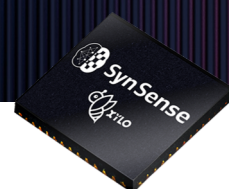


Xylo™

an ultra-low power low-dimensional signal processor



About Xylo™

The Xylo™ family enables always-on real-time temporal signal processing and recognition applications, at ultra-low-power (100–200µW). Coupled with a range of efficient direct sensor interfaces, Xylo™ powers the next generation of intelligent edge sensory processing. Xylo™Audio enables audio home security, human speech detection and understanding, audio scene analysis and industrial audio applications.

All Xylo™ family devices feature an efficient, fully configurable spiking neural processor, for flexible application development and deployment. Xylo™ is highly suited for intelligent processing of a variety of signals, including micro-electromechanical systems (MEMS) microphones, temperature sensors, pressure sensors, vibration sensors, acceleration sensors, gyroscopes, electromyography (EMG), electrocardiography (ECG), and more.

Xylo™'s SNN core simulates up to 1000 leaky integrate-and-fire (LIF) spiking neurons for configurable and flexible inference applications.

Applications

Audio Detection

- Speech detection and analysis
- Scene classification
- Keyword and command detection

Wearable Devices

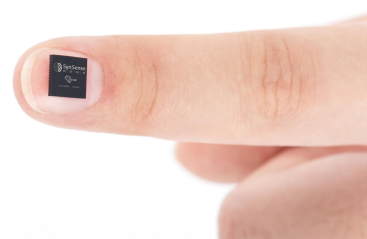
- Behavioral state detection
- Gait detection and analysis
- Breath detection
- ECG and EMG signal analysis

Industrial Testing

- Industrial fault monitoring and predictive maintenance

Smart Security

- Glass break and audio event security detection



Baby crying detection based on Xylo™ Audio

Application overview

Xylo™ Audio enables always-on, intelligent monitoring for baby distress — alerting you immediately when something is wrong.

Integrated into an audio monitoring system, Xylo™ Audio detects baby cries and other household sounds of interest, in real time and at sub-milliwatt power levels.

The Xylo™ series of low-dimensional natural signal processors from SynSense processes temporal signals from a range of sensors. Xylo™ Audio is a low-power, always-on mixed-signal AI chip based on SNN technology, ideal for processing audio signals. It is highly compatible with a range of microphone technologies, and Xylo™ Audio's efficient audio front-end (AFE) converts audio input signals for analysis.

Xylo™ Audio and the example crying detection SNN model, combined with a regular analog microphone, enables high-precision baby crying detection/recognition within a range of 1.5 meters.

Based on Xylo™ Audio, sound events can be efficiently monitored within a designated range with sub-milliwatt-level ultra-low power consumption and millisecond-level ultra-low latency. SynSense empowers its partners in the infant care and companion toy industries with real-time sound detection and recognition capabilities.

Key benefits

Cost effective

Lowered cost of up to 10 times

Privacy security protected

Local processing of raw audio with no buffering or cloud compute

Fast response

Response time <50ms (typical applications)

Ultra-low power consumption

300mW inference power

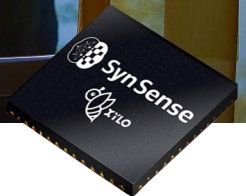
Highly configurable

Deploy a wide range of sophisticated SNN audio processing applications

Specifications

Circuit	Synchronous digital circuit
Neurons	1,000
Power consumption	<1mW

Low power audio event monitoring for security with Xylo™ Audio



Application overview

Xylo™ Audio is an ultra-low-power audio processing platform, based on the Xylo™ neuromorphic inference core. The Xylo™ family supports real-time continuous environmental monitoring, from audio, vibration, motion sensors, bio-signals and more. Xylo™ enables ambient intelligence for consumer devices, providing edge perception and edge computing in energy-constrained environments.

Xylo™ Audio can detect audio events such as glass breaking and gunshots, for in-home security applications.

Integrate low-power always-on security monitoring into your smart home devices.

Specific application scenarios

Door lock

Smart home speaker

Component in other smart-home system

Key benefits

Cost effective

Lowered cost of up to 10 times

Low latency

Response time <200ms

Privacy security protected

Local processing of raw audio with no buffering or cloud compute

Ultra-low power consumption

less than 500 microWatt continuous power

Highly configurable

Deploy a wide range of sophisticated audio processing applications

Specifications

HW specifications

Circuit	Synchronous digital circuit	Output channels	8
Input	Single-channel differential analog audio	Process	40 nm
Input range	0.1-112 mV RMS	LIF Spiking Neurons	1008

Application specifications

Sensitivity	>99% at 10dB SNR; 83% at 0dB SNR
Total inference power	<500 microWatt
Median latency	<200ms



Real-time audio scene analysis with Xylo™ Audio

Application overview

Xylo™ Audio is an ultra-low-power audio processing platform, based on the Xylo™ neuromorphic inference core. The Xylo™ family supports real-time continuous environmental monitoring, from audio, vibration, motion sensors, bio-signals and more. Xylo™ enables ambient intelligence for consumer devices, providing edge perception and edge computing in energy-constrained environments.

Xylo™ Audio can detect and classify the ambient acoustic environment in real time, with sub-milliWatt power consumption and low latency.

Use Xylo™ Audio's ambient intelligence to tune the noise rejection approach for consumer audio devices such as portable headsets and hearing aids.

Key benefits

Cost effective

Lowered cost of up to 10 times

Privacy security protected

Local processing of raw audio with no buffering or cloud compute

Ultra-low power consumption

300 microWatt inference power

Highly configurable

Deploy a wide range of sophisticated SNN audio processing applications

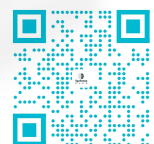
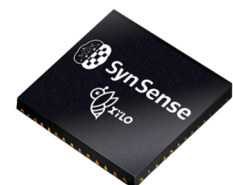
Specifications

HW specifications

Circuit	Synchronous digital circuit
Input	Single-channel differential analog audio
Input range	0.1-112 mV RMS
Output channels	8
Process	40 nm
LIF Spiking Neurons	1008

Application specifications

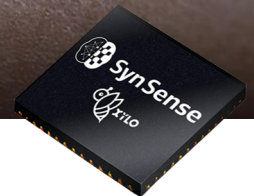
Accuracy	98%
Total inference power	312 microWatt
Median latency	100ms



 sales@synsense.ai

 www.synsense.ai

Human movement and action classification with Xylo™ IMU



Application overview

Xylo™ IMU is an ultra-low-power motion processing platform, based on the Xylo™ neuromorphic inference core. The Xylo™ family supports real-time continuous environmental monitoring, from audio, vibration, motion sensors, bio-signals and more. Xylo™ enables ambient intelligence for consumer devices, providing edge perception and edge computing in energy-constrained environments.

Xylo™ IMU can detect and classify human, animal and other motion signals in real time, with sub-milliWatt power consumption and low latency.

Use Xylo™ IMU to provide ultra-low-power responsiveness to user motion-based interaction. Build movement-response applications, and monitor human motion for health.

Specific application scenarios

Smart consumer devices

Human behaviour monitoring for smart watches, smart clothing

Key benefits

Cost effective

Lowered cost of up to 10 times

Privacy security protected

Local processing of movement data, with no cloud dependency

Ultra-low power consumption

less than 500 microWatt

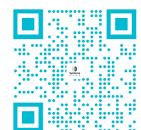
Highly configurable

Deploy a wide range of sophisticated motion processing applications

Specifications

HW specifications

Circuit	Synchronous digital circuit
Input	MEMSIC IMU sensor
Output channels	16
Process	40 nm
LIF Spiking Neurons	512



 sales@synsense.ai

 www.synsense.ai

Sports wearables based on Xylo™ IMU

Example use-cases

- Personalised recognition of human posture and behaviour, based on motion
- Smart, personalised feedback on active sports technique
- Optimized movement and posture training with personalised feedback
- Correction of children's walking posture

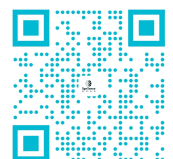
Implementation

Fitness and training equipment

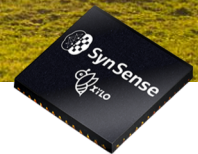
Smart rackets, smart balls, fitness equipment, etc.

Wearable devices

Smart bracelets, sports shoes, orthopedic shoes



Human-Computer Interaction devices based on Xylo™ IMU



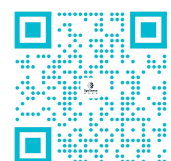
Example use-cases



- Vibration / tactile interaction for smart watches. By tapping the shell of the smart watch, you can send commands. Control the playback of music without activating the watch or phone screen.
- Movement-based interaction for wearables. Interact with your AR/VR device by nodding or shaking your head. By picking up or putting down your earphones, you can pause and start the music playback.

Implementation

Smart wearables

Smart earphones, smart watches, smart bracelets, AR/VR headsets and interaction devices



 sales@synsense.ai
 www.synsense.ai

Industrial monitoring devices based on Xylo™ IMU



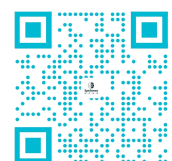
Example use-cases

- Preventative maintenance by detecting imminent failure, continuously at low power
- Vibration-based analysis of machine operation

Implementation

Vibration- and audio-based anomaly detection

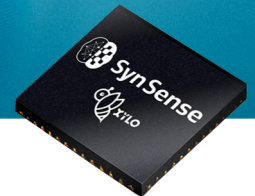
Factory machines, automobiles,
high-speed trains, drones



 sales@synsense.ai

 www.synsense.ai

Real-time analysis of bio-signals with Xylo™



Application overview

Xylo™ is an ultra-low-power processing platform. The Xylo™ family supports real-time continuous environmental monitoring, from audio, vibration, motion sensors, bio-signals and more. Xylo™ enables ambient intelligence for consumer devices, providing edge perception and edge computing in energy-constrained environments.

Efficient monitoring of High-frequency brain oscillations recorded by EEG has shown to be crucial in epilepsy treatment. Xylo™ can reliably detect these patterns in EEG signal in real time, with sub-milliWatt power consumption and low latency.

Xylo™ meets the requirements to be integrated in a monitoring system inside an operation room and can also be integrated in a wearable device for continuous monitoring of epilepsy patients.

Xylo™ is a compact and low-power solution for long-term bio-signal monitoring. The detection of anomalies and patterns in EEG can be used in clinical neuroscience to enhance patients' quality of life.

Specific application scenarios

Long-term EEG monitoring

Anomaly detection

Key benefits

Cost effective

Lowered cost of up to 10 times

Ultra-low power consumption

270 microWatt inference power

Privacy security protected

Local processing of raw audio with no buffering or cloud compute

Highly configurable

Deploy a wide range of sophisticated SNN audio processing applications

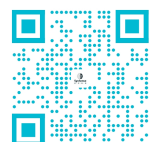
Specifications

HW specifications

Circuit	Synchronous digital circuit
Output channels	8
LIF Spiking Neurons	1008

Application specifications

Total inference power	270 microWatt
-----------------------	---------------



 sales@synsense.ai

 www.synsense.ai



Make Intelligence Smarter