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(31) Priority Document No	:NA	(72)Name of Inventor :
(32) Priority Date	:NA	<b>1)Dr. SARIKA AGARWAL</b>
(33) Name of priority country	:NA	<b>2)YADUVIR SINGH</b>
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(57) Abstract :

The invention discloses a smart device for real-time air quality monitoring comprising a sensing unit (101), microcontroller (102), wireless communication module (103), power management unit (104), cloud platform (105), and mobile application interface (106). The device detects pollutants including PM2.5, PM10, CO, SO<sub>2</sub>, NO<sub>x</sub>, VOCs, and O<sub>3</sub>, processes sensor data, and transmits it via wireless communication for cloud-based storage and analysis. The system delivers real-time visualization, predictive alerts, and personalized health recommendations. Energy-efficient design and solar-assisted charging ensure adaptability in both indoor and outdoor environments.

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