

ABSTRACT

The rapid growth in energy demand in the industrial sector poses a major challenge in maintaining a sustainable national energy supply. Reliance on petroleum as the primary energy source is increasingly problematic due to limited reserves and high daily consumption. To address this issue, environmentally friendly alternative energy solutions that can be practically implemented are needed. One promising alternative is the use of saltwater as an electrolyte in the electrolysis process. However, the electrolysis process requires a stable power supply, and in this study, the energy source comes from solar modules. Reliance on solar modules presents challenges in the form of fluctuations in current and voltage, necessitating a monitoring system capable of controlling and maintaining the stability of these process parameters.

In this study, an Internet of Things (IoT)-based monitoring system was developed using several sensors. The INA219 sensor was used to measure voltage and current from the solar modules, the ACS712 sensor to measure current during the electrolysis process, and the pH sensor to monitor changes in solution composition. The system is controlled by an Arduino Uno and ESP32 that work in an integrated manner and send data in real-time to the Blynk application. Test results show that the system is able to maintain an average SCC voltage of 13.55 volts and a current of 0.412 amperes during the process, with a PV module of 7.71 W and SCC of 5.58 watts. The electrolysis process successfully produced an acidic solution with a pH between 0.7 and 0.81 and a basic solution between 10.6 and 10.84. These values indicate that the system can quantitatively control and optimize the electrolysis process, thereby supporting sustainable and efficient alternative energy production.

Keywords: electrolysis, solar module, monitoring, IoT, pH sensor, voltage and current sensor, Blynk, renewable energy