

ABSTRAK

The utilization of renewable energy such as solar panels is increasingly developing as a solution to global warming. In this final project, a control and monitoring system for smart electrical energy on a laboratory-scale PV simulator was designed and implemented, based on SCADA and the Internet of Things (IoT). This system is capable of monitoring environmental parameters such as temperature, humidity, and light intensity, as well as electrical parameters such as current and voltage in real time. For laboratory practice purposes, the system can control actuators such as a servo for panel tilt, relays for the fan and heater, and an AC dimmer for lighting, either locally through the HMI or remotely via the web. The data communication used includes the Modbus and MQTT protocols, with Node.js as the server and SolidJS as the user interface. The test results show that the system can function properly and maintain data integrity and synchronization, making it a potential educational platform and an initial prototype for the development of smart energy in renewable energy implementation.

Keywords : Smart Electrical Energy System, Supervisory Control and Data Acquisition, Internet of Things (IoT), Control and Monitoring