

Solar Powered Air Purifier with Air Quality Monitoring System

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Abstract: *Rapid urbanization and industrialization have significantly degraded indoor air quality, leading to increased health risks. Conventional air purifiers depend on grid electricity, which increases operating costs and carbon emissions. This study presents the design and development of a solar powered air purifier integrated with an air quality monitoring system. The proposed system utilizes an Arduino Nano controller, MQ-2 gas sensor, HEPA-based filtration approach, and a solar energy subsystem consisting of a photovoltaic panel and sealed lead-acid battery. The system continuously monitors air quality and automatically activates purification when pollutant levels exceed the threshold. Experimental evaluation demonstrates effective detection of harmful gases and efficient air purification with reduced energy dependency on the grid. The proposed model is suitable for low-power, portable, and eco-friendly indoor air purification applications*

Keywords: Solar air purifier, Air quality monitoring, Arduino Nano, MQ-2 sensor, HEPA filtration, Renewable energy

