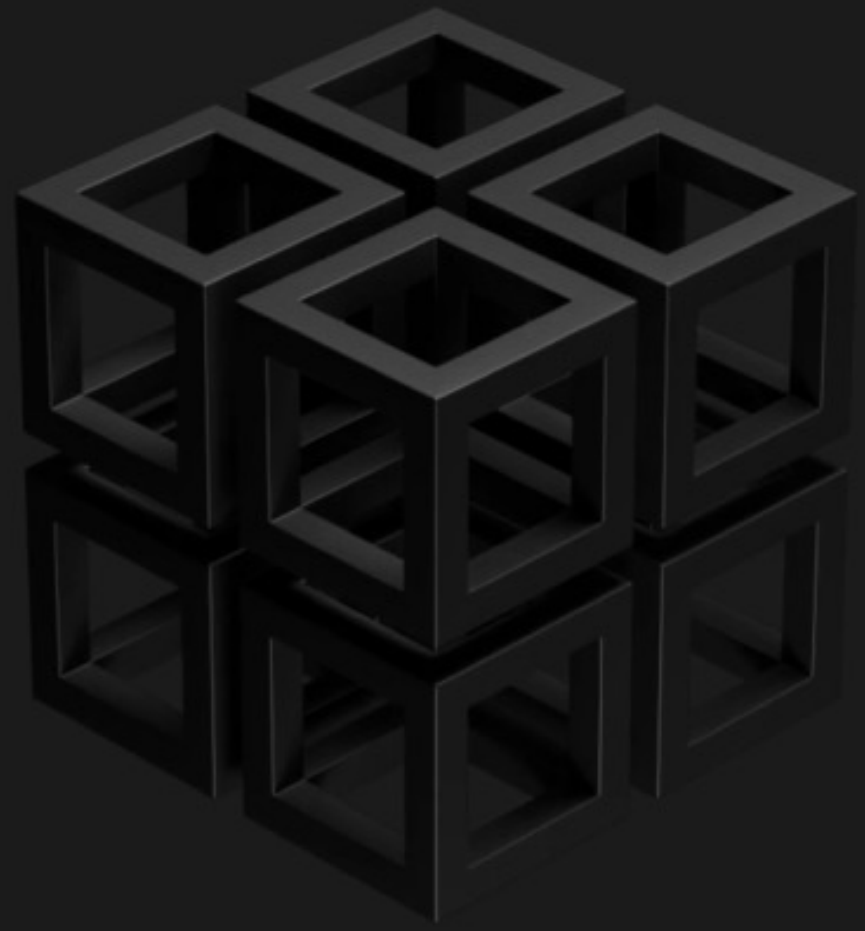
ambient Scientific

# Why AI Needs to Leave the Cloud:

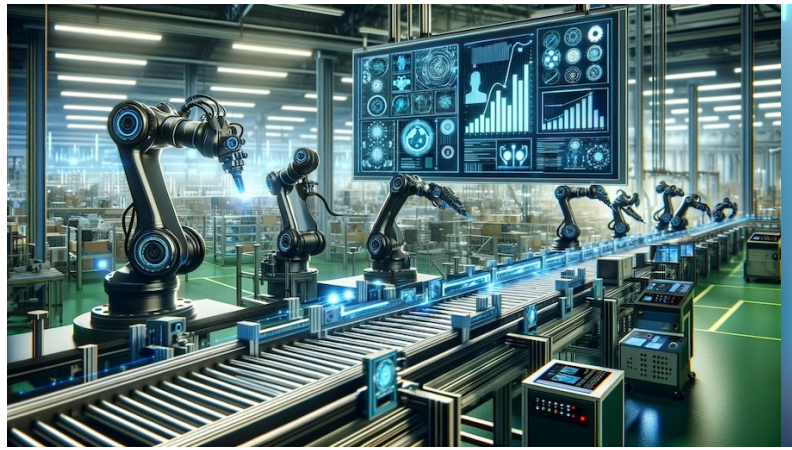
# A Fall Detection Case Study



July 2025

# AI today is changing human lives

**Industrials** Process Monitoring

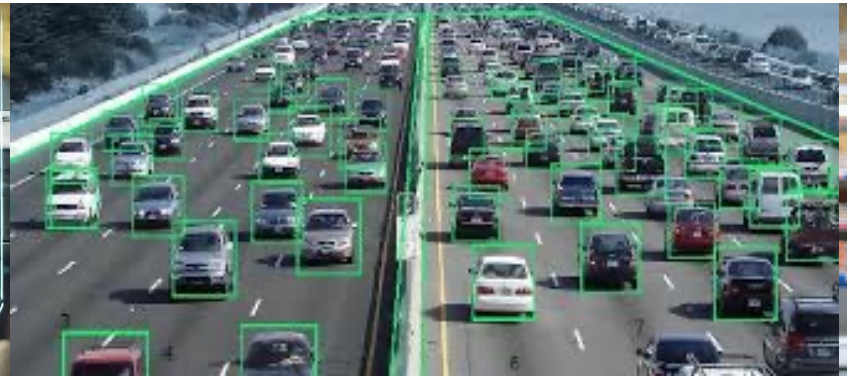


**Healthcare** Medical Imaging

**Agriculture** Crop Analysis

**Automotive** Safety Monitoring


**Public Sector** Traffic Monitoring



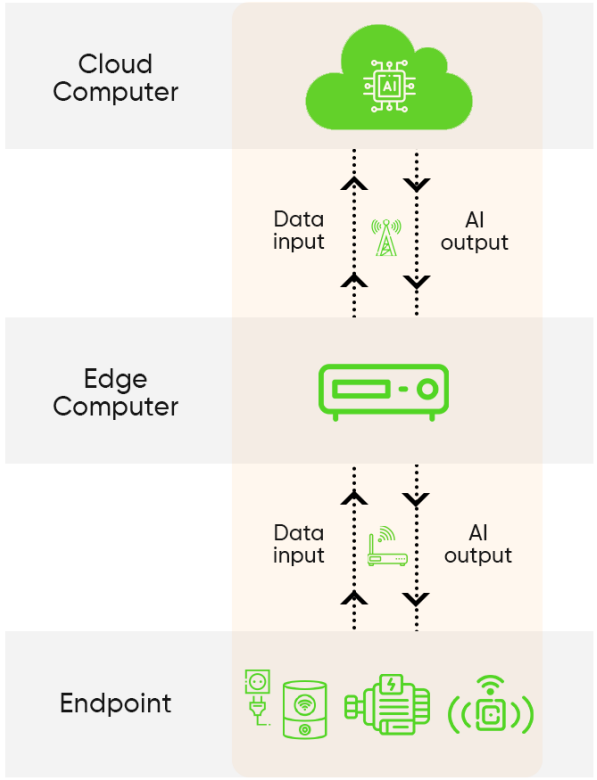
**Retail** Security Surveillance

# But only when you're connected

## Cloud AI Model

AI processing happens in the cloud with all data transmitted

- Significant Cloud Expenditure
- Latency due to Network Relay
- User Data Privacy Concerns
- Low reliability due to connectivity issues




**No Connectivity**

**=**

**No AI**

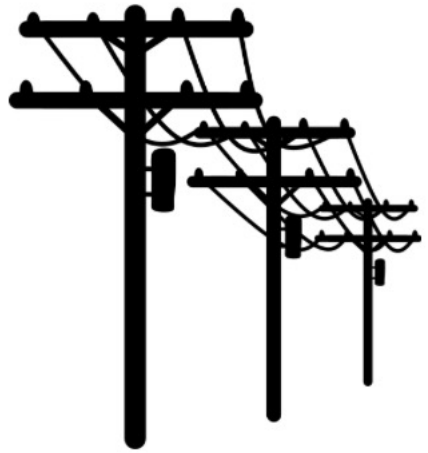
# Why AI still lives in the cloud

**Complex Neural Networks**

Requiring massive compute

**Suboptimal hardware**

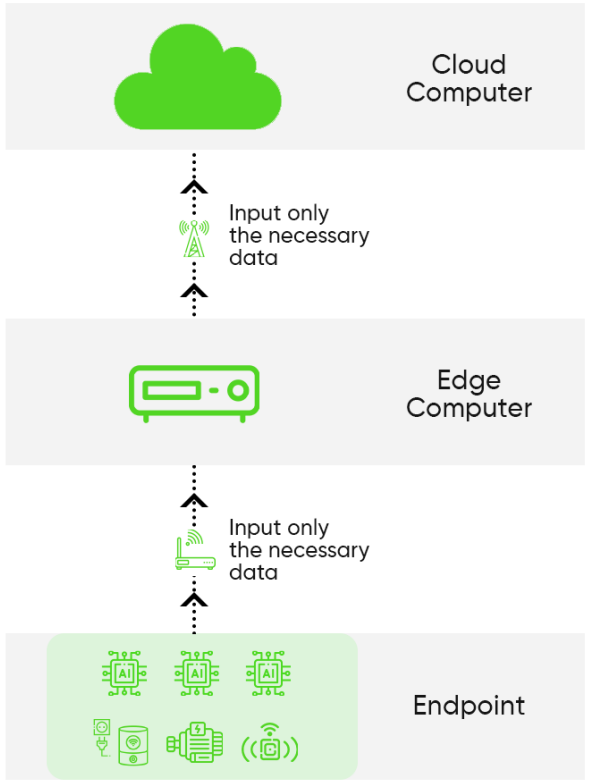
Housed in far away data centers



**Enormous power**

Requiring specialized infra.

# What about AI for Good at the edge?



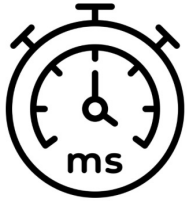

## Edge AI Model

AI processing happens on the sensor or device close to the user

- \+ Reduced Total Cost of Ownership
- \+ Near Zero Latency & Real Time Insights
- \+ User Data stays On Device
- \+ Higher Reliability no connectivity dependence

**Cloud-Free**

**Battery-Powered**

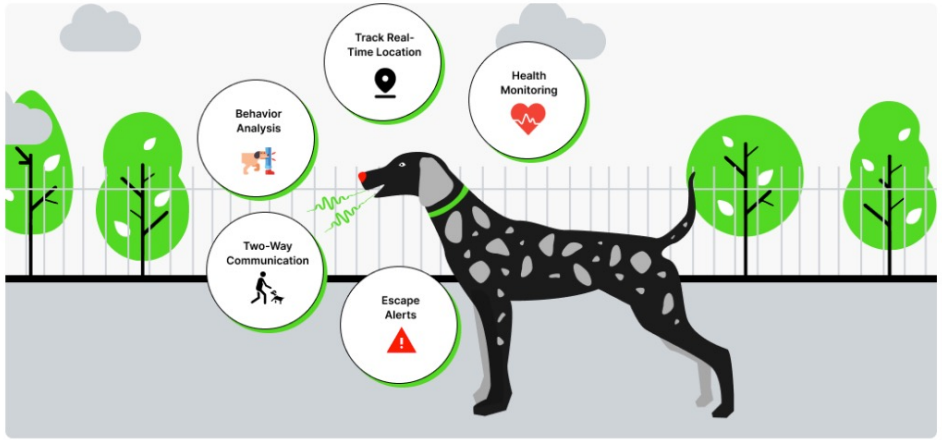



**Real-Time AI**

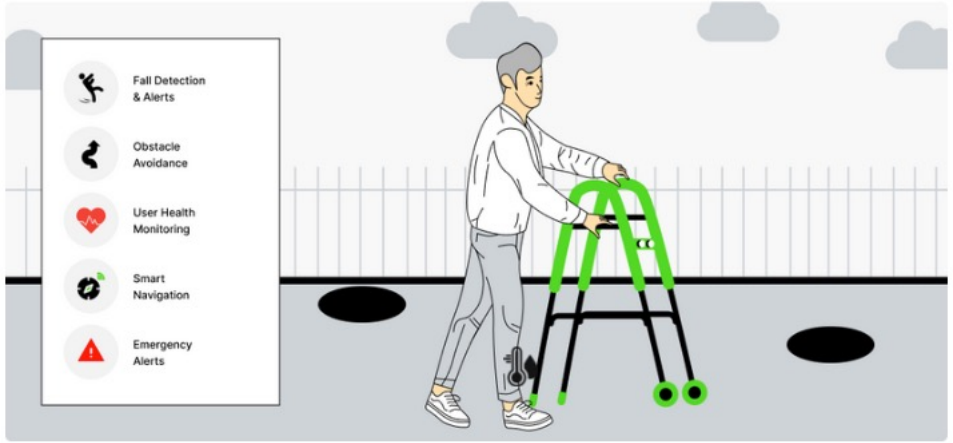
# Edge AI applications can change lives

## Smart Helmets to prevent accidents


## Smart Collars to protect pets




## Smart Sticks to assist the differently abled




## Smart Shoes to diagnose Parkinson's

# Fall Detection at the edge can save lives

**1 in 3**

**Seniors (65+)**

**Each Year**

**25%**

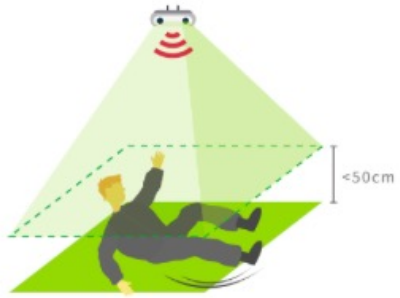
**Higher Mortality**

**For each extra hour**

# Traditional solutions have serious limitations

**Traditional wearables**

- \+ Portable
- \+ Cost Effective
- – Poor battery life
- – Usage inconsistency




**Vision Based Solution**

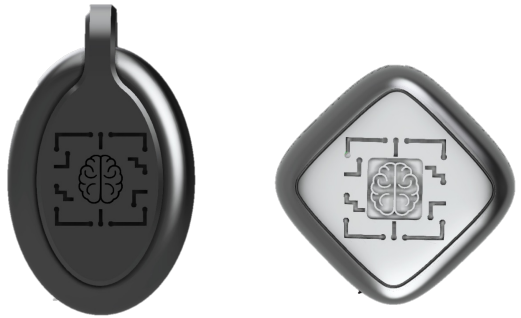
- \+ High accuracy
- \+ User hassle free
- – Privacy concerns
- – Cloud dependence

**Millimeter Wave Sensors**

- \+ User convenience
- \+ Privacy preservation
- – Prone to false alarms
- – Works indoor only

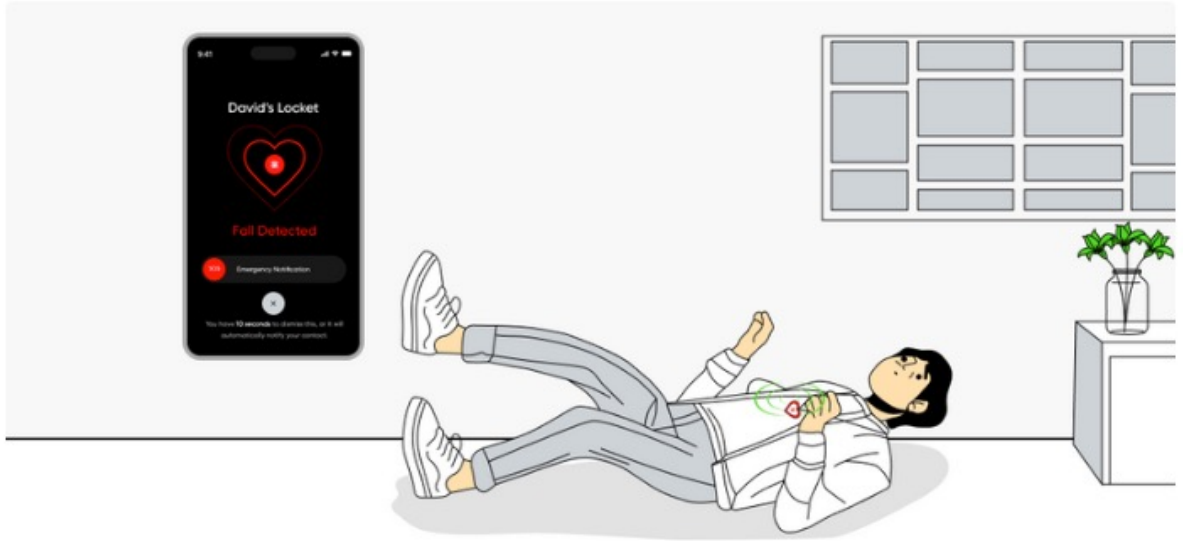
# We envisioned the perfect solution

## Always-On Fall Detection Locket





- Accurate Detection: Minimal false positives.
- Infrequent-Charging: Runs on a coin cell for 6 months
- Real-Time Alerts: Notifies caregivers or emergency
- Comfortable Form Factor: Light & Easy to wear.




**Accelerometer**
Detects sudden falls.

**Pressure Sensors**
Tracks body posture changes.

**Gyroscope**
Measures orientation and movement.

**Temperature Sensors**
Monitors body temperature for abnormalities.

# But existing chips couldn't deliver low-power AI

**Typical GPU**

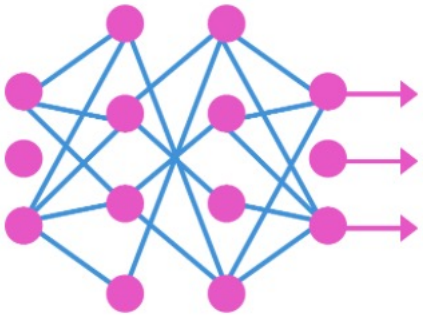
**Typical MCU**

| | | |
|---|---|---|
| High AI Perf. | **AI Performance** | Low AI Perf. |
| Battery Drain | **Power Efficiency** | Battery Drain |
| Size Increase | **Form Factor** | Compact |
| Cost Increase | **Affordability** | Affordable |

**Traditional processors consume 1000X power required**

# Underlying chip architecture was the culprit

## Neural Network

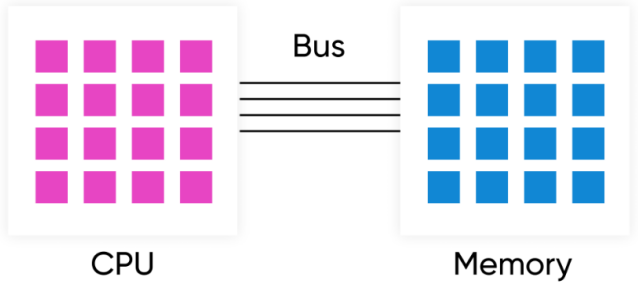


Activations (Compute)

Weights (Memory)

Neural networks are essentially repeated matrix multiplications between input values and stored weights

## Traditional Chip Architecture

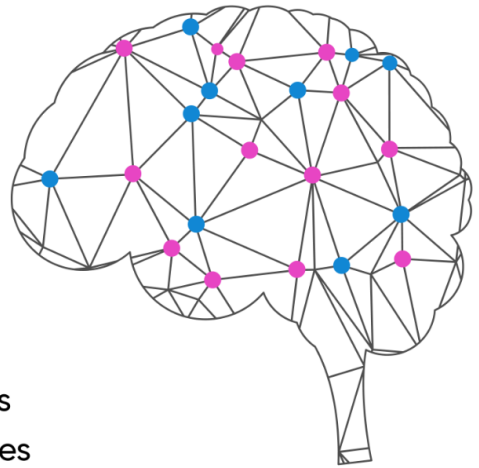



Computing Cell

Memory Cell

Constant transfer between memory and CPU creates bottleneck and causes large power consumption

## Human Brain Architecture

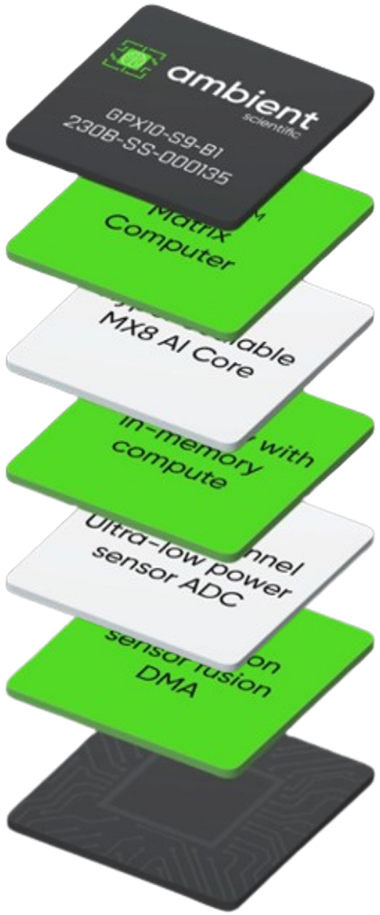


Neurons

Synapses

Human brain is much more efficient with memory and compute centers interwoven throughout the system

# Until we re-invented it




**Software**

- Flexible SDK (Tensor flow, Pytorch)
- Advanced compiler

**SoC Level**

- Multi-Channel Ultra-Low power ADC
- Always-on sensor fusion DMA

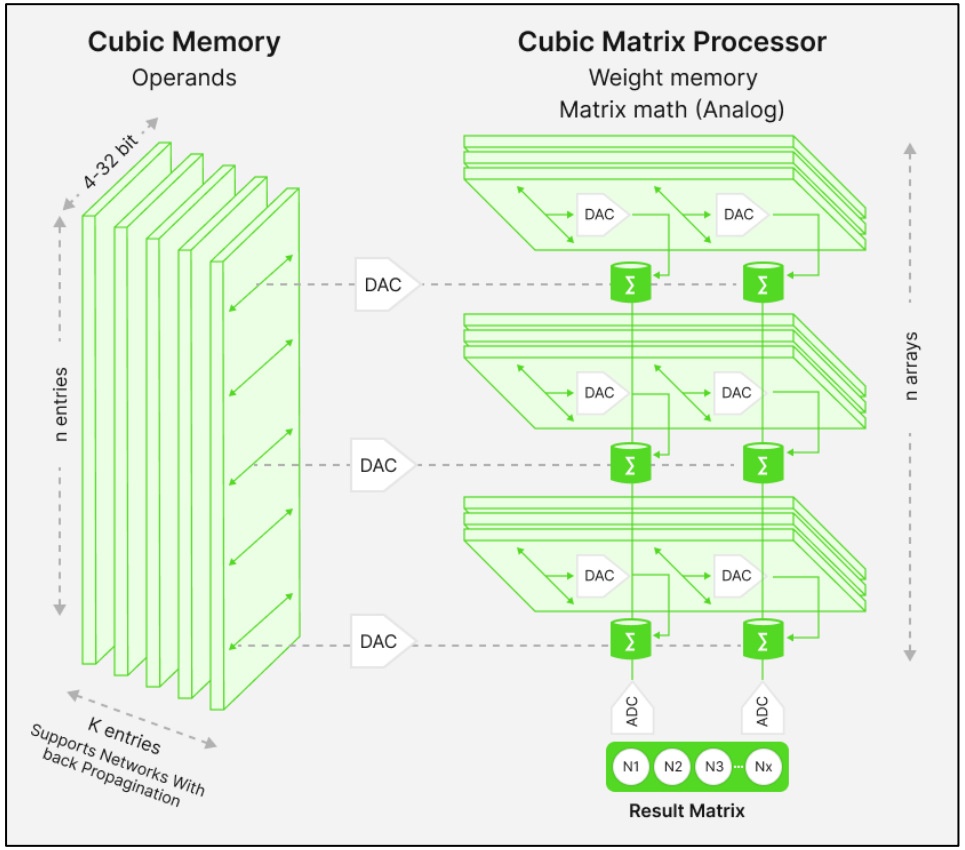
**Architecture**

- ISA designed specifically for AI
- Programmable & Scalable AI Cores

**Circuits**

- Massive dot product engine
- 3D Memory & in-memory computing
- Digital-Analog AI computing

## Ambient's DigAn™ Architecture



# And created the world's lowest power AI processor

| Metrics | Ambient GPX10 | Comparable ASIC chip | Typical GPU |
|---|---|---|---|
| Peak performance (GOPs) | 512 | 0.24 | 512 |
| Power consumption (Microwatts) | ~80 | 200 | 6,000,000 |
| Efficiency (TOPs/watt) | 7.3 (Measured) | 1.2 | 1 |
| Programmability | Extensive | Limited | Extensive |

**1000X**

Power saving for comparable performance

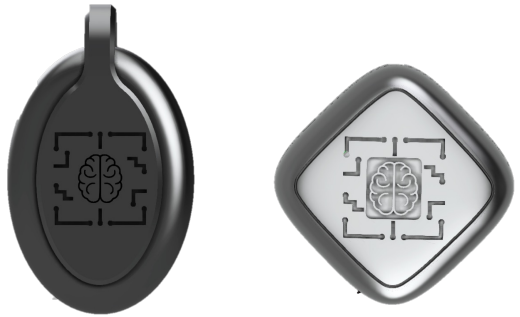
OR

**1000X**

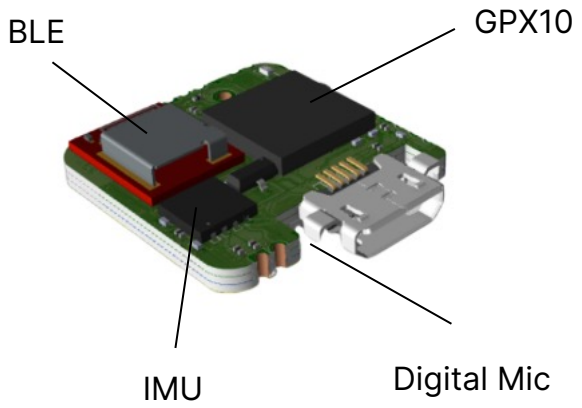
Performance at comparable power consumption

# To enable an impossible fall detection solution

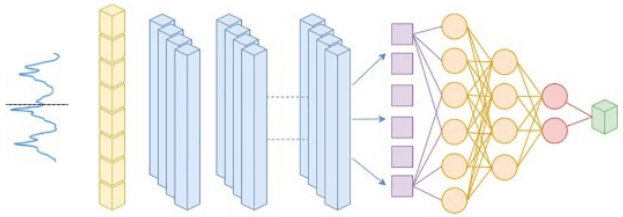
**Form Factor Locket**



**GPX10 Module**




**Proprietary Algorithm**



**>95% Accuracy**

**>3 Months coin cell battery**

**Wearable & light form factor**

# Fall Detection in action


**Product in Design**

**By Tier 1 Customer**

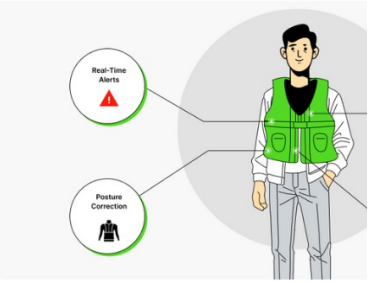
**Q1 2026**

# Many more edge AI applications coming

ambient

## Smart Vest (For Workers)

The Smart Vest improves worker safety by tracking vit
offering real-time alerts for health risks and hazards in




**Heart Rate & ECG Sensors**
Monitor vital health signs.

**Accelerometer & Gyroscope**
Track movement and posture.

**Key Features**

- Real-Time Alerts: Instant hazard notifications.
- Posture Correction: Prevents injuries.
- Environmental Monitoring: Detects unsafe conditions.
- Lightweight & Durable: Comfortable for harsh environments.

Wh

+
+
+
+

Ambient Scientific

ambient

## Food Authenticity Detect

The Food Authenticity Detector ensures
composition, and contaminants, helping


**Spectroscopy Sensor**
Analyzes composition and freshn

**Moisture Sensor**
Monitors water content for freshn

**Key Features**

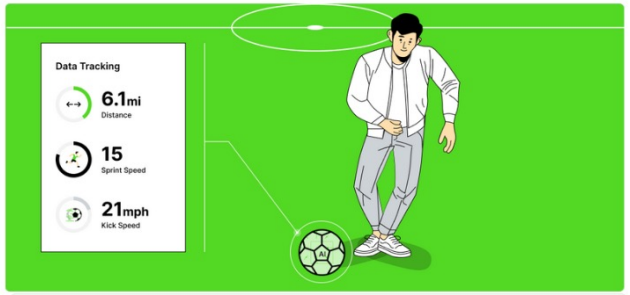
- Freshness Analysis: Detects spoilage and shelf-life indicators.
- Nutritional Assessment: Provides composition insights.
- Contaminant Detection: Identifies harmful chemicals or additives.
- Smart Alerts: Notifies users about unsafe food.

Ambient Scientific

ambient

## Smart Soccer Ball with Trajectory Analysis

AI-powered soccer ball with sensors to track trajectory, speed, spin, and impact, enhancing training and game analysis for players, coaches, and enthusiasts.




**IMU**
Monitors motion, acceleration, and rotation.

**Proximity Sensor**
Detects player interactions.

**Pressure Sensor**
Measures force during kicks.

**GPS**
Tracks ball trajectory & location.

**Key Features**

- Real-time analysis of path, speed, and spin via an app.
- Provides feedback on shot power, accuracy, and technique.
- Interactive drills and challenges improve specific skills.
- Captures ball movement for post-game insights.

**Why GPX10?**

+ Ultra-low power ensures long battery life.
+ Real-time AI enables instant feedback without external servers.
+ Compact design integrates sensors seamlessly into the ball.
+ Edge computing offers cloud-free operation in all settings.

Ambient Scientific 10


**Download our Edge AI Application Playbook**

# And many more Ambient AI Processors

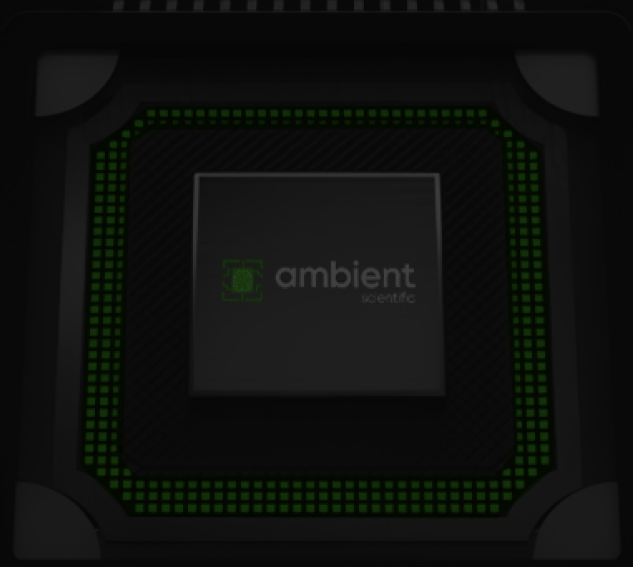
**Scalable architecture enables long roadmap of products**

Scalable to any # of AI cores

| In production | In design | | | |
|---|---|---|---|---|
| ambient scientific GPX10 | ambient scientific GPX64 | ambient scientific GPX256 | ambient scientific GPX2000 |  |
| Intelligent Edge Devices | Computer Vision & NLP | Small Servers | Enterprise & Autonomous Driving | Cloud & Supercomputer |
| **Available Now** | **Q2 2026** | **Q4 2026** | **Q1 2027** | **To be planned** |

ambient Scientific

# Thank You!




Saharsh Singhania, Product Marketing

812-369-5859

saharsh@ambientscientific.ai

www.ambientscientific.ai