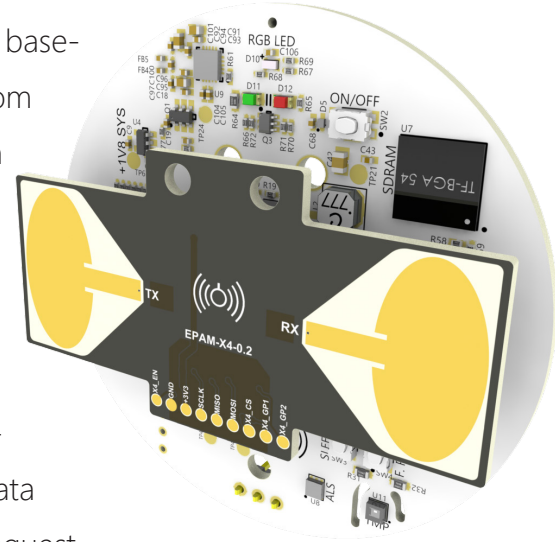## Overview

The SLMX4 Health Module is a 2-piece hardware set consisting of the base-board (SLMX4-Base) which utilizes the i.MX RT1060 crossover MCU from NXP and the elliptical patch antenna module (EPAM) that is equipped with Novelda's X4 UWB Radar. This combination means the Health Module is capable of applications including, but not limited to, occupancy, prox-imity, respiration, and embedded machine learning. The Health Mod-ule also boasts large data storage accessible via micro SD card. Furthermore, the Health Module features optional configurations to in-clude WIFI+Bluetooth capabilities and additional sensors that collect data such as room temperature, humidity, and illuminance at the customer's request.

Sensing Capabilities

Sensing Metrics
- Presence Detection
- Respiration (±1 RPM)
- Target Distance (±10cm)

Range
- Up to 10 meters

Optional Peripheral Sensors
- Ambient Light
- Temperature
- Humidity

Communication Interfaces
- USB
- WiFi
- BLE

Hardware

X4 SoC Transceiver
- Impulse Radar
- CF = 7.29 GHz
- BW = 1.4 GHz
- Integrated Planar Patch Antenna Pair

NXP i.MX RT1060 Cortex-M7 MCU
- 1284 DMIPS @ 600 MHz
- 1MB On-Chip SRAM

Memory Options
- 16 MB Flash
- 8 MB SDRAM
- uSD Card Slot
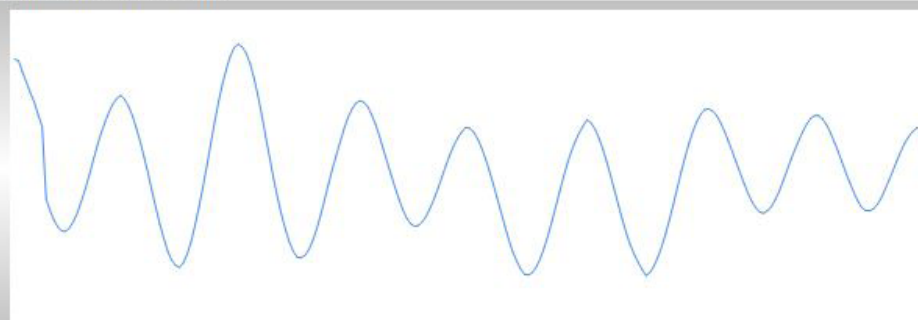
Visual Indicators
- Three user-controlled LEDs (1 RGB)

Health Firmware:

- Presence and distance to a human target
- Respiration within ± RPM, out to 5 meters.
- Fast and Slow Movement Indicator
- *Health Message* via USB or Wi-Fi
- Client-side GUI

Radar Firmware:

- MATLAB / Python Client Connector
- RF data sampled at 23.328 GS/s
- In-Phase/Quadrataure (IQ) downsampled data
- User control of all radar register perameters

Respiration Waveform:

Health:

Frame Counter:	685	Presence Detected:	1
		Distance:	0.91
Humidity:	1.55	Distance Signal Quality:	10
Temperature:	0.06	Movement Detected:	0
Lux:	473.74	Movement Type:	None
SPL:	-	Respiration Detected:	1
RMS:	0.59	Respiration Signal Quality:	10
RMS Std (x1000):	21.66	Respiration RPM:	20.5

Data