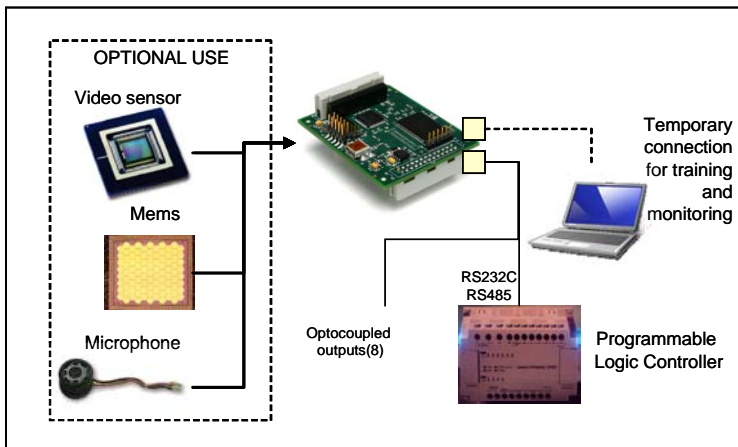


The CogniMem Evaluation Base board (CM-EB) offers developers and OEMs a comprehensive platform to evaluate the CogniMem neural network technology for the real-time recognition of data coming from sensors, instruments, or else. Typical applications include machine vision, face recognition, voice and signal recognition, but also data mining.

The board features 2 CogniMem chips, each with 1024 neurons, an Actel FPGA accessible to programmers and a digital input bus for easy connectivity to external sensors. User I/O lines include an I2C serial bus, an RS232 bus and 8 uncommitted general purpose I/Os brought to header pins.

The CogniMem neural network implements two powerful non-linear classifiers (RCE and KNN) in a natively parallel architecture. The tremendous benefit of this architecture is a recognition cycle which remains under 11 us whether the entire network is composed of 1, 2 or more chips. Brute computational power is equivalent to 80 gig operations/second @ 27 MHz for one chip, twice as many for two chips, etc. If the real-time recognition engine built into CogniMem is running, the data received on the digital input bus is automatically broadcasted to the neurons and the response of the neuron with the best match is available within less than 11 microseconds after the feed of the last data and directed to the general purpose I/Os of the board.



The CogniMem neurons build their knowledge by learning example vectors and their associated category. This can be done in real-time or a pre-existing knowledge can be loaded in advance from file or Flash memory.

Applications

Research

- High-speed pattern recognition
- Data modeling
- Biometrics
- Bioinformatics
- Predictive maintenance

Real time

- Adaptive control
- Signal recognition
- Image recognition
- Industrial process
- Consumer electronics

More...



Specifications

Neural network

- ✓ Classify pattern vectors of up to 256 bytes
- ✓ Up to 32768 categories
- ✓ Classification status in 1 clock cycle (status= identified, uncertain or unknown)
- ✓ Category readout in 36 clock cycles per firing neuron from smallest distance and up (equiv to 3 microsec at 27 Mhz)
- ✓ Radial Basis Function or K-Nearest neighbor classifier
- ✓ Automatic model generator
- ✓ 2048 neurons working in parallel (2 CM1K chips)
- ✓ Expandable through neuron expansion modules

High-speed recognition engine

- ✓ 16-bit digital input bus
- ✓ input clock signal (up to 27 Mhz) and vector valid signal
- ✓ Output category with the best match 3 us after receipt of the last vector data
- ✓ In case of video input:
 - ✓ line valid input signal
 - ✓ region of interest as small as 16x16 pixels and as large as a full frame
- ✓ Built-in signature extraction
- ✓ Connector compatible with Aptina sensor demo board

I/O buses

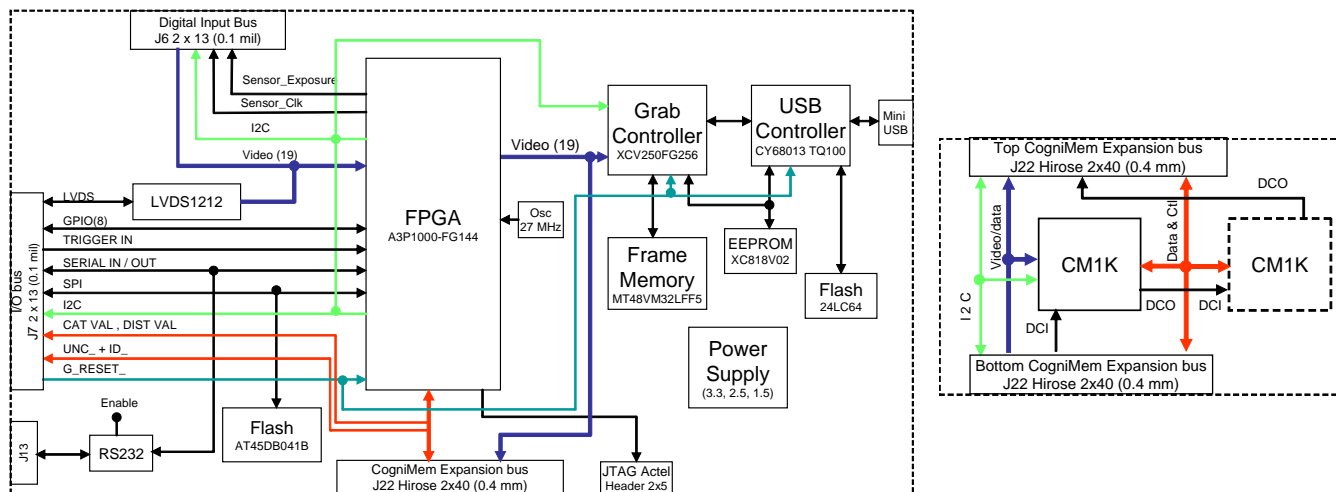
- ✓ Miniature USB Hi Speed (480 Mbps)
- ✓ I2C serial interface (100-400 kbit)
- ✓ Serial output (115,200 baud)
- ✓ 8 parallel outputs (LVTTTL 16mA)
- ✓ Save project to Flash memory for autonomous power up

FPGA

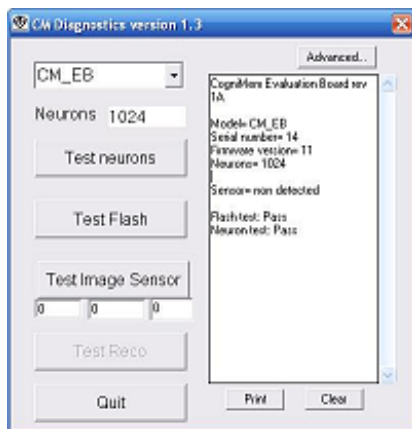
- ✓ Optional core modules (input and output data conditioning, signature extraction, decision logic, etc)

Mechanical and Electrical

- ✓ 3.3v @ <250 mA
- ✓ 55 x 65 mm



The Diagnostics utility tests the components of the board and allows register level access.



Ordering information

- CM-EB, includes
 - one CM-EMB2K module,
 - CogniMem development library
 - Easy Video Trainer software
- Optional stackable CM-EMB2K modules with 1024 or 2048 neurons

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