POLYN TECHNOLOGY
NEUROMORPHIC ANALOG SIGNAL PROCESSING

PRODUCT BRIEF

NeuroSense

NeuroSense is a Tiny AI chip that processes heart rate measurements and other sensor raw data, while consuming 100 times less power and ensuring much higher accuracy than other solutions in the market.

NeuroSense is based on POLYN's Neuromorphic Analog Signal Processor (NASP).

NeuroSense provides a comprehensive solution, allowing neuromorphic processing of pulse measurements with high accuracy for both zero motion and active movement states.

NeuroSense is a true Tiny edge AI device that applies neuromorphic computations on-device and performs properly even without cloud connectivity.

PRODUCT HIGHLIGHTS

- Ultra-low power consumption: below 100 µW
- High accuracy
- Works perfectly at 25 Hz
- Small IC footprint: 8x8 mm
- Support for cloudless operation

NASP NEUROSENSE — TINY-AI CHIP FOR WEARABLES:

- Replaces the sensor MCU
- Significantly reduces power consumption
- Boosts accuracy of heart rate measurements
- Supports human activity recognition
- Supports full flexibility on the application level

APPLICATION — WEARABLES

A typical wearable device, based on the traditional system design with a sensor MCU and always-on HR monitoring, has less than 24 hours of operating time for the battery charge cycle. For smartwatches, fitness trackers and health monitoring wristbands NeuroSense significantly extends the device battery operating time thanks to the NASP inside the sensor processing unit.

NeuroSense is designed for sensor applications such as PPG and IMU and allows an application extension for other wearable sensors.

NeuroSense doubles HR measurement accuracy by removing noise factors. NeuroSense employs a new method of human activity recognition — the digital matrices generated by the NASP neuro core from the IMU sensor data flow — providing high recognition accuracy of 94%.

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PRODUCT DESCRIPTION

Features

- Contains NASP — Neuromorphic Analog Signal Processor
- On-chip neural network inference solution
- Acts as PPG and IMU data processing unit
- Pass-through PPG AFE and IMU raw data if needed
- On-chip processor is RISC-V with the lowest power overhead
- High-speed serial chip-to-chip interconnect
- Receiving data every 1 sec
- Power consumption 110 µW

Operation

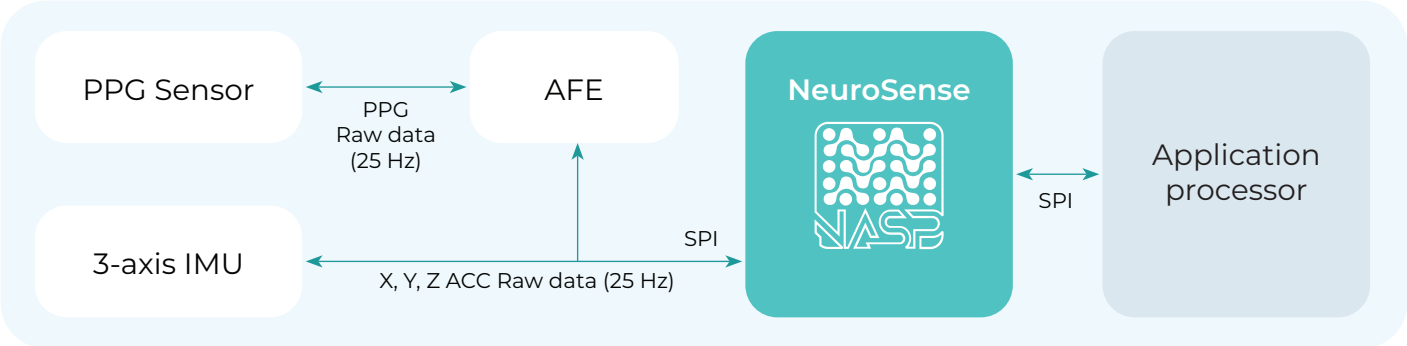
- Collects data from PPG AFE and IMU
- NASP provides the highest accuracy even using a simple and affordable PPG sensor
- LED1 and LED2 — LED1/LED2 light reflected from a human hand
- ALED1 and ALED2 — ambient light registered right after a certain LED
- X, Y, Z acceleration values

Output parameters

- Heart rate — 1 parameter
- Heart rate confidence interval — 1 parameter
- Human activity descriptor — array of 16 parameters
- Human activity class — 1 parameter

Interface

- To AFE, IMU sensors: SPI
- To main CPU: SPI



NeuroSense integration block diagram

ORDERING OPTIONS

Product Name	Product Description
NeuroSense NS150-01	PPG and IMU data processing unit for wearables, personal health monitoring
NeuroSense NS150-02	PPG, IMU, impedance, EDA, temperature. Customization with additional parameters: arrhythmia signs detection, sleep tracking, stress monitoring, emotion monitoring, oxygen saturation level