ABSTRACT

Ultraviolet (UV) radiation is a component of sunlight that significantly impacts human health. Therefore, an accurate UV index prediction system is essential for mitigating the risks of UV exposure. This study aims to design and develop a prediction system using the ML8511 sensor and ESP32 microcontroller. The data obtained is used as input for a Long Short-Term Memory (LSTM) model to generate UV index predictions. The prediction results are displayed through a Streamlit-based web interface, allowing users to easily access the information. Testing shows that the average percentage of sensor error compared to manual measurements is 0.44%, indicating a high level of precision, and a comparison between the ML8511 sensor measurement and BMKG data shows an agreement level of 89.33%. The evaluation of the LSTM model provides a Root Mean Squared Error (RMSE) of 0.2657 and Coefficient of Determination (R^2) of 98.60% on training data, and an RMSE of 0.5342 and R^2 of 98.86% on test data, these results indicate a high level of accuracy in UV Index prediction. Thus, this study demonstrates that the developed prediction system can accurately estimate the UV index and function as a reliable tool for UV exposure protection and decision-making.

Keywords: *UV radiation, ML8511, LSTM, prediction system.*