LIVE OBJECT LEARNING AND RECOGNITION

Powered by ArduCam and a NeuroMem network

Applications

Learning and Monitoring of a fixed region

Including the detection of novelties

- Inspect a part passing on a conveyor

- Detect if someone is coming towards a door

- Ring alarm if a raccoon comes through the cat door

- Etc.

Requirements

- Arduino microcontroller board with at least 5 KB memory

- ArduCam Shield V2 featuring
  - Color low-res CMOS sensor
  - LCD display

- NeuroMem neurons from a variety of boards:
  - Arduino/Genuino 101 (128 neurons)
  - NeuroShield shield (576 neurons) (** wiring required, see last page)

- SD card (optional)
  - To load an initial canned knowledge at startup
  - To load/save knowledge created by user in real-time
  - To export to General Vision Knowledge Builder software and applications developped with General Vision SDK
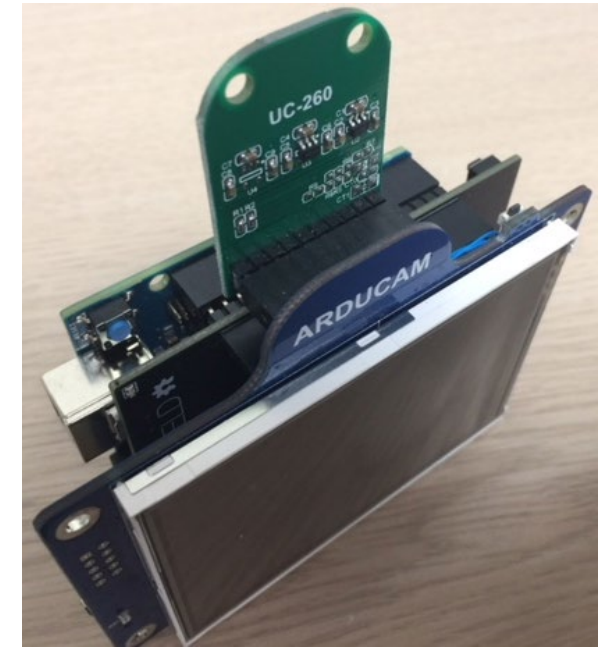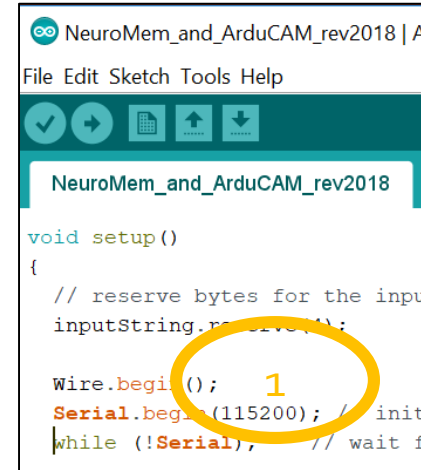
Arduino IDE Installation

1. Requirements: Arduino IDE (you can download the latest version at https://www.arduino.cc/en/Main/Software

2. Select your Arduino board under Tools\Board menu. If not in the list, select Board Manager and install its driver

3. Load the File\Examples\Basic\Blink script

4. Upload the script to your board

5. Verify that the LED of the microcontroller board is blinking
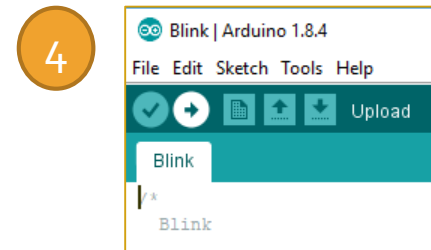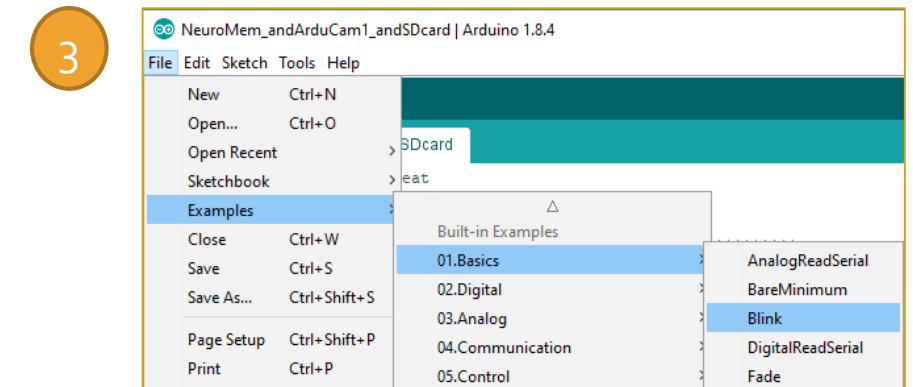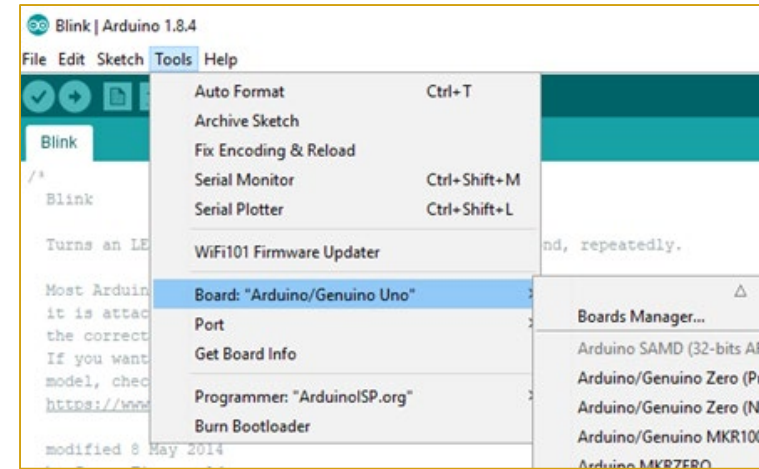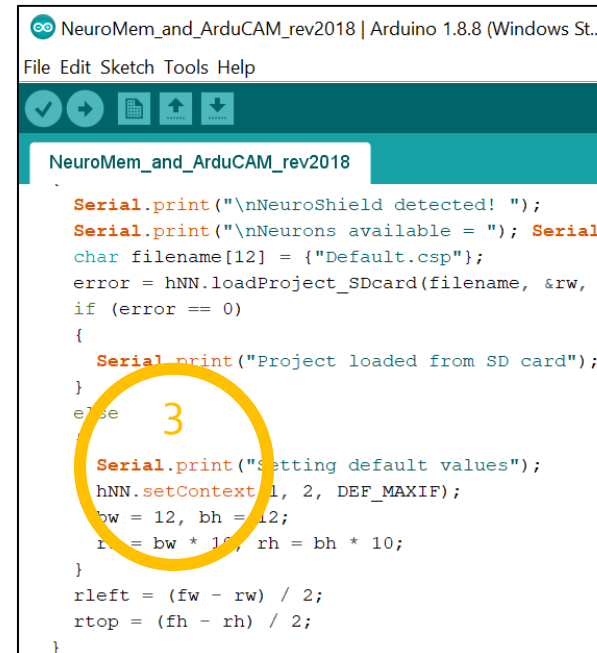
Configure the script

1. Adjust the correct baud rate for the serial monitor

2. Select the correct NeuroMem platform by commenting out its library

3. Set your preferred default settings for the project if no project file is found on the SD card
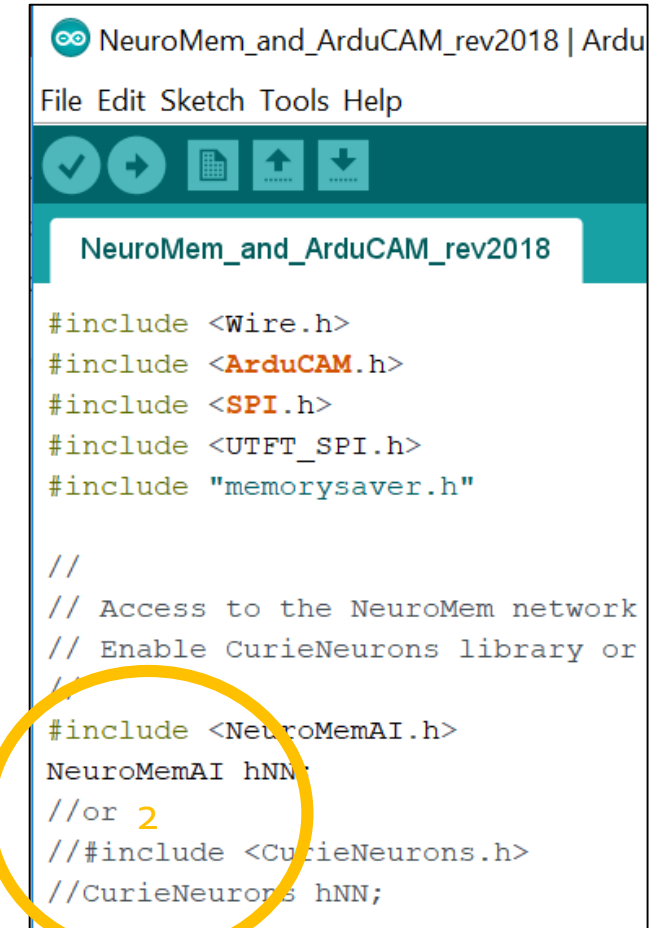
General Vision Inc.

Launch the script

- Open the serial monitor

- Live video appears at the end of the setup

- The blinking rectangle at the center of the screen is the region being taught or monitored

- The result of the recognition is displayed in upper left corner

- Type "h" to view the HELP menu
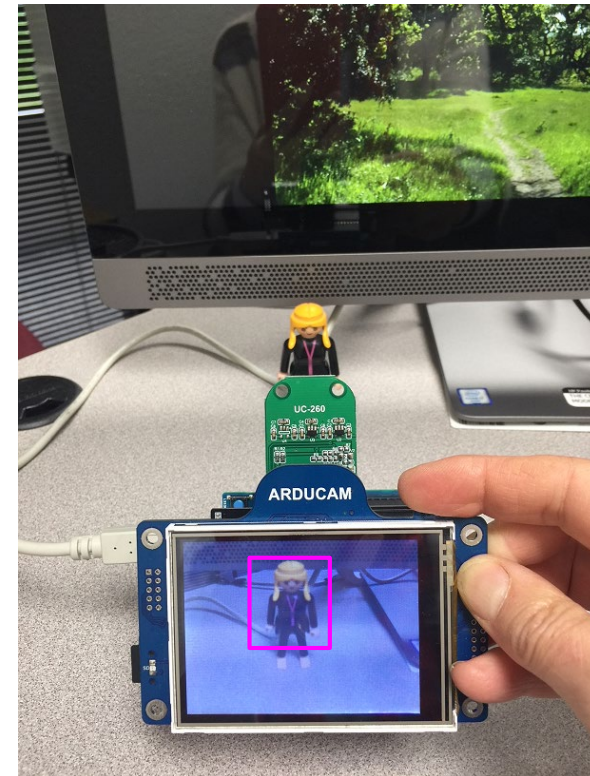
Learn a 1st object

- Enter the category number to learn (between 1 and 9)

- Move camera so the object appears within the rectangle

- Press the shutter button until blink stops

- Bottom line reports the number of committed neurons

- Upper line displays the recognized category
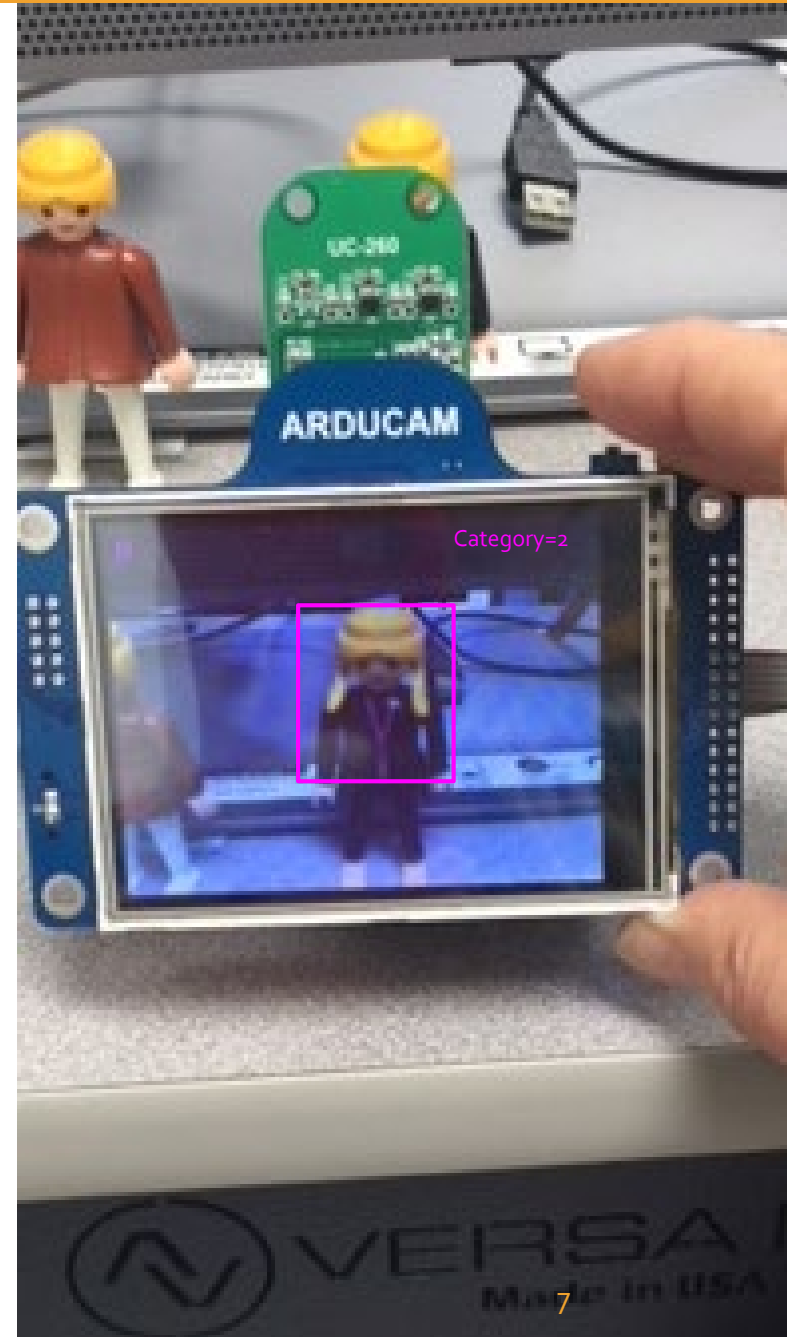
More training

Learn a 2nd object

- Enter a new category number (>0) to learn a different object

- Move camera so the object appears within the rectangle

- Press the shutter button until blink stops

Correct false positive

- Enter the category number 0

- Move camera where an incorrect category is report

- Press the shutter button until blink stops

Option to build a knowledge of novelties

- Enable the learning of novelties by typing "rn"

- All "Unknown" are submitted to the neurons for learning under in a different context #2.

- Save the knowledge by typing "skn"

- Review the knowledge at later time with Image Knowledge builder or applications developed with the CogniSight SDK

- Decide if the models retained by the neurons under context #2 should be assigned to existing or new categories

What is next ?

- Design UI allowing category selection on the touch screen

- Improve UI to better synchronize the teaching instruction to the real-time image acquisition

- And more....
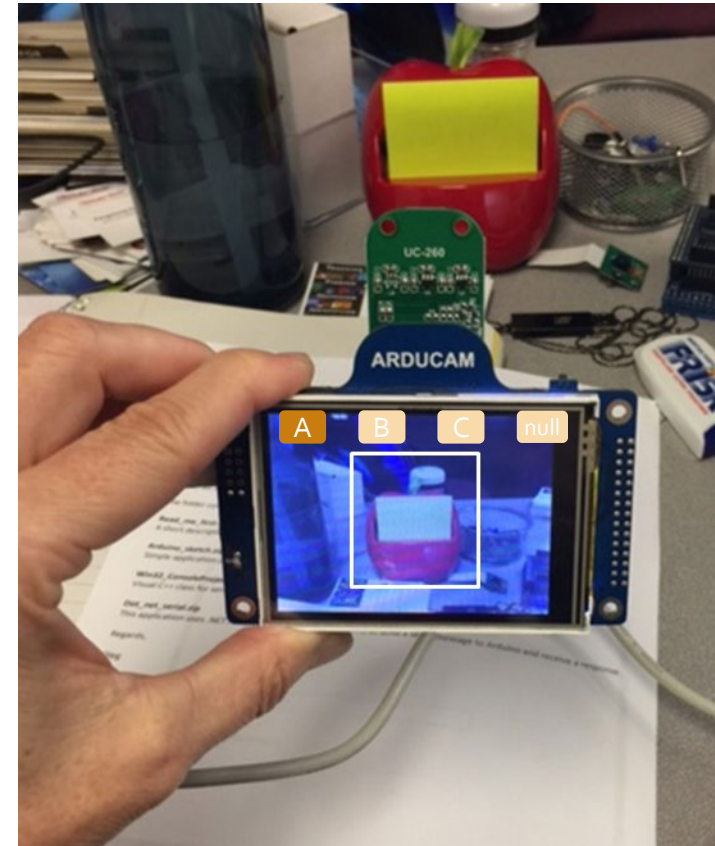
Connecting ArduCAM SPI on NeuroShield
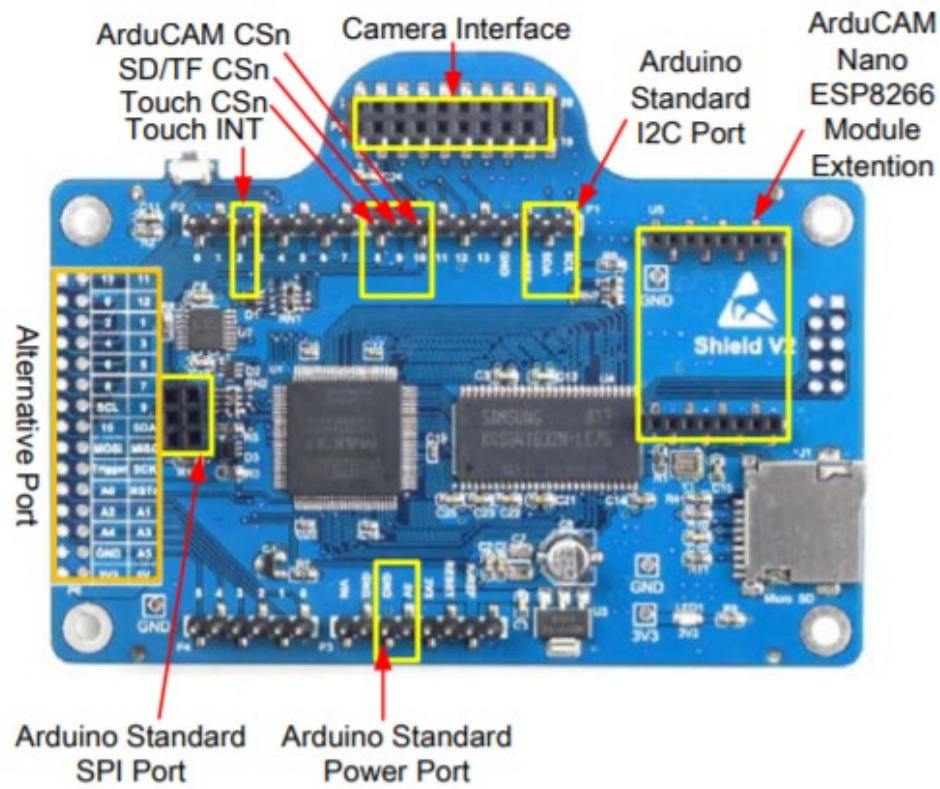
- The NeuroShield does not pass-thru the lines of the ICSP 6-pin connector

- You need to bring the lines SPI_CLK, MISO, MOSI, from the ICSP of the Arduino board to the ICSP connector of the shield or to the lines 11, 12 and 13 to the J2 or Alternative port of the shield

ICSP

J2