**Defensive Disclosure: VIGIL-MD Wearable Health Monitoring and Safety System for Industrial and Mining Environments**

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**1. Purpose of Disclosure**

This document is a defensive disclosure for the VIGIL-MD system, created to establish prior art and publicly disclose the architecture, function, and unique claims of this invention. The goal is to prevent any future patent claims on the same system or its core components.  
  
This disclosure is intended to preserve open innovation and ensure the inventor retains full freedom to operate in commercial, industrial, and defense sectors.

**2. System Overview**

VIGIL-MD is a ruggedized, wearable health and safety system designed for workers in mining, industrial, and high-risk field environments. It provides continuous real-time monitoring of physiological and environmental data, enabling early detection of health risks such as:  
  
- Heat stress  
- Fatigue  
- Cardiac distress  
- Falls or injury  
- Prolonged motionlessness  
  
The system includes:  
- A smart compression shirt embedded with biosensors  
- A custom sensor PCB with integrated power and data management  
- A LoRa-based communication relay  
- A mobile/tablet interface via the Titan Guardian App  
- Edge-based triage logic with AI-informed alerts

**3. Key Components and Technical Description**

Wearable System:  
- Constructed using moisture-wicking, durable fabric with conductive textile channels to embed wiring.  
- Interior layers contain sensor pads and protective foam inserts to shield electronics from body movement and sweat.  
- Shirt is machine-washable with removable sensor modules.  
  
Sensor Board (PCB):  
- Includes:  
 - MAX86150 (ECG + PPG)  
 - LSM6DSOX (IMU)  
 - SHT40 (humidity/temp)  
 - MLX90632 (IR skin temp)  
 - BQ27427 (fuel gauge)  
- Plug-and-play into the shirt’s connector housing.  
- Protected by ruggedized enclosure.  
  
Power System:  
- Powered by ELI-1614 wearable battery  
- Regulated using DROK adjustable buck converter  
- Manual sealed inline SPST power switch  
  
Communication:  
- LoRa SX1262 module with mesh relay logic  
- Range up to 1–2 km  
- Rugged relay boxes  
  
Titan Guardian App:  
- Displays vitals, alerts, fatigue markers  
- Functions offline or syncs with cloud  
- Configurable thresholds and alerts

**4. System-Level Claims (What Makes It Novel)**

- Medical-grade vitals sensors in rugged industrial apparel  
- LoRa mesh in comms-denied environments  
- Manual power switch + rugged board  
- Data fusion model for triage and heat stress detection  
- Offline-first app with optional cloud  
- Designed for full-crew deployment

**5. Use Case Distinction**

VIGIL-MD is not a fitness or consumer wearable. It is designed for:  
- Underground mines and remote worksites  
- Heat-intensive outdoor labor  
- Industrial deployments requiring low-latency safety alerts  
  
Not intended for medical diagnosis or personal wellness tracking.

**6. Statement of Defensive Intent**

This document is published for the purpose of establishing public prior art. It is not a patent application. The intent is to prevent other parties from filing patent claims that would restrict or preclude use of the invention described herein.  
  
All rights to commercialize this system are retained by:  
Justin Anhalt, Founder of Titan Defense Technologies Inc.