“SAMVED” HACKATHON 2026

TITLE PAGE

- **Problem Statement ID** – 04
- **Problem Statement Title-** Smart Safety and Assistance System for Sanitation Workers of Solapur Municipal Corporation
- **Theme-** Decent Work and Economic Growth
- **Team ID-** MITVPU_SAMVED_Team 39
- **Team Name (Registered on portal) -** SanitiSafe

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SMART SANITATION WORKER SAFETY MONITORING SYSTEM

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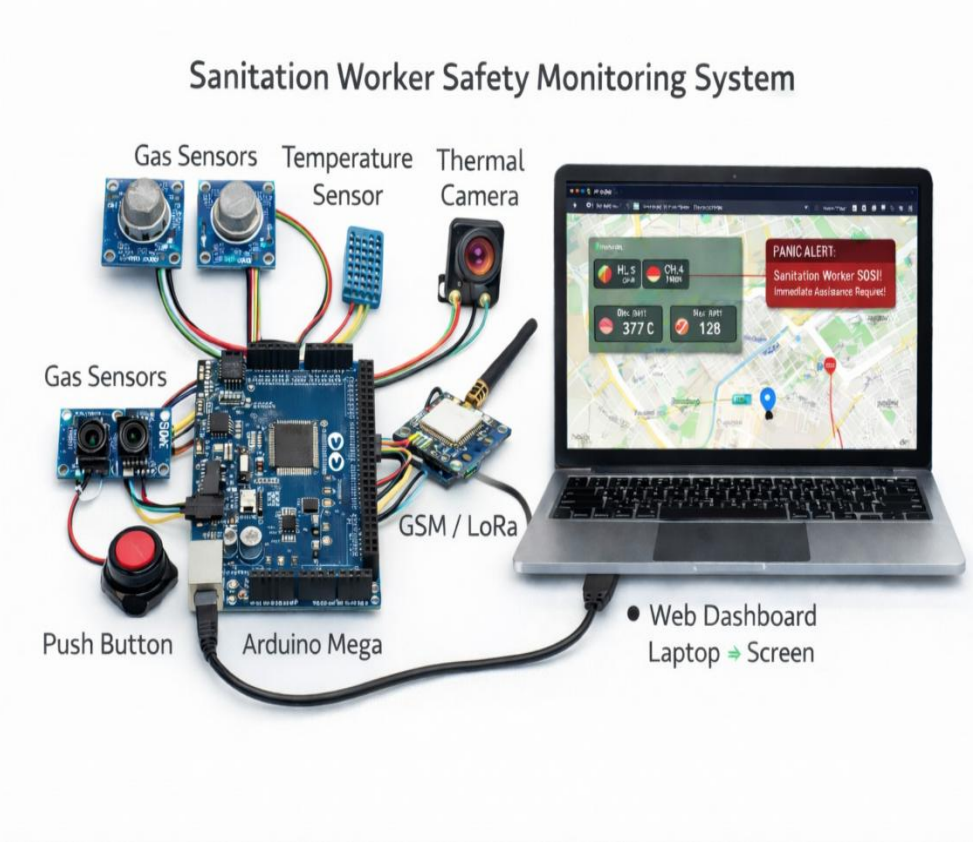
Idea Overview :

- A smart wearable safety band for sanitation workers
- Continuously monitors toxic gases, health, and location
- Sends real-time alerts to municipal authorities
- Enables fast emergency response and prevents accidents



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TECHNICAL APPROACH

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Hardware Tools:

- Arduino Mega 2560A, Gas Sensors (MQ-series) , Thermal Camera Module GSM / LoRa Module Push Button (SOS), Power Supply (Battery / Adapter)

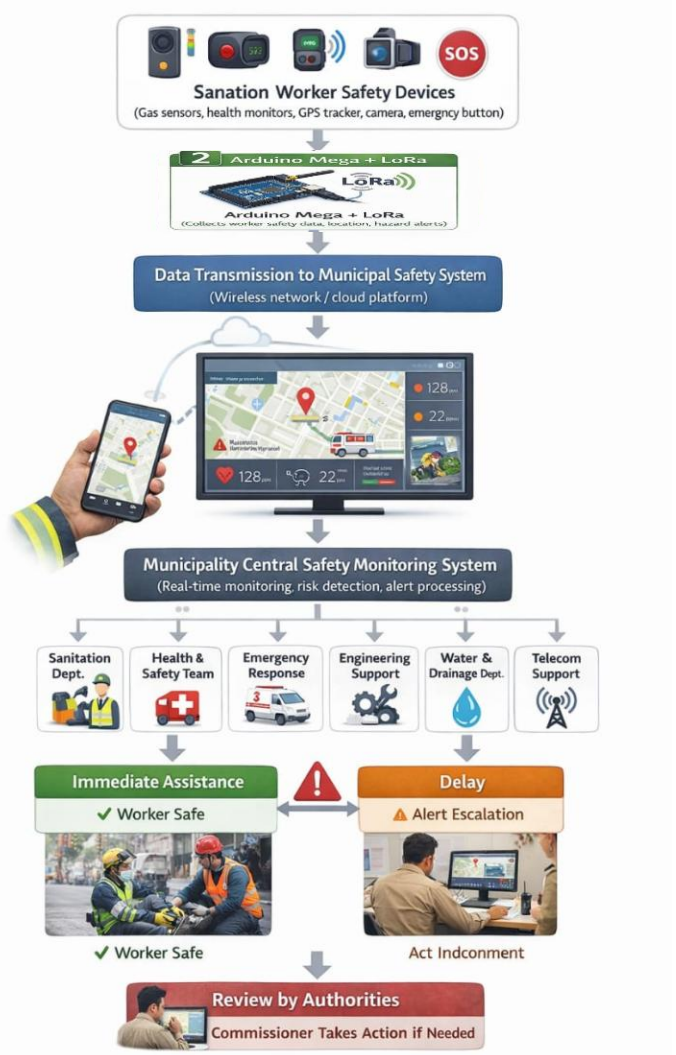
Software Tools:

- Arduino IDE, Embedded C / C++, Cloud / IoT Platform, Web Dashboard

Technical Flow:

- **Sensor-equipped safety devices** (gas, temperature, thermal camera, GPS, SOS button) continuously monitor sanitation worker health and environmental conditions.
- **Arduino Mega / Raspberry Pi edge device** processes sensor data in real time to detect hazardous conditions and emergency situations.
- **GSM / LoRa wireless communication** transmits processed data and panic alerts to the municipal cloud and central safety monitoring system.
- **Central safety dashboard** displays live worker location, sensor readings, and alerts, enabling coordinated response from sanitation, health, emergency, and engineering departments.
- **Immediate assistance or alert escalation** is initiated, followed by authority review to ensure worker safety and accountability.

Technical flow



FEASIBILITY AND VIABILITY

Feasibility Analysis:

➢The proposed system is technically and economically feasible as it uses low-cost sensors, Arduino/Raspberry Pi, and existing GSM/LoRa networks.

Challenges and Risks:

➢Possible challenges include sensor accuracy, network connectivity in underground areas, device maintenance, and user adoption by workers.

Mitigation Strategies:

➢These challenges can be overcome through sensor calibration, multi-network communication, rugged device design, regular maintenance, and proper worker training.

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IMPACT AND BENEFITS

Impact on Target Audience:

➢Improves safety, health protection, and confidence of sanitation workers by providing real-time hazard monitoring and instant emergency assistance.

Social and Environmental Benefits:

➢Reduces worker fatalities and occupational health risks while promoting dignified, safer sanitation practices and a cleaner urban environment.

Economic and Operational Benefits:

➢Lowers medical and compensation costs, improves emergency response efficiency, and helps municipalities optimize operations through data-driven decisions.

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RESEARCH AND REFERENCES

Ministry of Social Justice and Empowerment, Government of India

➢*Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013*

https://socialjustice.gov.in

World Health Organization (WHO)

➢*Occupational health and safety of sanitation workers*

https://www.who.int/publications/i/item/WHO-CED-PHE-WSH-18.2

Arduino Official Documentation

➢*Arduino Mega 2560 – Datasheet and Technical Reference*

https://docs.arduino.cc/hardware/mega-2560

MQ Gas Sensor Datasheets

➢*MQ Series Gas Sensors – Detection of Toxic and Combustible Gases*

https://www.sparkfun.com/datasheets/Sensors/Biometric/MQ_Series_Sensors.pdf

LoRa Alliance

➢*LoRa Technology for Low-Power Wide-Area Networks*

https://lora-alliance.org

Thank you