SAMVED-2026

*A joint initiative by MIT Vishwaprayag University, Solapur and Solapur Municipal Corporation*

**Problem Chosen: Smart Safety and Assistance System for Sanitation Workers of Solapur Municipal Corporation**

## Problem Definition

### Problem context

Sanitation workers frequently operate in hazardous environments such as underground drainage systems, waste handling areas, and confined spaces, where they are exposed to toxic gases, extreme temperatures, and serious health risks. These working conditions have resulted in accidents, long-term health complications, and in severe cases, loss of life.

Currently, there is no reliable system in place to continuously monitor environmental safety conditions in real time and provide early warnings during emergencies. The absence of such monitoring mechanisms leads to delayed response, significantly increasing the risk to sanitation workers.

### Objectives

- Real-time safety monitoring
- Wearable and portable design
- Reliable alert generation
- User-friendly operation
- Cost-effective implementation
- Scalable system architecture

### Constraints

- The device must be lightweight and suitable for continuous wearable use
- Power consumption must be low to support extended operation on battery power

- The system should operate reliably in humid and harsh working environments
- The overall cost of the system must be affordable for large-scale deployment
- The system should function with limited or no continuous internet connectivity
- The response time for alerts must be minimal to ensure timely intervention

**Functions**

- Monitor environmental conditions around the sanitation worker
- Detect the presence of hazardous gases
- Measure temperature and humidity levels
- Generate audible and visual alerts during unsafe conditions
- Allow manual emergency alert activation by the worker
- Display real-time status information to the user

**Consolidated Problem Definition (Derived from Objectives, Constraints, and Functions)**

**Sanitation workers operate in hazardous environments such as underground drainage systems and waste handling areas, where exposure to toxic gases and extreme environmental conditions poses serious health and safety risks. The lack of a real-time monitoring and alert system results in delayed response during emergencies, leading to accidents and health complications.**

**The proposed solution aims to develop a wearable, real-time safety monitoring system for sanitation workers that continuously observes environmental conditions and alerts the worker during unsafe situations.**

**The system should be compact, reliable, affordable, and suitable for daily use in municipal operations.**

**The solution must function under limited power availability, withstand harsh working environments, and use cost-effective components to enable large-scale deployment. The system shall monitor hazardous gas levels, temperature, and humidity, provide visual and audible alerts when safety thresholds are exceeded, and include an emergency push-button for manual distress signalling. Collected data can be extended to mobile or backend systems for remote monitoring and future analysis.**