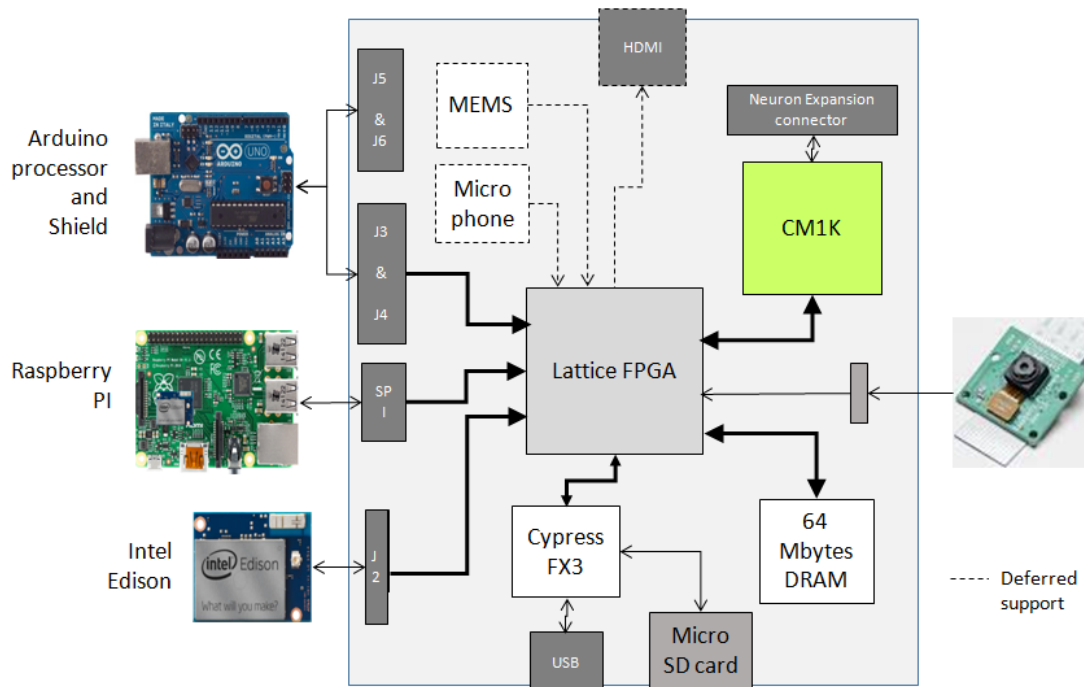


The BrainCard can bring interactive and responsive intelligence to IoT and smart appliances thanks to its trainable neuromorphic chip. It can interface to a wealth of sensors and actuators through Arduino Shields and the sensor data collected on the processor board can be broadcasted to the neurons for real-time learning or recognition.



### What can I do with the Braincard?

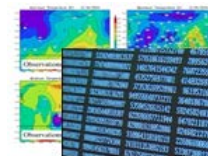
- Actuate, transmit or record when something of interest occurs;
- Monitor signal input continuously and send an alarm in case of anomaly or novelty;
- Learn examples in real-time using push-button, touch screens, or else;
- Perform data analytics on-board at high-speed and low-power;



Face recognition, motion detection, target tracking...



Audio recognition, Bio-signal analytics, Vibration monitoring,...



And any other data analytics such as text, packets, dna sequences,...

## SPECIFICATIONS

### CONNECTIVITY

- Connect to [Arduino](#) controller or Arduino Shield. Only supports Arduino boards with 3.3v IOs.
- Connect to a [Raspberry Pi](#) module through a dedicated SPI connector
- Connect to the [Intel® Edison](#) module through dedicated connector on the back of the BrainCard

### INTELLIGENCE

- The neurons of the CM1K can store up to 1024 models classified into up to 1024 different categories
- Learning is performed in real-time by sending a category value after the broadcast of a new pattern. The neurons will decide autonomously to store this new pattern as a model if it represents novelty compared to the existing stored models.
- Recognition is performed in real-time by reading the category value(s) returned by the neurons, if applicable, after the broadcast of a new pattern. Depending on your application, recognition can be limited to a positive detection, or the identification of the closest match, or the list of all the firing matches with their confidence levels.
- Knowledge base built by the neurons can be saved and restored
- Expansion connector to stack additional pairs of CM1K (totaling up to 9,216 neurons)

### OTHER

- [RaspiCam](#) video signal sent directly to the video recognition stage of the CM1K chip, or acquired through the FPGA for multiple feature extractions, multiple region processing and more
- Provision for the display of the video or else through a Mini HDMI connector
- Provision for support of 9-axis inertial MEMS and Audio MEMS
- Configurable FPGA to run different type of recognition engine such as monitoring a fixed region in a video frame, reporting abnormal variations in a slice of signal, etc
- SD card to store the knowledge built by the neurons. This SD card is also used as a boot sector to load a configuration file of the FPGA.
- Power supply through the USB port or the Arduino power connectors

### API

- Example monitoring live video acquired through the RaspiCam and reporting recognized objects (similar to the [recognition of flashcard as seen on our web site](#))
- Example using the Inertial Module Unit of the Arduino 101 ([similar to preliminary demo as seen on our web site](#))
- Academic example using patterns generated on the controller board and illustrating how the neurons behave ([similar to the programming tutorial as seen on our web site](#)).