ABSTRACT

Hydroponics is a method of cultivating plants without using soil, instead utilizing water as a substitute for soil. In hydroponic systems, plants receive nutrients from water delivered through water pumps and nutrient-regulating tools like timers and pH meters. Hence, electrical energy is crucial for running hydroponic systems.

Hydroponic methods require electricity to supply lighting and automated control systems. An environmentally friendly alternative power source for hydroponics is using electricity generated from solar energy or Solar Power Plants (SPPs). However, solar energy usage has its drawback; electricity production decreases during adverse weather conditions or insufficient sunlight. To address this, a Smart Automatic Transfer Switch (ATS) has been developed, utilizing a NodeMCU as a controller, with primary power sourced from SPPs and backup power from another source. This system is equipped with relays and current and voltage sensors to transfer and measure electrical current and voltage in the ATS. With this system in place, hydroponics can operate continuously and efficiently without disruptions caused by power outages.

The creation of this system has the potential to provide the necessary electrical energy supply for hydroponic systems and significantly enhance the quality of hydroponic plant growth. Testing of the smart automatic transfer switch for hydroponics involves four testing parameters. Accuracy sensor testing results in an average measurement error of only 0.08% for voltage sensor measurements, while with a 25-Watt load on the hydroponic system, the average error is 0.12% of the overall measurement error. Furthermore, ATS function testing shows that the ATS operates when voltage drops below 8 volts. Two of these four testing parameters, system resilience and solar panels in the system, also play vital roles in this research.

Keywords: *hydroponics, Automatic Transfer Switch, NodeMCU, PLTS*