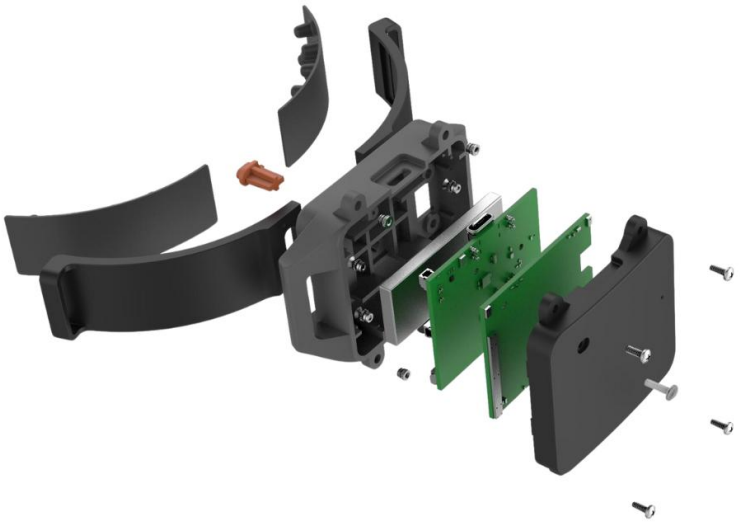
Oxeltech

Smart Dog Collar- Health & Location Monitoring System



A next-generation pet wearable that provides pet owners with 24/7 health insights and real-time location tracking, enabling better preventive care, peace of mind, and stronger human-pet bonds through technology. This compact, durable collar integrates advanced biosensing and IoT connectivity for continuous monitoring and reporting.

Key Features:

Health Monitoring: Heart rate and respiratory rate sensing via piezo sensors and microphones, plus activity classification from IMU data.

Location Tracking: Built-in GNSS for real-time positioning, with cellular connectivity for cloud integration and BLE for local sync.

Biosensing Innovation: Dual-modality measurement combining mechanical (piezo) and acoustic (microphone) sensing for higher accuracy in vital sign detection.

Hardware Development

Hardware and rigid PCB design tailored for a compact wearable form factor.

Power management architecture optimized for small battery capacity with efficient energy handling.

Multi-radio RF design enabling cellular / GNSS / BLE coexistence with robust antenna performance.

Firmware Development:

RTOS Architecture: Modular design using FreeRTOS for multitasking.

Drivers & Communication: UART, SPI, and I²C interfaces for sensors and radio modules.

Sensor Processing: GPS parsing, IMU data acquisition with filtering, and activity classification.

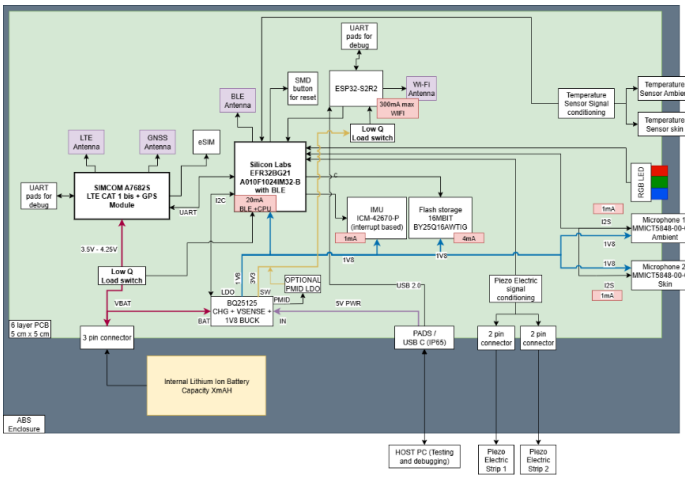
Biosensing Algorithms: Heart and respiratory rate extraction from piezo and microphone signals.

Connectivity: BLE pairing and data sync routines; secure cloud API integration for health and location data.

Reliability & Updates: Firmware Over-The-Air (FOTA), event-based health alerts, watchdog timers, and fail-safe logging.

Power Optimization:

Deep sleep modes and peripheral shutdown for extended battery life.



Applications:

- IoT-based Pet Health Monitoring
- Pet Tech / Smart Pet Devices Market

Technologies Used:

- **MCU:** ESP32 (WiFi + Bluetooth), Silabs EFR32xG21
- **GPS & IoT Module:** SIMCOM A7682S (CAT M1 for low-power wide-area connectivity)
- **Flash Storage:** BY25Q16AWTIG
- **IMU Sensor:** ICM-42670-P
- **Additional Sensors:** Piezoelectric/Dual microphone sensors for activity and physiological data