

ECOSPHERE MONITORING KIT

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Problem statement

Air quality deterioration has emerged as a critical public health and environmental challenge, particularly in rapidly urbanizing areas where industrial emissions, vehicular exhaust, and dust pollution are prevalent. These pollutants contribute to respiratory illnesses, cardiovascular diseases, and reduced overall quality of life. At the same time, domestic environments face increasing risks from leakages of gases such as liquefied petroleum gas (LPG), methane, and propane, which can cause poisoning, explosions, and fire outbreaks.

Current air quality monitoring solutions are predominantly centralized, large-scale, and expensive, limiting their accessibility to households, small businesses, and community-level users. Moreover, many of these systems lack real-time, localized, and predictive capabilities necessary for timely intervention. As a result, individuals and communities remain vulnerable to invisible threats that compromise health, safety, and environmental sustainability.

This gap highlights the urgent need for an affordable, scalable, and IoT-enabled monitoring system capable of providing real-time air quality data, early-warning alerts, and predictive insights to support informed decision-making and risk prevention at both domestic and community levels.

Main objective

Detailed.

To design and implement an IoT-based air quality monitoring system (EcoSphere Monitoring Kit) that provides real-time detection, predictive analytics, and alerts for harmful pollutants and hazardous gases.

Less detailed.

To design a scalable IoT air quality monitor with real-time detection, prediction, and alerts

Specific objectives

1. To monitor air pollutants such as particulate matter (PM_{2.5}, PM₁₀) and harmful gases (e.g., CO, methane, LPG) in real time.
2. To measure environmental parameters like temperature and humidity.
3. To provide instant alerts when air quality exceeds safe thresholds.
4. To enable remote monitoring through a cloud-connected web application.
5. To raise awareness on health and safety by making air quality data easily accessible.
6. To design a scalable and affordable system adaptable for homes, industries, and cities.

Flowcharts



