

ABSTRACT

The performance of solar power plants is influenced by environmental factors such as temperature, humidity, and light intensity, which can cause fluctuations in electrical output. A decrease in performance due to these conditions may hinder the optimal utilization of solar energy. This study aims to design an Internet of Things (IoT)-based monitoring system to observe environmental parameters and analyze their effects on system performance. The system was built using a microcontroller and sensors for temperature, humidity, and light intensity, with data visualized through a web interface and early warning notifications sent via a Telegram bot. The results show that light intensity significantly affects the power output, while high temperatures tend to reduce efficiency. Humidity has an impact on power but does not directly affect panel efficiency. The maximum power output of 2232 W was recorded at an irradiance of 431,4 W/m², temperature of 35,81°C, and humidity of 26,5%, with an efficiency of 24,7%. Meanwhile, the minimum power of 318 W occurred at an irradiance of 54,2 W/m², temperature of 31,25°C, and humidity of 57,7%, with an efficiency of 28%.

Keywords: *monitoring system, IoT, temperature, humidity, light intensity, solar power plant*