpenPLC Runtime
- FactoryIO
- Control Development System (Codesys)

The Control Development System (Codesys) is used to test trial and error the Ladder Logic Diagram or Ladder Diagram (LLD/LD/LAD) and tested by using Control Win V3 Virtual PLC that runs locally on the computer. The communication between the Control Win V3 Virtual PLC and the FactoryIO will be established by using the Modbus TCP Server/Client Protocol. The same protocol will be used for communication between the Raspberry OpenPLC and the FactoryIO later on. Modbus TCP protocol is used because it allows devices to communicate with each other over an Ethernet network. Making it easier to connect even at longer distances, and it is already being the industry standard for communication protocol.

8. Design Instrumentation

The research will use the Experimental Design Research type. The data is collected through the FactoryIO software, all the Coil and the Input tags are provided by the FactoryIO and later used as the tags for the Ladder Logic Diagram or simply Ladder Diagram (LLD/LD). The test program is using the Control Development System (Codesys Program) before implementing it to the Raspberry Pi running the OpenPLC.

9. Data Analysis

The data analysis for this research is done by observing the connection between the Modbus TCP. Raspberry Pi. And the Computer, analyses which ladder code can cause a reaction between one program to another one.

10. Proposed Advisor

I propose Dr. Ir Tutuko Prajogo, M.S.Mfg.E, and Dipl.-Ing Maralo Sinaga as my advisor and co-advisors for my proposed thesis

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