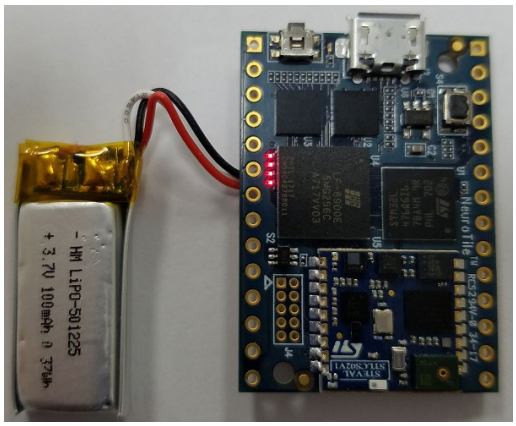
NeuroMem Smart!

NEUROTILE

AI FOR IOT



Unique combination of sensors, microcontroller, FPGA and a NeuroMem® neuromorphic chip in a miniature module perfect for wearable and low-power IoT applications.

The multiplicity of onboard sensors including accelerometer, gyroscope, pressure, and audio allows you to create plenty of imaginative projects for wearable, home and building automation and IOT smart things.

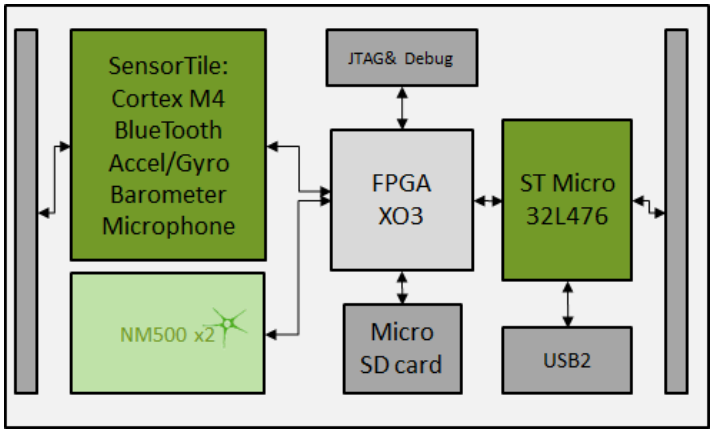
Single or multiple sensor signals can be collected and matched with models stored in the NeuroMem neurons. The NeuroMem network is trainable on-the-go or off-line.

Decision can be taken immediately without any requirement for connectivity and cloud-based software. Bluetooth Low-Energy (BLE) transmission can be triggered when an event of interest is detected. Storage of the data on the SD card can become selective too.

NeuroTile can be programmed using the Arduino IDE or the ST development tools for the STM32. Support external Li-Ion battery to power portable and wearable for rapid prototyping.

Main board

- NeuroMem digital neural network (1152 neurons))
- STM32L476 microcontroller
- Lattice FPGA XO3
- 14 GPIO lines (SPI, I2C and digital lines)
- MicroSD card
- Micro USB
- Battery-charging circuitry
- Up to 800mAh Li-Ion battery



SensorTile

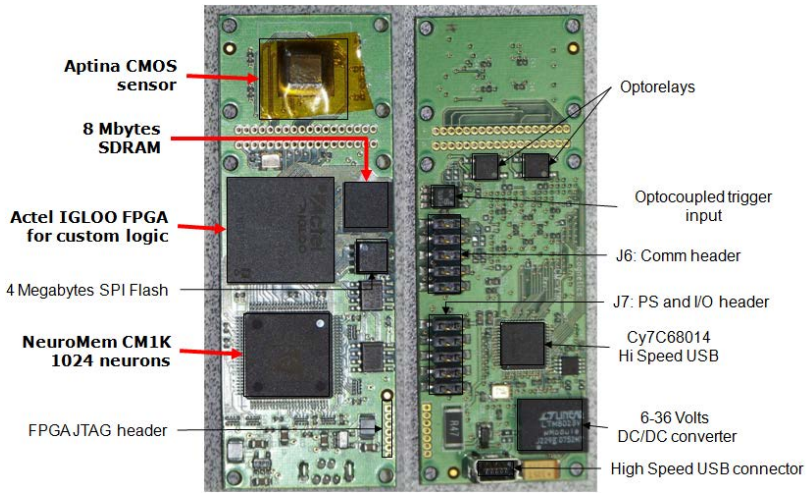
- Bluetooth Low Energy
- 6-axis accelerometer + gyroscope
- 6-axis accelerometer + magnetometer
- Pressure sensor
- Microphone

康普企業有限公司
台北市和平西路二段141 號6 樓之4
Email: CECL@seed.net.tw
http://www.compton.com.tw
Tel: (02) 2314-2018, 2381-7255
Mobile: 0928-812-548

1.1 Hardware Overview 板卡

CogniSight Sensor is an evaluation module for the NeuroMem technology applied to video and image recognition. The board features a CM1K chip with 1024 neurons, a high quality Aptina monochrome video sensor, a reconfigurable Actel Field Programmable Gate Array (FPGA), 8 MB of SDRAM, 4 MB of Flash memory, one high-speed USB2 port, two RS485 ports, 2 opto relays, and one opto-isolated input line.

The CM1K chip can learn and recognize pixel data coming directly from the Micron sensor or previously manipulated in the FPGA to produce a feature vector. In the former case, the feature vector is automatically extracted by the CM1K chip from a region of interest defined by the user. The FPGA can also consolidate and format the response of the neural network for transmission to the outside world. The SRAM is partially used to store the memory frame but can also hold user data.



Aptina MT9V022 video sensor
Monochrome or color, Progressive scan
752x480 pixels at 60 frames per second
Global shutter, Automatic exposure control (AEC), Automatic gain correction (AGC)
External trigger input
I2C sensor control

Lens (default)
60 degrees horizontal field of view angle
M7 (7 mm thread)
Adjustable to 10 mm horizontal Field of view (8 mm distance) to infinity

Cypress USB chip
The Cypress Semiconductor Cypress CY7C68013A_8 USB Microcontroller chip supports the high bandwidth offered by the USB 2.0.

CM1K chip
1024 silicon neurons working in parallel with automatic model generator
Classify vectors of up to 256 bytes, Up to 16382 categories
Radial Basis Function (Restricted Coulomb Energy) or K-Nearest neighbor classifier

FPGA hosting recognition and decision logic
Actel IGLOO FPGA 600 (600,000 gates)

Flash memory
Atmel Flash Memory 2048 pages of 264 bytes. SPI access.

SDRAM
Micron MT48LC8M16A2. Synchronous 8 MB DRAM: 2 Meg x16 x 4 banks

康普企業有限公司
台北市和平西路二段141 號6 樓之4
Email: CECL@seed.net.tw
http://www.compton.com.tw
Tel:(02)2314-2018, 2381-7255
Mobile:0928-812-548