

ABSTRACT

The purpose of this thesis project is to make one of the lab modules in IULI become online, so others who do not have access to this lab module could have the freedom to study anywhere and remotely. This thesis project aims to make a prototype of an online experiment using an IoT-based controller that acts as a slave device to bridge between one device to another using a network, in this case, between the CODESYS or the Control Win V3, and the ASIMA Advance Simulator.

This project used an MCU (ESP32) with a Wi-Fi feature for the IoT interface board, making it suitable for this project. The Control Win V3, the virtual PLC, is assigned as the master controller. The project used the Modbus protocol to manage communication between the master and the slave device. By setting the slave device's IP address in the protocol, the master will know which IP to send the data. The slave device will then output the information to the master device. The IoT interface board could interface the two devices using the Modbus protocol over a network.

The prototyping of an online experiment with ASIMA controlled by the IoT controller was able to function. The project is establishing a digital twinning (a linking between the physical and digital representation of a device). Minor problems occur, such as blinking LED in the ASIMA when connected; the multiplexer in the IoT Board is suspectedly causing such a thing. The active-low of the optoisolator in the interface board is inverting the output lamp in the ASIMA. Those who will continue to do this project need to investigate the issues further, so the IoT Interface Board will be better and could help others learn about lab modules that are not available in their region and use an OpenPLC project for further studies.

Keywords: CODESYS, ASIMA, digital twinning, IoT (Internet of Things), Modbus