

AQI Monitoring and Datalogging System using ESP8266

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Abstract: Air pollution is an important environmental and public health issue that requires constant monitoring to measure air quality and reduce possible threats. This project is concerned with the design and implementation of an air quality monitor and data logger based on the ESP8266 microcontroller with several gas sensors, such as MQ135, MQ2, and MQ7, and a dust sensor for the detection of various air pollutants. The system is equipped to monitor important air quality parameters like carbon monoxide (CO), carbon dioxide (CO₂), liquefied petroleum gas (LPG), smoke, and particulate matter (PM) in real time. The data collected is wirelessly sent to the ThingSpeak cloud platform, where it is displayed using dynamic graphs and dashboards for easy interpretation. One of the most important characteristics of this system is that it can log air quality data over a period of time and is thus an important aid to environmental research and analysis. ThingSpeak not only offers real-time visualization but also gives access to download historical data in Excel format, making it possible to perform in-depth analysis, trend analysis, and prediction modeling. This makes the system an effective data-logging solution for measuring levels of pollution in urban settings, industrial areas, and indoor spaces. The ESP8266 microcontroller is instrumental in enabling wireless communication, keeping the system cost-effective, portable, and easy to install in different locations. The combination of IoT and cloud computing increases the accessibility of the data, enabling users to remotely access air quality from any internet-enabled device. Due to its low power usage, scalability, and simplicity, this system is an effective alternative to conventional air quality monitoring systems. Through a real-time, cloud-based, and data-driven solution, this project seeks to contribute to environmental sustainability, public health consciousness, and smart city initiatives. The data gathered can be used by researchers, environmentalists, policymakers, and the general public to evaluate pollution patterns, implement regulations, and formulate strategies to enhance air quality.

Keywords: MQ7, MQ2, ESP8266, IoT

