

## ***Abstract***

Increased air pollution in urban areas, including the city of Surabaya, has prompted the need to develop accurate and adaptive air quality forecasting models. This study aims to analyze the relationship between meteorological parameters and air quality, as well as to build a forecasting model using the Long Short-Term Memory (LSTM) method based on multivariate data. The data used were obtained from the Kebonsari Air Quality Monitoring Station (SPKU) for the period January 2022 – December 2024, with air temperature, humidity, and wind speed as inputs, and PM<sub>10</sub> and CO as targets. Correlation analysis was conducted to identify the influence between parameters, and the results showed significant relationships that can be utilized in forecasting. The LSTM model was built using a time series approach and trained using a network architecture capable of capturing temporal patterns between variables. Model performance was evaluated using the Mean Squared Error (MSE), Root Mean Squared Error (RMSE), Mean Absolute Percentage Error (MAPE), and Symmetric Mean Absolute Percentage Error (SMAPE) metrics. The evaluation results showed that the model produced an MSE of 113.6211, an RMSE of 10.6593, a MAPE of 49.45%, and an SMAPE of 28.17%, indicating fairly good forecasting performance. With these results, the multivariate LSTM model has the potential to be used as a tool for air quality monitoring and control by relevant agencies in the city of Surabaya.

**Keywords:** CO, Air Quality, LSTM, Multivariate, PM<sub>10</sub> , Forecasting, Surabaya, Time Series