## Early-Stage Solution Architecture

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

**List of subsystems**

| Sl.No | Subsystem Name | Functionality |
|---|---|---|
| 1 | Sensing Unit | Collects environmental and safety-related parameters such as gas presence, temperature, and humidity around the sanitation worker. |
| 2 | Processing and Control Unit | Processes sensor data, evaluates safety conditions, and controls the overall operation of the system including alert generation. |
| 3 | Alert and Actuation Unit | Generates audible and visual alerts to warn the sanitation worker during unsafe or emergency conditions. |
| 4 | User Interaction Unit | Enables manual emergency alert activation and displays real-time system status information to the user. |
| 5 | Power Supply Unit | Provides regulated electrical power to all subsystems to ensure continuous and reliable operation of the wearable device. |

**Subsystems Interaction matrix**

| From \ To | Sensing Unit | Processing & Control Unit | Alert & Actuation Unit | User Interaction Unit | Power Supply Unit |
|---|---|---|---|---|---|
| Sensing Unit | — | Data: environmental readings | — | — | Energy: power supply |
| Processing & Control Unit | Data: sensor data | — | Data: alert control signals | Data: status & user input | Energy: power supply |
| Alert & Actuation Unit | — | Data: alert trigger signals | — | — | Energy: power supply |
| User Interaction Unit | — | Data: user commands & display data | — | — | Energy: power supply |
| Power Supply Unit | Energy: electrical power | Energy: electrical power | Energy: electrical power | Energy: electrical power | — |

## Architecture Diagram
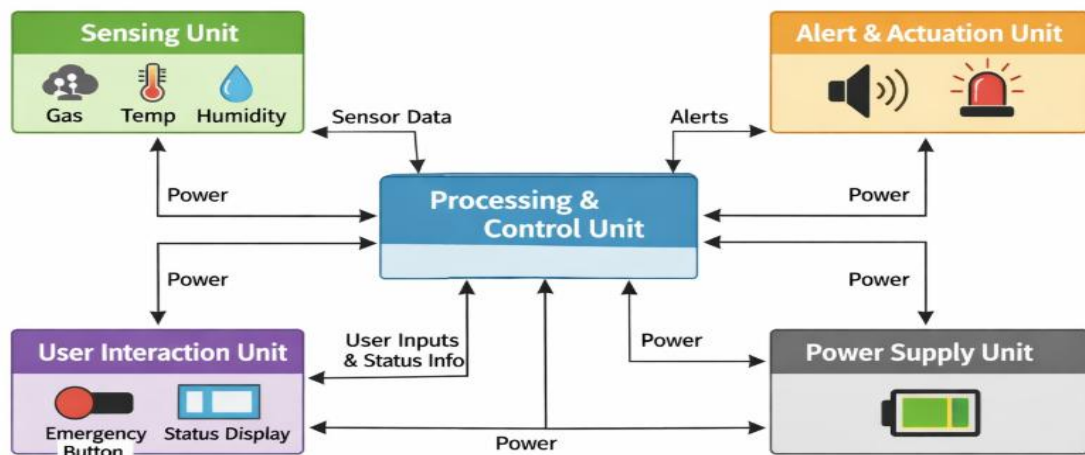


Figure: High-level architecture of the proposed sanitation worker safety system showing subsystem interactions.