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Apna PRAHARI: A Smart Portable AQI Monitoring and LPG Leakage Prevention System

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Abstract

This device can detect air pollution levels in real time, using different types of sensors. It helps people monitor harmful gases and particulate matter, and take steps to protect their health. Indoor pollution occurs when the air inside homes, offices, schools, or other enclosed spaces becomes polluted. It can cause health issues such as breathing problems, allergies, headaches, and respiratory diseases. LPG (Liquefied Petroleum Gas), carbon monoxide (CO), and ammonia (NH_3) are significant contributors to indoor air pollution and pose health risks if not managed properly.

This project aims to design a **Smart Air Quality Monitoring Device,** which detects indoor AQI in real time, alerts users through mobile/PC, and prevents fire damage by sensing LPG leakage and triggering an alarm. The efficacy of indoor air purification was done using selected plants: Feather Palm, Money Plant, Chlorophytum (Spider Plant), Sansevieria (Snake Plant). It was proven that Indoor plants play a significant role in improving air quality by absorbing harmful gases and increasing oxygen content.The device can be used for monitoring air quality in schools, homes, offices and hospitals, helping individuals with respiratory issues, at individual level, LPG levels can be monitored for safety, it supports local authorities and researchers in collecting environmental data and can be used for educating & creating awareness amongst the public for promoting healthier living

Keywords: AQI, air pollution, indoor pollution, gas leakage, Air purifying plants

1. Introduction

'Apna Prahari' 'अपना प्रहरी' (meaning in Hindi 'my guard'):A PORTABLE POLLUTION PROBE aims to track the air quality (AQI) specially Indoor Air Quality along with temperature and humidity

Many people are unaware of the air they breathe every day, whether indoors that is home, school, office or outdoors. This project focused on designing a device that can detect air pollution levels in real time, using different types of sensors. It helps people monitor harmful gases and particulate matter, and take steps to protect their health Indoor pollution occurs when the air inside homes, offices, schools, or other enclosed spaces becomes polluted. It can cause health issues such as breathing problems, allergies, headaches, and respiratory diseases. LPG (Liquefied Petroleum Gas), carbon monoxide (CO), and

ammonia (NH_3) are significant contributors to indoor air pollution and pose health risks if not managed properly.

The **Main Causes are** Smoking, Cooking smoke, Chemicals from cleaning products, Poor ventilation, Dust, mold, pollen. Indoor air pollution contains harmful chemicals that come from everyday activities and building materials.

Encouraged by the Principal Mr Anil Kumar,DPS RK Puram Class X students Jap Malhotra & Vani Menon under the mentorship of Ms Niva Chhonkar, HoD Biology developed a 'Apna Prahari' 'अपना प्रहरी':A PORTABLE POLLUTION PROBE with the aim to track the air quality (AQI) specially Indoor Air Quality along with temperature and humidity.

The **Main Causes are** Smoking, Cooking smoke, Chemicals from cleaning products, Poor ventilation, Dust, mold, pollen. Indoor air pollution contains harmful chemicals that come from everyday activities and building materials.

Common Indoor Chemical Pollutants include:

1. **Carbon Monoxide (CO):** Produced by gas stoves, heaters, and tobacco smoke. It prevents oxygen from reaching body tissues.
2. **Volatile Organic Compounds (VOCs):** Found in paints, cleaning products, air fresheners, and adhesives. They can cause irritation, headaches, or long-term health issues.
3. **Formaldehyde:** Present in pressed wood products, furniture, and some fabrics. It can trigger allergies and respiratory problems.
4. **Nitrogen Dioxide (NO_2):** Released from gas appliances and combustion. It affects lung function.
5. **Particulate Matter (PM2.5 and PM10):** Dust, pollen, mold spores, and fibers that cause breathing problems and allergies.

Incomplete combustion of LPG leads to release of harmful gases like CO which is colorless, odorless, and tasteless gas. It accumulates in closed spaces and is highly toxic.

2. Methodology

This project aimed to design a **Smart Air Quality Monitoring Device,** which detects indoor AQI in real time, alerts users through mobile/PC, prevents fire damage by sensing LPG leakage and triggering alarm. The efficacy of indoor air purification using selected plants: Feather Palm, Money Plant, Chlorophytum (Spider Plant), Sansiviera (Snake Plant)

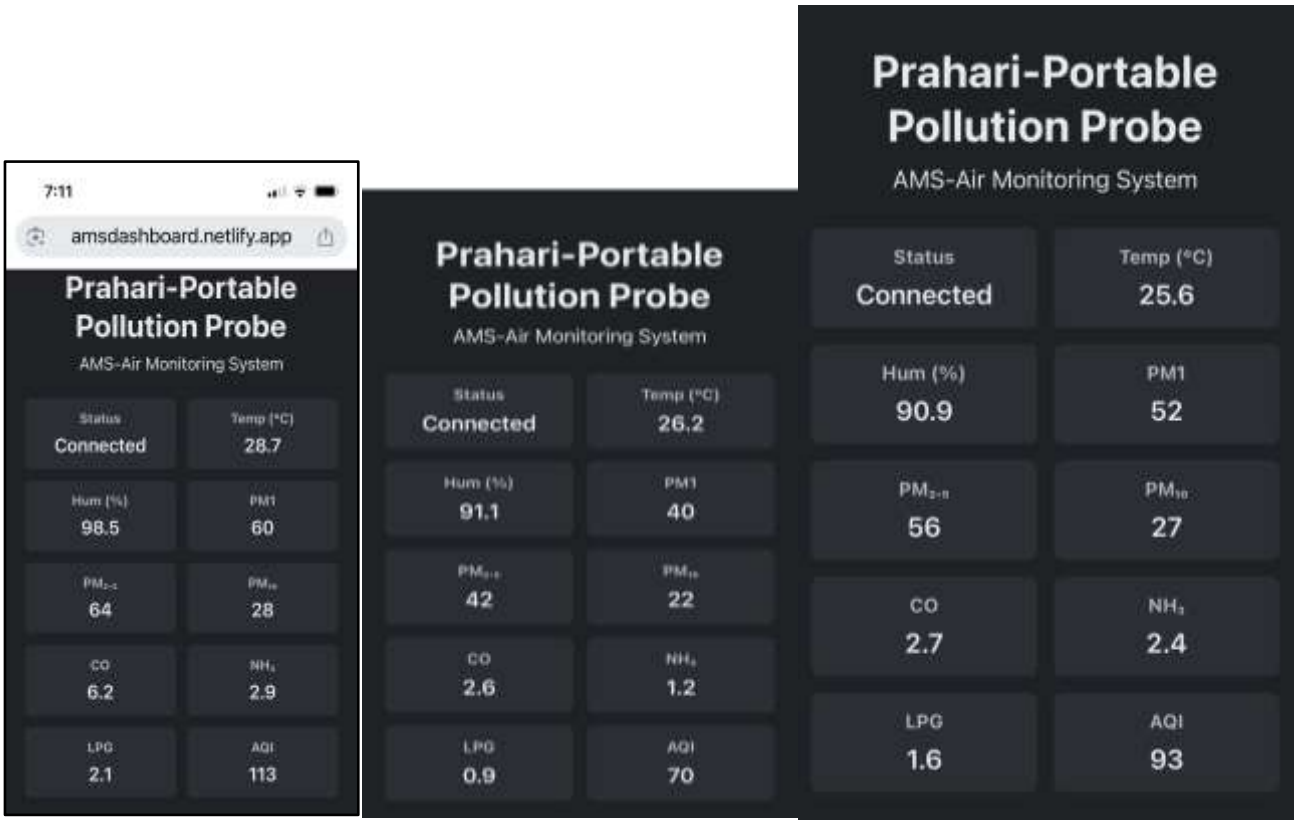
Various Air sensors for continuously monitoring the levels of pollutants like CO_2, NO_2, SO_2, PM and LPG were used with the Sensitivity range- MQ 7-20 ppm to 2000 ppm (parts per million),MQ 135 CAN DETECT Ammonia (NH_3),Nitrogen oxides (NO_x), Alcohol, Benzene, Smoke, CO_2-10 ppm to 1000 ppm depending on the gas,For NH_3, around 5–500 ppm, For CO_2, around 200–1000 ppm.MQ-2-CAN DETECT LPG, Propane, Methane, Hydrogen, Smoke. Its Sensitivity Range: 300 ppm to 10000 ppm depending on the gas. LPG detection approximately 200–10000 ppm 4 selected plants (Feather Palm, Money Plant, Spider Plant, Snake Plant) were placed in a Biology with AQI monitoring device. AQI levels were recorded after every 2 hours for 6 hours before placement of plants (Baseline) and after the placement of plants. Air Quality Improvement Percentage was calculated for each plant separately. The primary effects of indoor plants are air purification and air quality improvement. Secondary effects of the potential of the indoor plants are increasing air humidity followed by reducing room temperature.

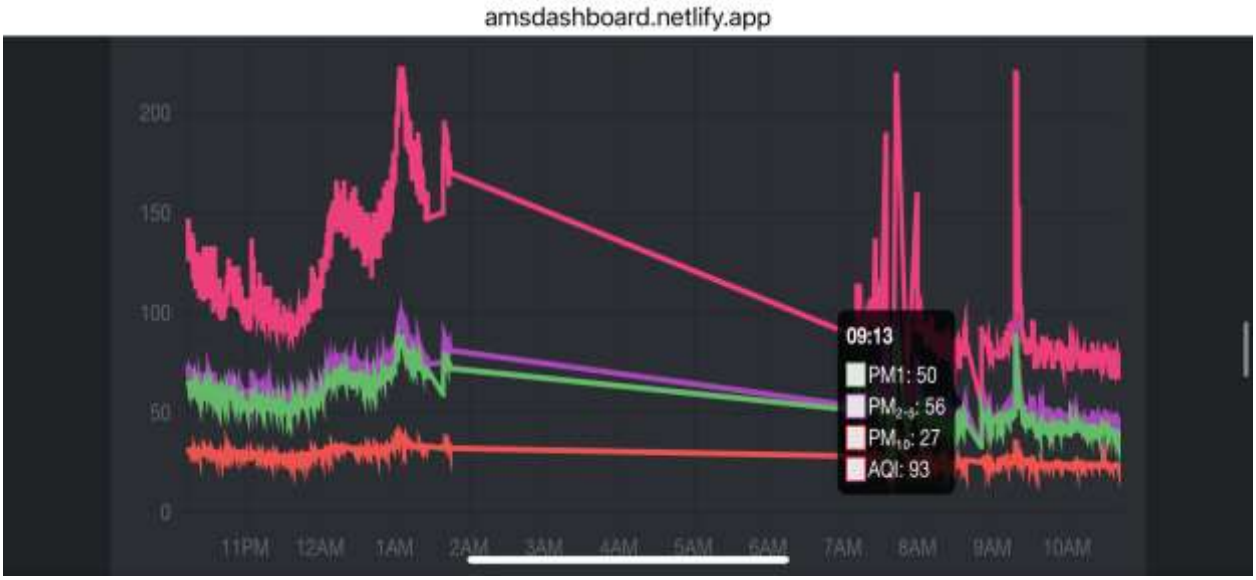
Plant	Scientific Name	Pollutant absorbed
Feather Palm	Dypsis lutescens	Formaldehyde, Xylene, Toluene
Money Plant	Epipremnum aureum	VOCs,benzene,CO, toluene
Spider Plant	Chlorophytum comosum	Carbon monoxide,xylene
Snake Plant	Sansevieria trifasciata	Carbon di oxide & formaldehyde

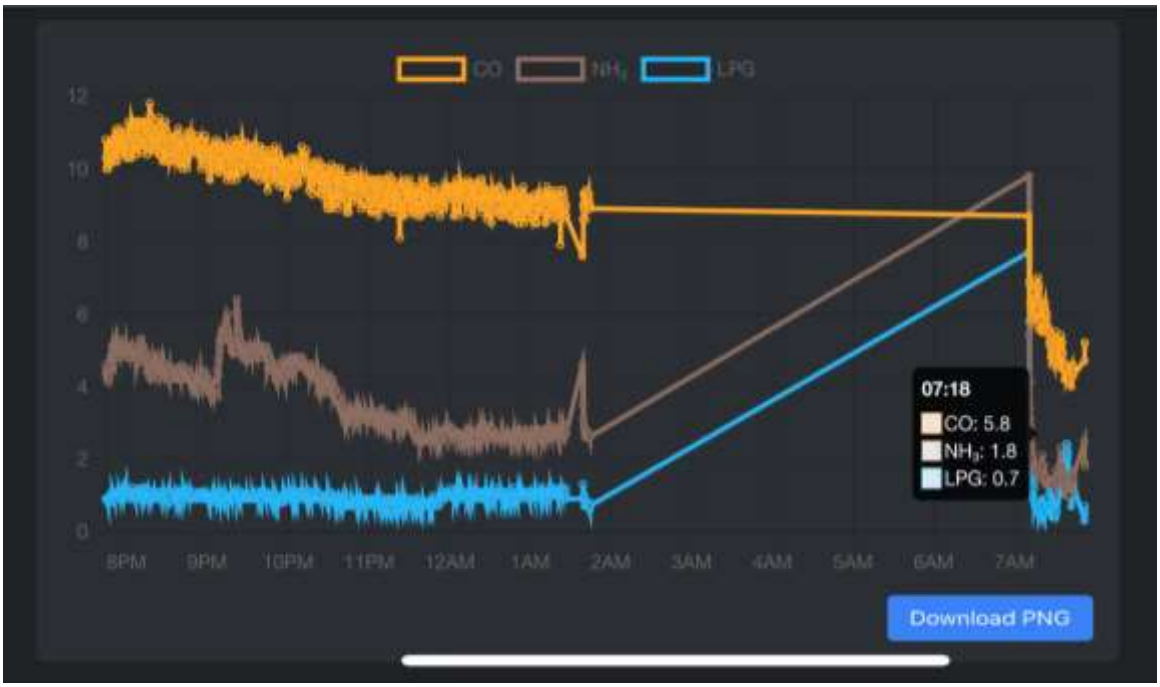
Device set up

3. Observation

CHANGES IN THE PARAMETERS BEFORE AND AFTER PLACING SPIDER PLANT & SNAKE PLANT IN THE BIOLOGY LAB







4. Observation Table

Hours	AQI with Feather Palm	% Improvement In AQI	AQI with Money Plant	% Improvement In AQI	AQI with Spider Plant	% Improvement In AQI	AQI with Snake Plant	% Improvement In AQI
0 without Plants	133	13 %	141	9 %	113	38 %	120	33 %

6 **With Plants**	117		129		70		93	

5. Result

The experiment results clearly indicate that Spider Plant and Snake Plant are effective in improving the indoor air quality

6. Highlighting features of this device

It will not give false data if there is error in sensors as it will connect to the nearest Government Weather station data & use it. It will display the data into a live website dashboard (amsdashboard.netlify.app) which could be accessed from anywhere in the world. Detailed Analytical charts lively updated every 3 mins .If the levels of pollutants increase then a buzzer alarm is initiated

This project successfully demonstrates that this Smart AQI + LPG Leakage System can monitor indoor air quality continuously and prevent fire hazards through instant alerts. The system helps users remotely access air quality data, enhancing real-time safety.

Indoor plants play a significant role in improving air quality by absorbing harmful gases and increasing oxygen content. Among selected plants, Money Plant and Snake Plant showed highest efficiency, especially in VOC removal and oxygen generation. The future scope is addition of AI prediction model to warn air pollution rise.

7. Applications

1. Monitoring air quality in schools, homes, offices and hospitals
2. Helping individuals with respiratory issues
3. At individual level, LPG levels can be monitored for safety
4. Supporting local authorities and researchers in collecting environmental data.
5. Educating & creating awareness amongst the public for promoting healthier living

8. Conclusion

The **Indoor & Outdoor Air Pollution Detection Device Using Sensors** is a practical and innovative solution to monitor air quality in real time. By providing accurate and timely data, it empowers users to take proactive steps to protect their health and the environment. The project contributes to raising awareness and encourages sustainable practices that can mitigate the harmful effects of air pollution.

9. Precautions

1. Entire device to be protected from water
2. Power supply and wi-fi required
3. Sensors to be cleaned with a soft cloth/tissue every 4-5 days
4. Probe to be kept away from any heating device

10. Future Scope

- Integration with AI algorithms to predict pollution trends.

- Expanding the range of detectable pollutants.

11. Acknowledgements

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12. Bibliography

1. https://www.breeze-technologies.de/blog/do-plants-improve-air-quality/
2. https://planterra.com/blogposts/how-can-plants-improve-air-quality/
3. https://iris.who.int/bitstream/handle/10665/260127/9789289002134-eng.pdf
4. Funding Declaration-Not Applicable