**T$O Gen-AI Hackathon – Guardian AI Submission Document**

**Team Name: NEMESIS**

**Team Leader: Sathwik Rao Arrabelly**

**Project Title: Guardian AI – A Fully Independent Gen-AI Emergency Wearable**

## 1. Problem Statement

Elderly individuals are vulnerable to life-threatening falls, strokes, and unconscious episodes—especially when alone. Conventional emergency systems require pressing a button or using smartphones, which often fails when the person is immobilized or unconscious. According to WHO, falls are the second leading cause of unintentional injury deaths globally, with adults aged 65+ at highest risk [World Health Organization, 2023]. Guardian AI addresses this gap by enabling automatic, voice-based, Gen-AI-powered detection and escalation — without needing a smartphone or human initiation.

## 2. Target Audience & Context

Our core users are elderly individuals in independent living, assisted homes, or rural households without smartphones. Secondary users include caregivers, hospitals, NGOs, and eldercare institutions. The system's eSIM connectivity ensures functionality even in areas without Wi-Fi. Guardian AI's voice-first interaction suits seniors with limited mobility or vision. A BLE-based admin app allows caregivers or family members to view alerts, incident history, and logs in real time, making remote monitoring seamless and secure.

## 3. Use of Generative AI

Guardian AI uses OpenAI's Whisper API to transcribe spoken replies and GPT-4o to perform real-time classification and intelligent decision-making. After detecting a fall, the wearable speaks to the user: "Are you okay?" The response is recorded, sent to Whisper, and then classified by GPT-4o as ["Okay", "Emergency", "No Response"]. GPT also generates a caregiver-friendly alert message. This use of Gen-AI ensures nuanced, empathetic escalation. Importantly, our team extensively used ChatGPT to structure the AI pipeline, select optimal hardware modules, and define fallback behaviors, greatly accelerating the design and technical implementation.

## 4. Solution Architecture & Workflow

The wearable includes:

- ESP32-S3 microcontroller for real-time logic and Wi-Fi/BLE
- MPU6050 for motion and fall detection
- INMP441 (I2S microphone) to record user response
- MAX98357A DAC for speaker output
- SIM7070G module with eSIM for GSM/GPS/SMS capability

Workflow:

[1] Fall detected → [2] Speaker prompt → [3] Mic records response
→ [4] Audio sent via HTTPS to Whisper → [5] Text to GPT-4o
→ [6] Classified intent → [7] Trigger SMS/call via GSM with GPS
→ [8] Caregiver receives personalized alert

This architecture is cloud-integrated but fully independent of phones. A companion BLE-based admin app allows users to pair with the device to check logs and configure contacts.

## 5. Feasibility & Execution Plan

All hardware components are low-cost and locally available. ESP32-S3 handles I2S audio and BLE. SIM7070G supports GSM, LTE-M, GPS, and eSIM integration. Audio files are stored in onboard flash or microSD. The MVP has been prototyped with functioning:

- Fall/stillness detection
- Voice prompt playback
- BLE admin app for event tracking
- Audio recording + GSM SMS
- Whisper + GPT-4o processing with real speech samples
- GSM calls/SMS via AT commands

Final phase includes integrating multilingual prompt options, low-power battery optimization, and expanding caregiver dashboard functionality.

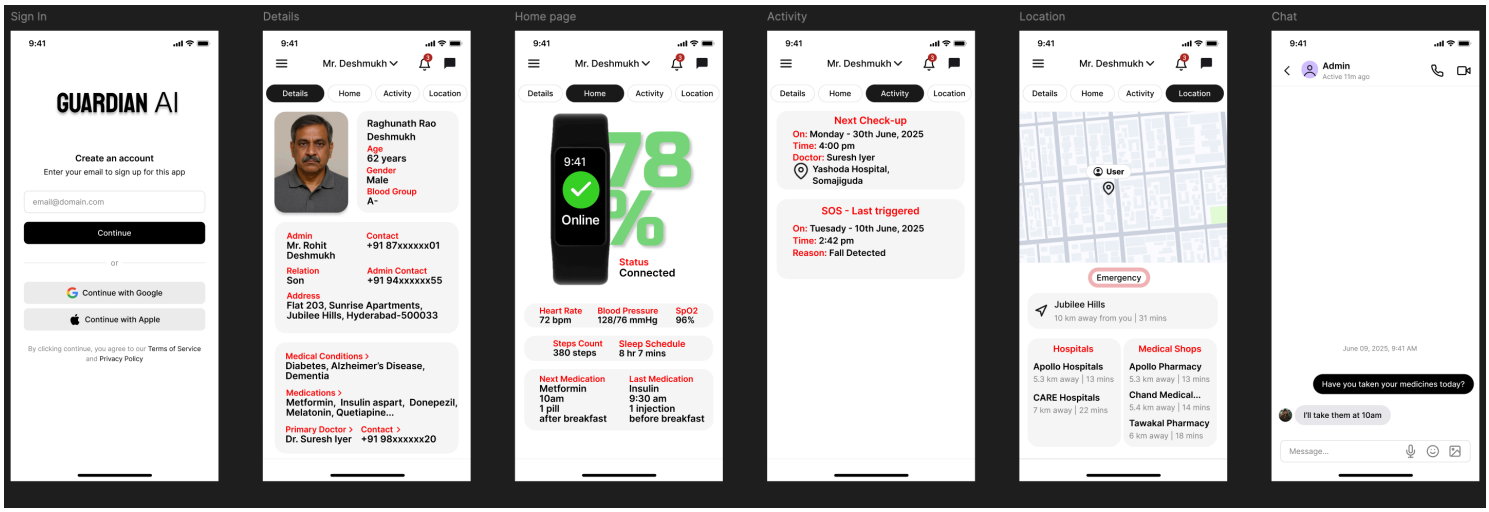
### 6. Scalability, Market Scope & Impact

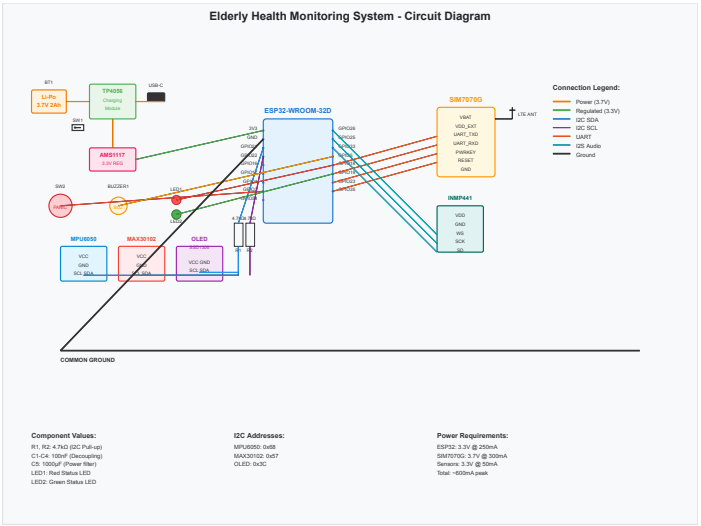
Guardian AI is designed for wide adoption — from rural households to smart hospitals. It's compatible with Indian eSIM networks, making it ideal for villages and remote regions. The elderly care tech market in India is projected to exceed $2.5B by 2027 [Statista, 2023]. Our platform is also ideal for NGOs, insurance companies, and eldercare providers seeking scalable, plug-and-play solutions. Unlike camera-based monitoring or expensive wearables, Guardian AI offers privacy, autonomy, and Gen-AI decision-making at scale. Support for multilingual voice and offline fallback models ensures inclusion and accessibility.

### 7. Summary & Minimum Lovable Product (MLP + Bonus)

Guardian AI is a standalone, intelligent wearable that can detect emergencies, interpret user responses via Whisper + GPT-4o, and alert caregivers — all without needing a phone or human assistance. Its MVP includes:

- Fall detection
- Voice prompt
- Audio classification via Gen-AI
- SMS/call via eSIM
- BLE-based caregiver app




**Hardware cost:** under ₹1500.

**Business model:**

AI alert credits, app subscriptions, and hospital/NGO deployment partnerships are revolutionizing emergency response systems. These technologies create a seamless network where AI listens attentively, understands intricate situations, and responds with human-like empathy and precision. The true charm lies in its silent vigilance—working tirelessly behind the scenes to save lives, even when individuals are unable to reach out for help. Through strategic partnerships with healthcare institutions and NGOs, this system ensures widespread accessibility and rapid deployment in critical moments. Its blend of technology and compassion makes it an indispensable tool in modern emergency management.

**References:**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**AI Assistance Declaration:**

ChatGPT (OpenAI) was actively used throughout this project to shape our solution architecture, select hardware components, refine the design, and ensure clarity in our documentation and video pitch preparation. It served as both a research assistant and co-designer, making this Gen-AI submission truly collaborative.