

# Design and Development of Ambient Dust Sampler

**Prof. S. A. Jadhav<sup>1</sup>, Mr. Prafull Dattatray Jadhavar<sup>2</sup>, Mr. Kunal Bhaskar Gaikwad<sup>3</sup>,**

**Mrs. Sakshi Ashok Takmoge<sup>4</sup>, Mr. Utkarsh Kisan Wayal<sup>5</sup>**

Professor, Department of Mechanical Engineering <sup>1</sup>

Students, Department of Mechanical Engineering<sup>2,3,4,5</sup>

JSPM's Rajarshi Shahu College of Engineering, Pune, India

**Abstract:** Air pollution is a growing concern in urban and industrial areas, with particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>) being one of the most harmful pollutants affecting both human health and the environment. Monitoring the concentration of these airborne particles is essential for understanding air quality and taking preventive actions. This project presents the design and development of a low-cost, portable ambient air dust sampler capable of collecting dust particles from the surrounding environment.

The system consists of a suction fan or vacuum pump that draws ambient air through a filter paper. Dust particles are trapped on the filter, and the mass of these particles is determined by weighing the filter before and after sampling. The volume of air passed through the system is calculated using the known airflow rate and sampling time. Using this data, the dust concentration in milligrams per cubic meter (mg/m<sup>3</sup>) is determined.

This project demonstrates a simple yet effective way to measure dust concentration using affordable components such as DC motors, filter membranes, and optionally, Arduino-based electronics for automation and real-time monitoring. It is suitable for educational, research, and environmental applications. With future enhancements like IoT integration and real-time sensors, this device can serve as a powerful tool in air quality management and pollution awareness campaigns.

**Keywords:** Flow Meter ,Flow rate, Suction Pump, Filter Chamber

