

ABSTRACT

Air pollution in urban environments, including in Banjarnegara Regency, is a crucial issue caused by emissions from the industrial sector, transportation, and domestic activities. Pollutant gases such as nitrogen dioxide (NO₂), sulfur dioxide (SO₂), and fine dust particles (PM_{2.5} and PM₁₀) are the main factors that reduce air quality and have a direct impact on public health. Unfortunately, the available air quality monitoring systems are still limited in terms of accessibility, cost, and availability of real-time data. This study aims to develop an Internet of Things (IoT)-based air quality monitoring system using NodeMCU V3 and MQ135, SDS011, and BME280 sensors. Data from the sensors are sent in real time to the server via a Wi-Fi connection and displayed in an informative and easily accessible web interface by users. The development method used is the prototyping approach, with periodic iterations and evaluations so that the system meets user needs. The system was tested at the Banjarnegara Main Terminal as an area with dense transportation activity. The highest values were recorded for PM_{2.5} and gases indicating moderate air quality, while air pressure was within the normal range. In general, the system shows quite accurate performance and is suitable for use. This research contributes as a cheap, effective air monitoring solution that supports rapid decision making in environmental pollution control.

Keywords: *Internet of Things, Urban Environment, NodeMCU, Air Monitoring, Air Pollution, Real-Time System*