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GridDB Cloud IoT Hackathon

AAROK

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1. Gooroo Mobility India (GMIndia)

Gooroo Mobility India Pvt. Ltd. (GMIndia), powered by BECOME is a pioneering Intelligent Systems company shaping the future of AI computing, automation, and GenAI-driven transformation across industries.

We build an Agentic AI + Edge Computing ecosystem that redefines how enterprises operate, connect, and scale with delivering Agile Delivery Excellence through a world-class Digital & Operational Excellence Center (Sigma Agile DM Center).

By fusing AI computing, automation, and adaptive intelligence, GMIndia enables organizations to achieve hyper-efficiency, precision, and measurable business impact across every vertical from smart manufacturing and logistics to aerospace intelligence, energy, and digital infrastructure.

Together with BECOME, we bridge technology and human potential by creating a unified ecosystem where innovation accelerates purpose, performance, and sustainable growth.

2. The Team

Vijay S

Vijay is a PhD scholar and an innovative embedded systems engineer, passionate about tech, AI, and IoT. A national award-winning mentor at SheSTEM and Youth Ideathon 2024, he transforms bold ideas into impactful real-world innovations.

Vishnu Kumar AR

Vishnu Kumar A R is a senior web developer and AI specialist with 8+ years of experience building scalable, intelligent digital solutions. He blends generative AI, automation, and data-driven marketing to turn ideas into measurable business impact.

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Acknowledgement:
Tech Backbone Team:
Mohamed Razik M, Ashok Kumar, Mohammad Jaim

3. Inspiration

The contemporary healthcare systems find it hard to monitor patients in real-time particularly in distant or resource constrained settings. We have tried to develop a low-priced, dependable and scalable IoT healthcare system that would be able to monitor vitals such as heart rate, SpO2 and body temperature and store the information in a high-performance cloud database.

What It Does

The answer is a real time patient health monitoring system that:

Collects Vitals

- Heart Rate using MAX30102
- SpO2 (blood oxygen saturation)
- Temperature using LM35
- All powered by ESP32
- Sends Data Wirelessly
- ESP32 transmits WiFi data in a cycle in the form of JSON.

Stores in GridDB

The server is a lightweight Python server that receives the data and stores it in a time-series optimized grid database, GridDB.

- Provides Live Monitoring
- Real-time vitals dashboard
- Latest reading display
- Notifications about unnatural values.
- Historical trend analysis.
- Everyone can access it on any network device.

4. How did we build it?

Hardware Layer

- ESP32 reads data from MAX30102 and LM35
- Noise declares, samples averages to accuracy.
- Calculates: Heart rate, SpO2 ratio, Temperature (ADC to Celsius)
- Packages data into JSON

Communication Layer

- ESP32 - WiFi - Python Flask API
- Measurement is done in every cycle by HTTP POST.
- Connection retry - error handling.

Backend Layer

- Sensor data is sent to Python Flask REST API.
- Validates inputs
- Stores are loaded into a time-series collection of a gridDB.
- Carries out aggregation and querying.
- Provides endpoints for: data, latest stats, count, delete.

Frontend Layer

- Datamonitor indicated through HTML dashboard (or Streamlit):
- Live heart rate
- Live SpO2
- Live temperature
- Colors of alert (Red/yellow/green).
- Statistics and trends.

5. Challenges we ran into

● Sensor Accuracy Issues - MAX30102 required precise finger placement; solved with multi-sample averaging and validation logic

● GridDB Cloud Integration - Authentication and REST API learning curve for time-series data insertion

● Real-time Synchronization - Managing timing between hardware, server, and dashboard to prevent data loss

● Device Status Tracking - Implementing timeout detection to distinguish offline devices from network delays

● WiFi Connectivity Problems - ESP32 connection drops; resolved with automatic reconnection logic

● Building Production-Ready Systems - Each challenge improved system robustness and reliability.

6. Accomplishments that we're proud of

- Real-time Monitoring - Under half a second sensor-to-dashboard response with live WebSocket information.
- GridDB Cloud Integration - Managed to conquer time-series database to stream data in IoT continuously.
- Intelligent Check in Device Tracking - Integrated automatic offline detection system where it makes sure that there is some degree of reliability in the monitoring.
- Simple Dashboard User Interface - Developed an easy-to-use computer to non-technical

user friendly dashboard that has color-coded alerts.

- Complete IoT Solution - Provided end to end hardware to frontend and cloud-based systems within limited time.
- Affordable Healthcare Access - Remote monitoring is proved to be affordable.
- Real-World Impact - Developed a solution that has the potential to literally save the lives in rural and underserved locations.

7. What we learned?

- IOT hardware integration (ESP32, MAX30102, LM35)
- Time-series database implementation - gridDB Cloud.
- WebSocket real-time communication.
- Standards of healthcare data accuracy and reliability.
- Embedded system to web dashboard development (full-stack).
- Project management and team work.

8. What's Next?

- Addition of more vital signs such as ECG, blood pressure
- Creating AI-driven health predictions on the basis of historical data in GridDB, creating and initiating pilot projects with rural clinics.
- We aim to be a certified medical device that is part of healthcare systems and quality monitoring that is monitored by millions.

9. Built With

- **Software & Tools**
- **Hardware: ESP32 + MAX30102 + LM35**
- **Backend: Python Flask + GridDB Cloud**
- **Frontend: HTML/CSS/JS + Chart.js**
- **Protocols: WiFi, HTTP, WebSocket**

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