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# Iot-Based Health Monitoring Jacket For Sanitory Workers

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## ABSTRACT

Sanitary workers are essential to maintaining public health and hygiene but are frequently exposed to hazardous environments that pose serious health risks. To ensure their safety and well-being, this project proposes an IoT-based Health Monitoring Jacket specifically designed for sanitary workers. The wearable device incorporates a range of sensors including a pulse sensor to continuously monitor heart rate and a temperature sensor to track body temperature. These vital parameters help detect signs of fatigue, illness, or abnormal health conditions at an early stage. An emergency switch is embedded in the jacket, enabling workers to call for help instantly when facing dangerous situations. The ESP32 microcontroller serves as the system's core, integrating all sensors and managing data transmission. A GPS module is also included to track the real-time location of the workers, allowing authorities to reach them quickly during emergencies. All sensor data is transmitted to a cloud platform using IoT technology. In case of any irregular health readings or emergency switch activation, the system triggers immediate alerts to designated authorities. This real-time monitoring system ensures swift medical or safety interventions, significantly improving the safety standards for sanitary workers. The project thus contributes to occupational health and safety by using modern IoT advancements for proactive care.

**Keywords:** Health Monitoring, Wearable Technology, Sanitary Workers, Smart Jacket & Occupational Health

## 1. INTRODUCTION

Sanitary workers perform one of the most critical yet often overlooked roles in maintaining public health and environmental cleanliness. From managing waste collection to cleaning sewers and public spaces, these workers are regularly exposed to hazardous and unhygienic conditions that put their health and safety at considerable risk. Despite their significant contributions, there is a lack of effective systems to monitor and safeguard their well-being in real time. Many sanitary workers continue to operate in hazardous environments without access to proper medical support or safety alerts, which can lead to severe health complications or even fatalities. Recognizing the need for a comprehensive safety mechanism, this project introduces an IoT-based Health Monitoring Jacket specifically designed for sanitary workers. The wearable jacket integrates modern sensor technologies and wireless communication modules to track the wearer's health and location in real-time.

The system is equipped with a pulse sensor to monitor the heart rate continuously. Sudden changes in heart rate can indicate fatigue, dehydration, stress, or more serious health conditions. In parallel, a temperature sensor keeps track of the body temperature, which is an essential parameter for identifying signs of infection, heatstroke, or physical exhaustion—common among sanitary workers exposed to harsh working environments. An emergency switch is embedded in the jacket, empowering workers to alert authorities or request help in urgent situations such as accidents, fainting, or gas exposure. These sensors are interfaced with the ESP32 microcontroller, which acts as the central processing unit of the

device. The ESP32 collects data from the sensors, processes it, and transmits it over the internet using built-in Wi-Fi and Bluetooth capabilities. To enhance situational awareness and ensure quick emergency response, a GPS module is included for tracking the real-time location of each worker. In the event of abnormal health readings or manual emergency alerts, authorities can view the exact location of the worker and dispatch assistance immediately. All collected data is transmitted securely to a cloud platform, where it is monitored through a dashboard accessible to medical personnel, supervisors, or municipal authorities. This enables centralized monitoring and decision-making. Notifications or alerts are triggered when sensor values deviate from predefined thresholds, ensuring that no critical situation goes unnoticed.

The implementation of this IoT-based system bridges a significant gap in the safety management of sanitary workers. It empowers both workers and authorities with technology-driven insights and real-time health visibility. Furthermore, this solution can be scaled to accommodate more advanced features such as gas detection, motion sensing, and integration with mobile applications for a more comprehensive approach to worker safety. In conclusion, the Health Monitoring Jacket serves not only as a technological innovation but also as a social initiative to protect and value the lives of those who ensure public sanitation.

## 2. OBJECTIVE

The primary objective of this project is to design and implement an IoT-based Health Monitoring Jacket that enhances the safety and health awareness of sanitary workers operating in hazardous environments. Sanitary workers often face exposure to toxic gases, infectious materials, extreme temperatures, and physical strain, making it essential to monitor their health and location in real time. This project aims to provide a reliable and wearable solution that can constantly track vital health parameters such as heart rate and body temperature, allowing early detection of medical conditions like fatigue, dehydration, infections, or cardiac irregularities. One of the key objectives is to ensure that in the event of any abnormal health readings or emergencies, instant notifications are sent to the concerned authorities for immediate action.

Another significant goal is to empower workers with an emergency switch mechanism, giving them the ability to manually trigger an alert if they encounter a dangerous or life-threatening situation. The system will use an ESP32 microcontroller to interface and manage all sensors and components, providing efficient and low-power data processing. Furthermore, the integration of a GPS module aims to provide real-time location tracking of each sanitary worker, ensuring that they can be located quickly in case of emergencies or for general supervision. This location data will also help in optimizing worker deployment and route planning by municipal bodies.

The project also aims to establish a seamless connection between the wearable device and a cloud platform using IoT communication technologies. This enables centralized monitoring of multiple workers simultaneously, providing live health data and alert status on a single dashboard. The real-time alerts triggered by the system will assist supervisors and medical personnel in taking immediate preventive or corrective actions. Additionally, by maintaining historical health data, authorities can assess long-term health trends of individual workers, enabling preventive healthcare strategies.

A major objective is to promote occupational health and safety in a sector that is often neglected in terms of technological intervention. By automating the health and safety monitoring process, the project reduces dependency on manual checks and improves the overall response time during health crises. The system is designed to be cost-effective, scalable, and easily deployable in urban and rural sanitation departments.

## 3. LITERATURE SURVEY

**IOT-BASED WEARABLE HEALTH MONITORING SYSTEM FOR INDUSTRIAL WORKERS - R. MEHTA; K. SRINIVASAN; P. AGARWAL -** This study focuses on developing an IoT-based health monitoring system specifically designed for industrial workers exposed to hazardous environments. The system integrates a pulse sensor, temperature sensor, and gas detection module, all connected to a microcontroller. Real-time health data is transmitted to a cloud server, enabling remote health supervision and early alerts in case of abnormal readings. The research concludes that wearable IoT systems significantly reduce response time in medical emergencies and ensure consistent health surveillance for workers in high-risk occupations.

**SMART JACKET WITH GPS AND HEALTH MONITORING FOR LABORERS WORKING IN UNSAFE ZONES - ANJALI MISHRA; ROHIT JADHAV; SAMEER KHAN -** This paper presents a smart jacket integrated with health monitoring sensors and a GPS module to track workers' vitals and locations in real-time. The system continuously measures pulse rate and body temperature and features an emergency button that can alert authorities immediately. GPS enables live location tracking, helping supervisors locate workers quickly during emergencies. The data is sent via IoT to a web server for monitoring and analysis. The study proves the effectiveness of wearable solutions in enhancing safety for laborers working in remote or hazardous areas.

**REAL-TIME HEALTH TRACKING SYSTEM USING ESP32 AND CLOUD INTEGRATION - VIKAS SHARMA; SWATI BANSAL; DEVRAJ SEN -** This research implements a real-time health monitoring system using ESP32, a low-power microcontroller with built-in Wi-Fi and Bluetooth. The system includes sensors for pulse, temperature, and environmental gases. Sensor data is uploaded to a cloud platform like Firebase for real-time monitoring and storage. Notifications are triggered when critical health parameters are detected. The study emphasizes ESP32's versatility and cost-effectiveness in building compact health monitoring devices for workers in challenging work environments.

**IOT-BASED HEALTH SURVEILLANCE JACKET WITH EMERGENCY ALERT SYSTEM - DIVYA IYER; NIKHIL SAHU; TANVI DESHMUKH -** The study proposes a wearable jacket embedded with sensors and IoT modules designed for people working under physical strain. The system includes body temperature and heart rate sensors, along with a panic button for emergencies. A GSM module is used to send real-time SMS alerts, while a GPS unit provides location tracking. Data is logged to a central database, and alert mechanisms are triggered when abnormal readings are identified. The research highlights the benefits of combining multiple IoT components for comprehensive worker safety and timely intervention.

## 4.SYSTEM IMPLEMENTATION

### 4.1 EXISTING SYSTEM

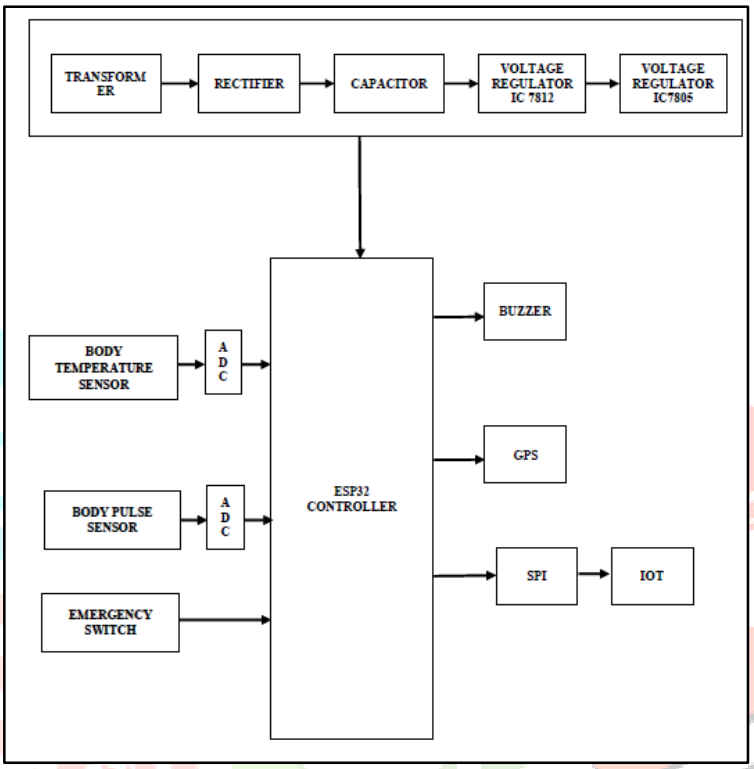
In the existing system, the health and safety of sanitary workers are largely monitored through manual methods, which involve periodic check-ups and visual inspections. These workers operate in highly hazardous environments, often dealing with exposure to harmful gases, waste, and strenuous physical conditions. However, the lack of real-time health surveillance makes it difficult to detect early signs of health deterioration, leading to delayed medical intervention and increased risks of serious health issues. Currently, there are very few technological solutions implemented for monitoring the well-being of these workers. Most of the tracking or monitoring systems available are either limited to location tracking via GPS or offer isolated health parameter checks that are not integrated into a real-time response framework. In cases of emergencies or sudden health complications, workers have no way of instantly alerting the authorities or requesting immediate help. Additionally, existing systems do not provide continuous monitoring or automated alerts based on abnormal vital signs. There is also minimal use of cloud-based data storage or IoT integration for remote monitoring, which limits the ability of healthcare providers or supervisors to make timely, informed decisions. The absence of integrated wearable health- monitoring solutions pose a significant gap in ensuring the safety and wellness of these frontline workers. Thus, there is a strong need for an automated, real-time health and safety monitoring solution that not only tracks vital parameters like pulse and body temperature but also includes emergency alert mechanisms and GPS-based location tracking. This sets the foundation for proposing an improved IoT-based system to safeguard sanitary workers through continuous health assessment and instant communication with supervisors.

### 4.2 PROPOSED SYSTEM

The proposed system introduces an IoT-based wearable health monitoring jacket specifically designed for sanitary workers operating in hazardous and high-risk environments. This smart jacket is embedded with essential health-monitoring sensors and communication modules to ensure the safety and well-being of the workers in real time. The system uses a pulse sensor to continuously monitor the worker's heart rate and a temperature sensor to track body temperature. These sensors are interfaced with an ESP32 microcontroller, which is responsible for processing and transmitting data. The ESP32 also enables Wi-Fi connectivity, allowing the real-time data to be sent to a cloud

platform for remote access and continuous health monitoring by supervisors or healthcare professionals. To enhance the safety and responsiveness of the system, the jacket includes a GPS module that continuously tracks the worker's location. This is particularly useful in case of emergencies, such as fainting or collapse, where the worker may not be able to communicate their condition. The system also features an emergency switch, which can be pressed by the worker to send an immediate alert signal along with their current health data and GPS location. All the collected data is stored on the cloud platform, enabling supervisors to access health records, analyze patterns, and take preventive actions if abnormalities are observed. When abnormal readings (like high body temperature or irregular heart rate) are detected or the emergency button is pressed, the system instantly sends alerts via notifications or SMS to designated authorities.

### 4.3 BLOCK DIAGRAM




## 5. SYSTEM SPECIFICATION

### 5.1 HARDWARE REQUIREMENTS

Power Supply Unit
Esp32 Microcontroller
Buzzer
Temperature Sensor
Adc
Gps

### 5.2 SOFTWARE REQUIREMENTS

Arduino Ide
Embedded C
Blynk Iot

## 6.RESULT & CONCLUSION

The proposed IoT-based health monitoring jacket serves as an innovative and effective solution to ensure the safety and well-being of sanitary workers. By integrating various sensors such as pulse and temperature sensors with a GPS module and ESP32 microcontroller, the system enables real-time health monitoring and location tracking. The continuous assessment of vital signs allows for early detection of health abnormalities, helping to prevent critical health situations. The emergency alert feature empowers workers to request immediate help in case of distress, improving emergency response

times. Data transmission to a cloud platform ensures remote monitoring by supervisors and healthcare personnel, promoting a proactive approach to worker safety. The system is compact, cost-effective, and easily wearable, making it suitable for daily use in the field. By addressing key limitations of existing manual systems, this project not only enhances occupational health standards but also demonstrates the potential of IoT in public safety applications. It contributes to building a safer, smarter, and more supportive environment for frontline sanitation workers. Ultimately, the implementation of this smart jacket can reduce health risks, boost worker confidence, and set new standards in occupational health monitoring.

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