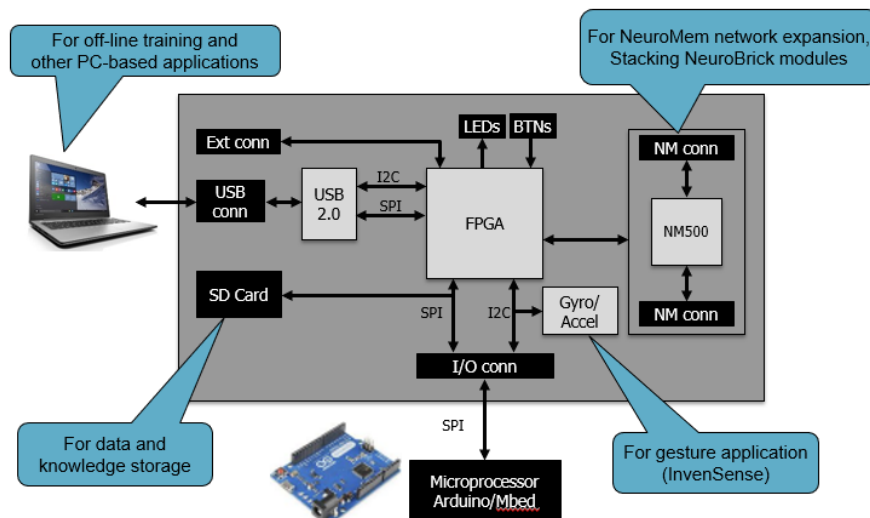


NeuroShield

NeuroShield brings interactive and responsive intelligence to IoT and smart appliances. It is compatible with Arduino and Mbed microcontrollers. In addition to the accelerometer and gyroscope mounted on the board, it can interface to a wealth of other sensors through Arduino Shields and the sensor data can be broadcasted immediately to the NeuroMem neurons of the NeuroShield.



NeuroShield can also be used as a simple USB dongle and empower PC-based applications with access to a NeuroMem network. A typical application can be to train the neurons offline using collected data and validate the accuracy of the recognition on large datasets. The resulting knowledge, which is nothing more than the contents of the committed neurons, can then be saved for backup and distribution to other NeuroShield boards. **NeuroShield and NeuroBrick are products from nepes.**

Contents

Getting started.....	2
Arduino Interface.....	2
Mbed Interface	3
USB interface (windows only).....	3
Expanding the network.....	3
Other SPI interface.....	4

Getting started

NeuroShield is powered through the USB connector or through the pins of the Arduino J1 connector.

Communication with the NeuroShield is made through an SPI protocol is described in the NeuroMem API manual.

- Download the NeuroShield Board Support package at <https://www.general-vision.com/bsp/>
- Documentation: [NeuroShield Hardware Manual](#)
- Choose your preferred interface:
 - Arduino interface
 - Mbed interface
 - Windows USB interface

Arduino Interface

We have tested NeuroShield with the following boards:

- Intel Arduino/Genuino 101
- Arduino/Genuino Uno (limited memory)
- Kocoafab Orange board (limited memory)
- ADAAfruit Metro (limited memory)

Depending on the base board, you may have to use spacers to ensure that the NeuroShield is properly plugged in and powered.

General Vision is offering an Arduino library slightly different from nepes:

- It supports both the NeuroShield and the BrainCard
- It saves datasets and knowledges built by the neurons in formats compatible with the SDKs and Tools from General Vision.

Documentation: [NeuroMem Arduino library](#)



Mbed Interface

Nepes has developed a driver for mbed processor which can be downloaded at <https://github.com/nepes-ai/neuroshield>.

USB interface (windows only)

[NeuroShield Console Manual \(PDF\)](#) and [video tutorial](#)
[NeuroMem API](#)

Additional tools available from General Vision:

[CogniPat SDK](#)

[CogniPat SDK MatLab](#)

[CogniPat SDK LabVIEW](#)

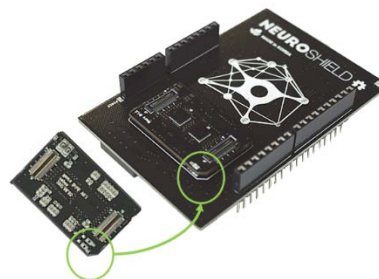
[NeuroMem Knowledge Builder](#)



Expanding the network

The NeuroMem network of the NeuroShield is composed of a single NM500, but it has the provision to be expanded by stacking passive NeuroBrick modules:

NeuroShield	576 neurons
+ 1st NeuroBrick	1728 neurons
+ 2 nd NeuroBrick	2880 neurons
+ 3 rd NeuroBrick	4032 neurons



- Make sure to disconnect the NeuroShield from its power supply before plugging a NeuroBrick module
- Make sure to align the cut corner of the NeuroBrick with the same marking on the NeuroShield
- The Connect function of the API automatically detects the size of the NeuroMem network and returns its value through the GetNetworkInfo function

Other SPI interface

NeuroShield can be interfaced to any device supporting an SPI interface.

The simple 10-bytes protocol to communicate with the neurons is described in https://www.general-vision.com/documentation/TM_NeuroMem_Smart_protocol.pdf.

Example source code can be retrieved from the Board Support Package:

- Arduino\Libraries\Src\NeuroMemSPI.cpp
- USB\NeuroMemAPI\lib\comm_neuroshield
- Python ex\NeuroShield.py

The NeuroShield settings are:

- SPI Speed 2Mhz
- MSBFirst
- SPI_Mode0

Mode	Clock Polarity (CPOL)	Clock Phase (CPHA)	Output Edge	Data Capture
SPI_MODE0	0	0	Falling	Rising
SPI_MODE1	0	1	Rising	Falling
SPI_MODE2	1	0	Rising	Falling
SPI_MODE3	1	1	Falling	Rising