



Enabling Smart Healthcare with AI and IoT

A large-scale IoT platform for a HealthTech company that offers continuous health monitoring for senior care patients globally by leveraging real-time data processing, advanced analytics, and predictive machine learning models.

Overview

Qburst built a robust, scalable IoT platform on AWS that handles real-time data from millions of devices, transforming reactive senior care into a proactive, data-driven system.

- **Proactive Safety:** Integrated Machine Learning models to predict movement patterns and fall risks, enabling caregivers to intervene before incidents occur.
- **Massive Scalability:** Designed the platform to seamlessly ingest and process high-throughput data, handling over 25,000 events every 10 seconds.
- **Global Monitoring:** Provided facility managers and family members with real-time health data and alerts through intuitive web and mobile applications.



Client Profile

A US-based HealthTech company specializing in digital solutions for elderly care. They design proprietary sensors and an integrated platform to monitor seniors' health and routines, enhancing care quality and operational efficiency for caregivers.

Challenges: Processing Millions of Records

The project faced severe technical challenges related to data velocity, volume, and predictive intelligence:

- **High Throughput Ingestion:** The platform had to seamlessly ingest and process real-time data from diverse IoT sensors, requiring the capability to reliably support over 25,000 events in 10 seconds.
- **Global Device Provisioning:** Ensuring that proprietary sensors and medical devices sold worldwide are easily integrated and monitored within the centralized system.

- **Real-Time Anomaly Detection:** The system needed advanced, real-time analytics to detect subtle anomalies (like irregular sleep or movement patterns) and immediately generate alerts for prompt caregiver intervention.
- **Security and Compliance:** Required secure data storage for massive volumes of historical and real-time data to ensure compliance and robust analysis capabilities.

Solution: Monitoring Solution for Smart Senior Care

QBurst delivered a scalable, proactive healthcare monitoring system by integrating proprietary sensor hardware with a robust cloud ecosystem utilizing AWS IoT Core and Amazon Kinesis. This combination ensures reliable data ingestion, real-time processing, and advanced machine learning analysis.

- **IoT Data Ingestion:** IoT sensors (temperature, heart rate, motion) installed in patient rooms continuously transmit data via secure protocols to Amazon IoT Core, which directs the data streams.
- **Real-Time Processing and Analytics:** Amazon Kinesis Data Firehose and Amazon Kinesis Data Streams process sensor data in real-time, enriching it with contextual information before structured storage.
- **AI-Driven Insights:** Machine Learning models analyze real-time sensor data to enhance predictive analytics, specifically identifying irregular sleep behaviors, movement patterns, and fall risks.
- **Data Storage and Archival:** Structured data is stored in Amazon S3 (for archival) and DynamoDB (for efficient retrieval), supported by AWS Glue for comprehensive historical reporting.
- **Alert System:** Alerts generated through AWS Lambda instantly trigger notifications in both web and mobile applications, ensuring responsible personnel can intervene immediately.

Technical Highlights

- **High Throughput Architecture:** Utilized Amazon Kinesis Data Firehose and Kinesis Data Streams for high throughput processing, capable of handling over 25,000 events in 10 seconds.
- **Machine Learning Integration:** Deployed custom Machine Learning models for predictive analytics (movement patterns, fall risk) and real-time sensor data enrichment.
- **Cloud Data Storage:** Leveraged Amazon DynamoDB for fast, efficient retrieval of structured real-time data and Amazon S3 for secure archival.
- **Global Device Provisioning:** Ensured seamless integration of diverse devices (wearable trackers, smart beds) globally via AWS IoT Core and secure protocols (MQTT, HTTP).

Impact: Patient Care with Data-Driven Efficiency

- **Enhanced Patient Safety:** Proactive monitoring and AI-driven prediction of movement patterns reduced incidents by an estimated 55%, helping caregivers to react before accidents occur.
- **Improved Healthcare Efficiency:** Automating continuous monitoring and instant alerts reduced manual observation efforts, increasing staff availability for essential tasks by 40%.
- **Data-Driven Decision-Making:** Facility owners can now analyze trends and optimize patient care protocols, improving overall resource allocation efficiency by 50%.
- **Family Engagement:** Intuitive mobile applications allow family members to stay updated on their loved ones' well-being, boosting satisfaction and trust in the facility.
- **Scalability for Future Growth:** The platform's robust, AWS-native architecture is built to effortlessly handle increasing device integrations and data loads, ensuring future scalability.