Artificial and robotic vision

Spring 2013

e-Lab

Eugenio Culurciello

Artificial and robotic vision

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Lecture 1: introduction

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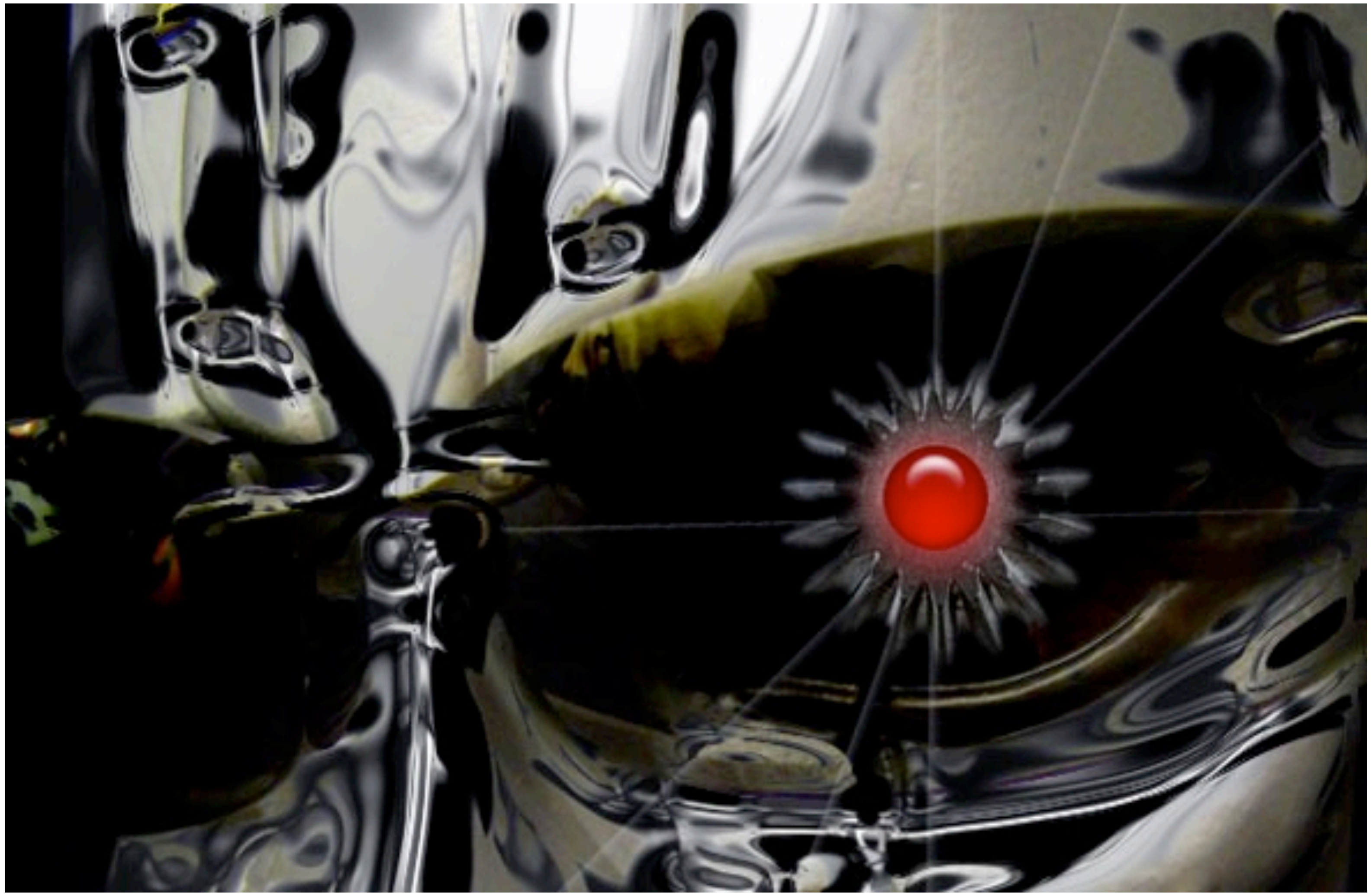
robot vision



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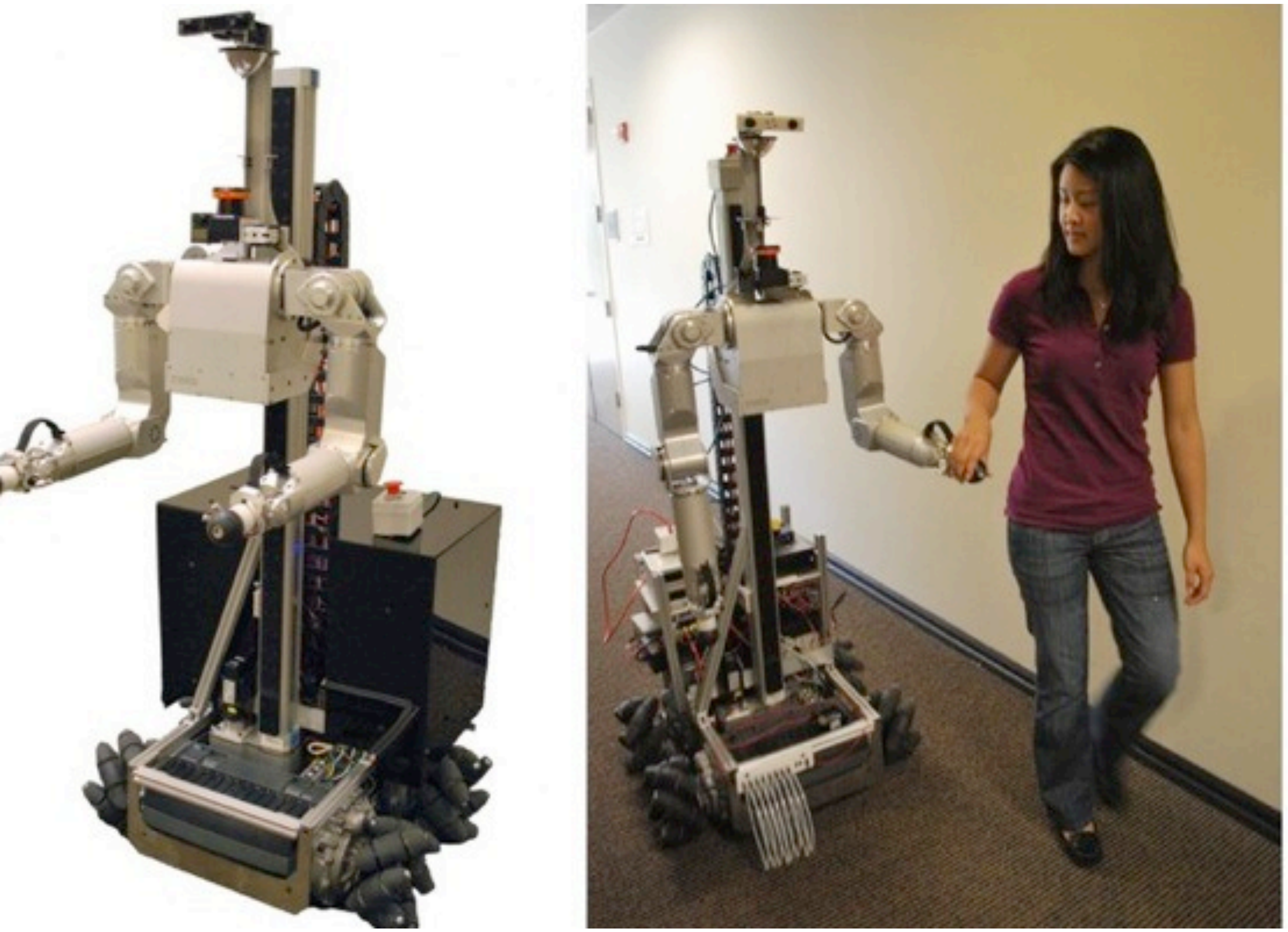
impact: robot vision

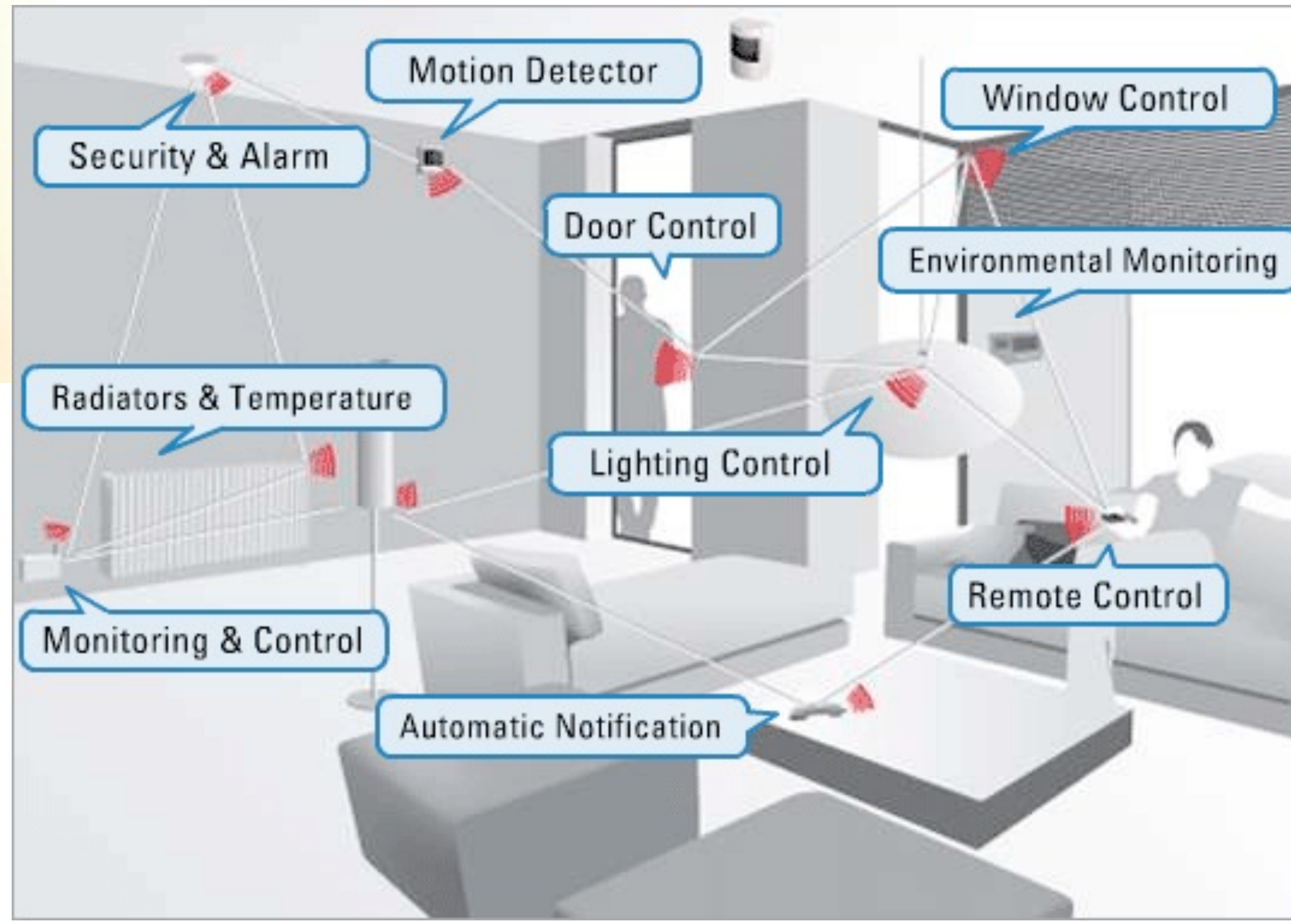


healthcare robot helpers, GATech

honda asimo

impact: smart environments

smart fridge by Frigidaire



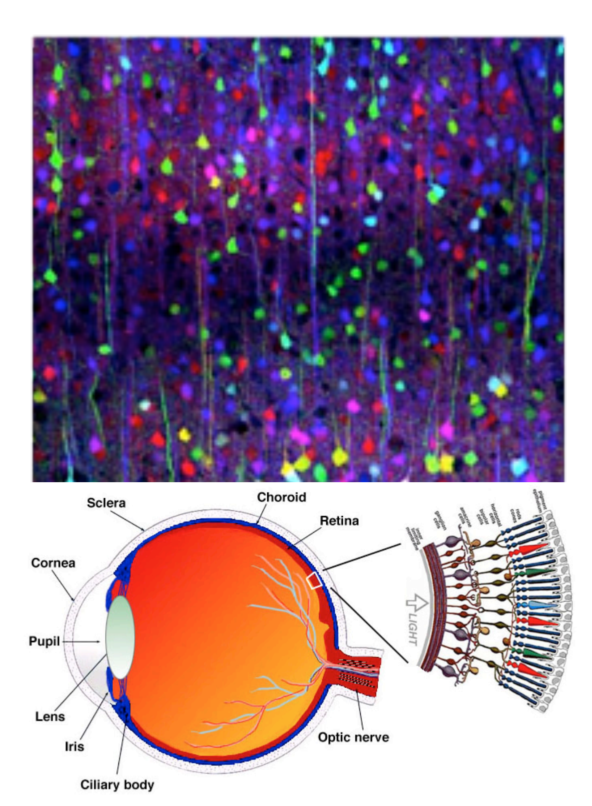
smart home

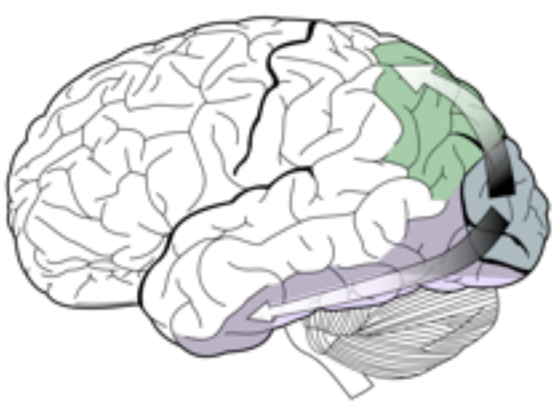
robot vision

“Minority Report”

BAE systems concept

about this course





```
begin
    make QUEUE empty;
    for j ⟵ 0 until m − 1 do make Q[j] empty;
    for l ⟵ l_max step −1 until 1 do
        begin
            concatenate LENGTH[l] to the beginning of QUEUE;
            while QUEUE not empty do
                begin
                    let A_i be the first string on QUEUE;
                    move A_i from QUEUE to bucket Q[A_ij]
                end;
            for each j on NONEMPTY[l] do
                begin
                    concatenate contents of Q[j] to the end of QUEUE
                    make Q[j] empty
                end
        end
end
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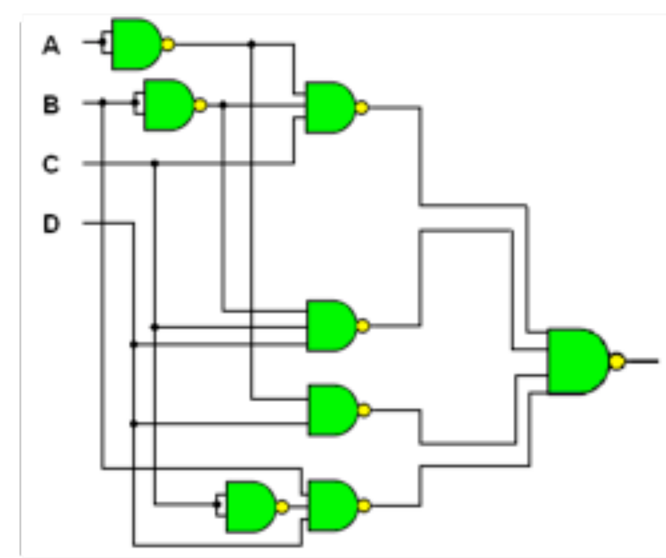

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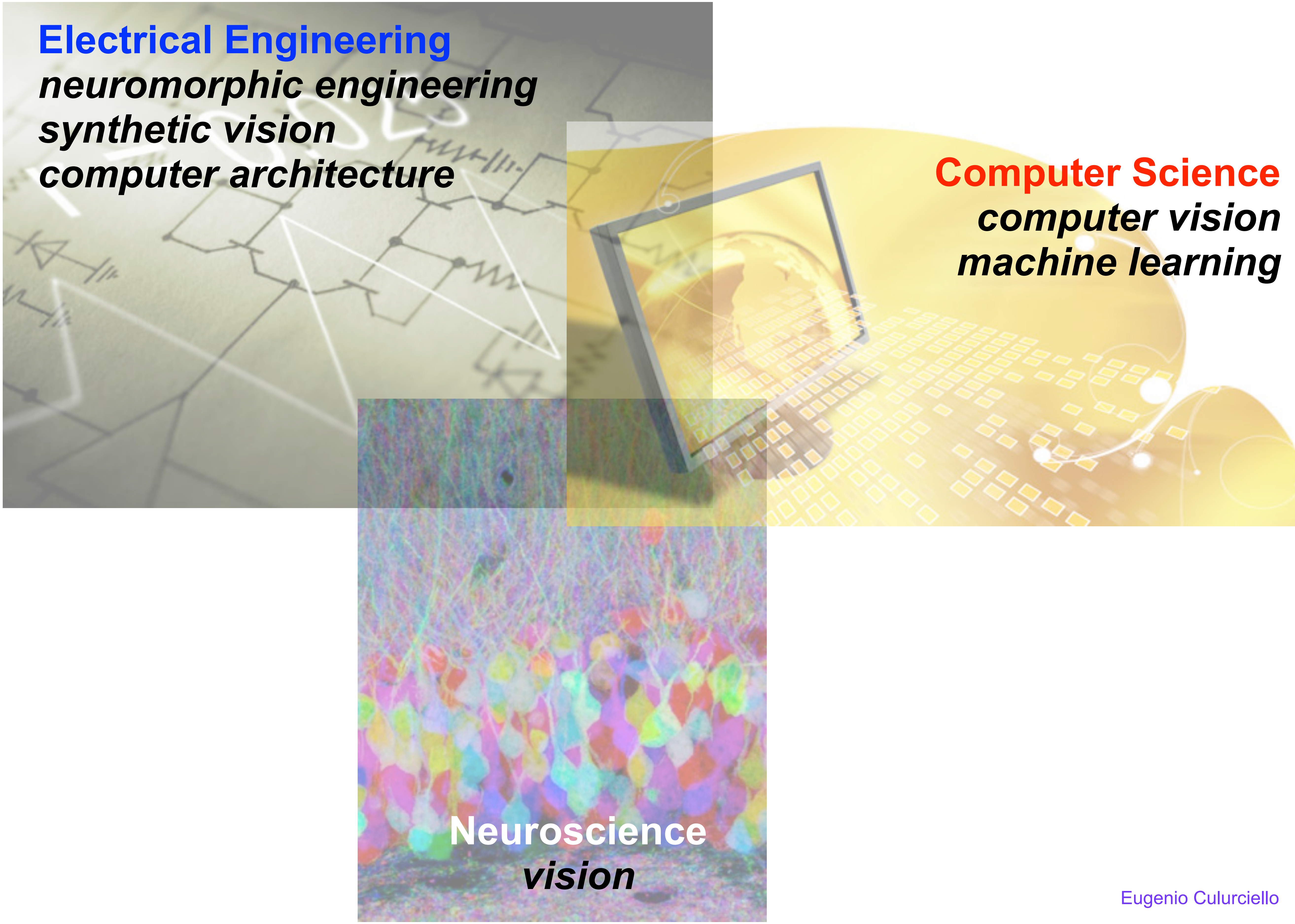

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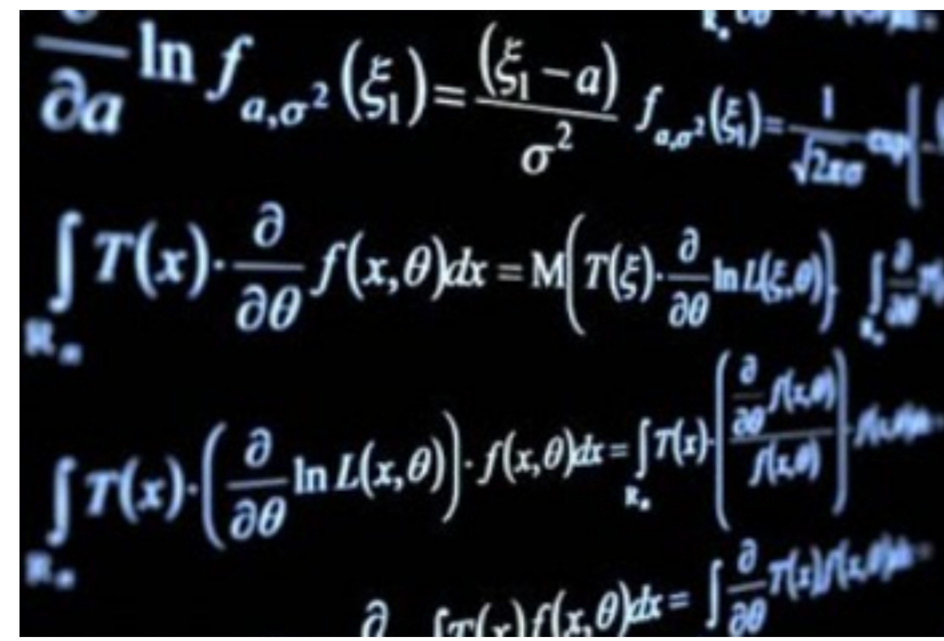
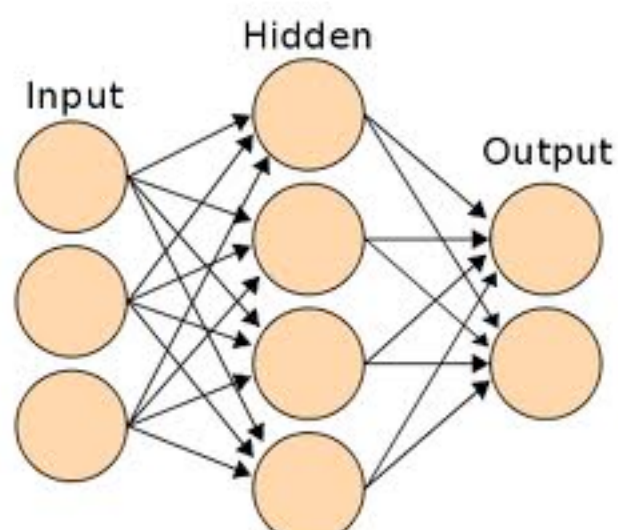
about this course

bio-inspired vision



applied mathematics



neural networks

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vision is hard

because it needs to explain the world we live in

http://karpathy.ca/

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vision is hard

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

PROJECT MAC

Artificial Intelligence Group July 7, 1966
Vision Memo. No. 100.

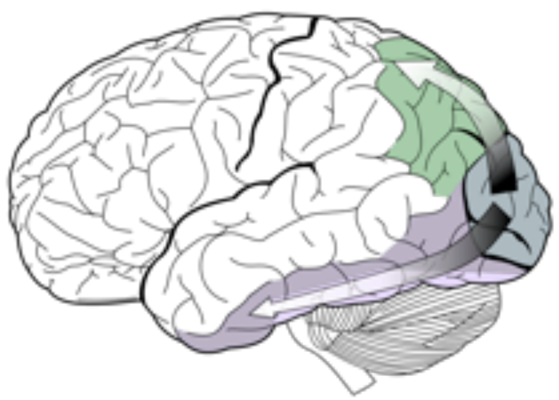
THE SUMMER VISION PROJECT

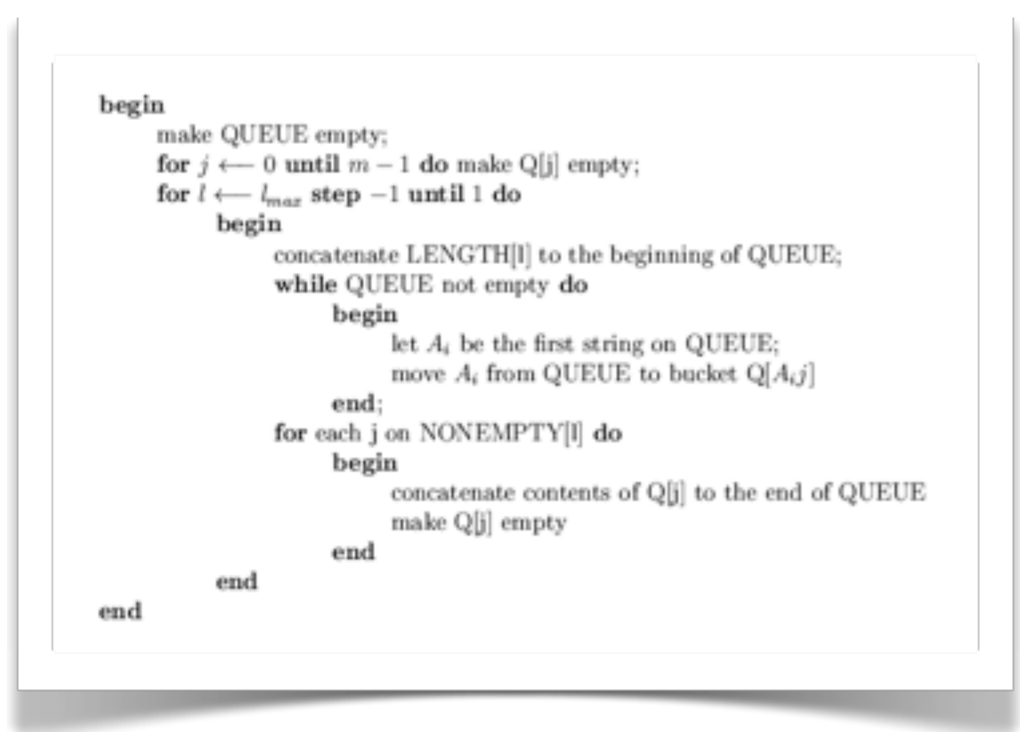
Seymour Papert

The summer vision project is an attempt to use our summer workers effectively in the construction of a significant part of a visual system. The particular task was chosen partly because it can be segmented into sub-problems which will allow individuals to work independently and yet participate in the construction of a system complex enough to be a real landmark in the development of "pattern recognition".

vision is hard

and explain our intelligence





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```

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Visual Intelligence Definition:

“being able to track targets of interests while they are on the scene, keep targets in memory if they disappear, recognize them when they re-appear”

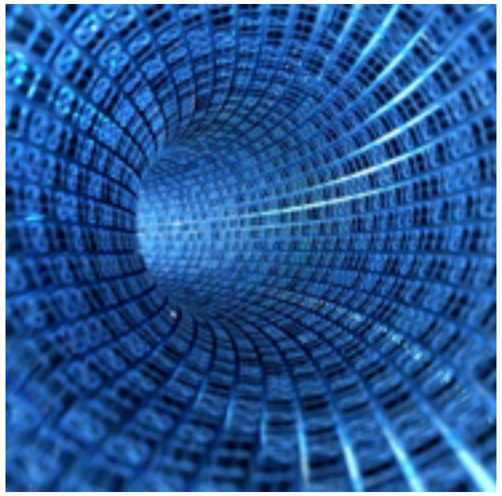
Targets: objects or parts of the scene

Scene: environment perceived by the visual system

Memory: a list of targets and their identifying features

how can we tackle this problem?

- large data sets



labeled!

- machine learning

- cheap and powerful computers

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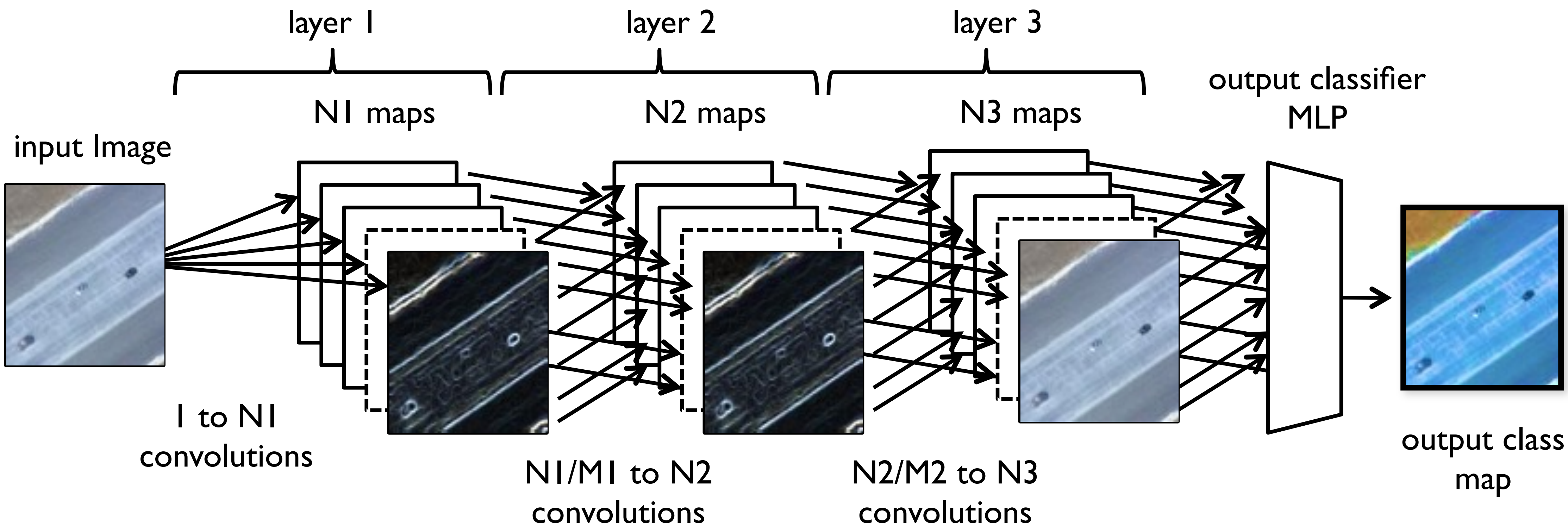
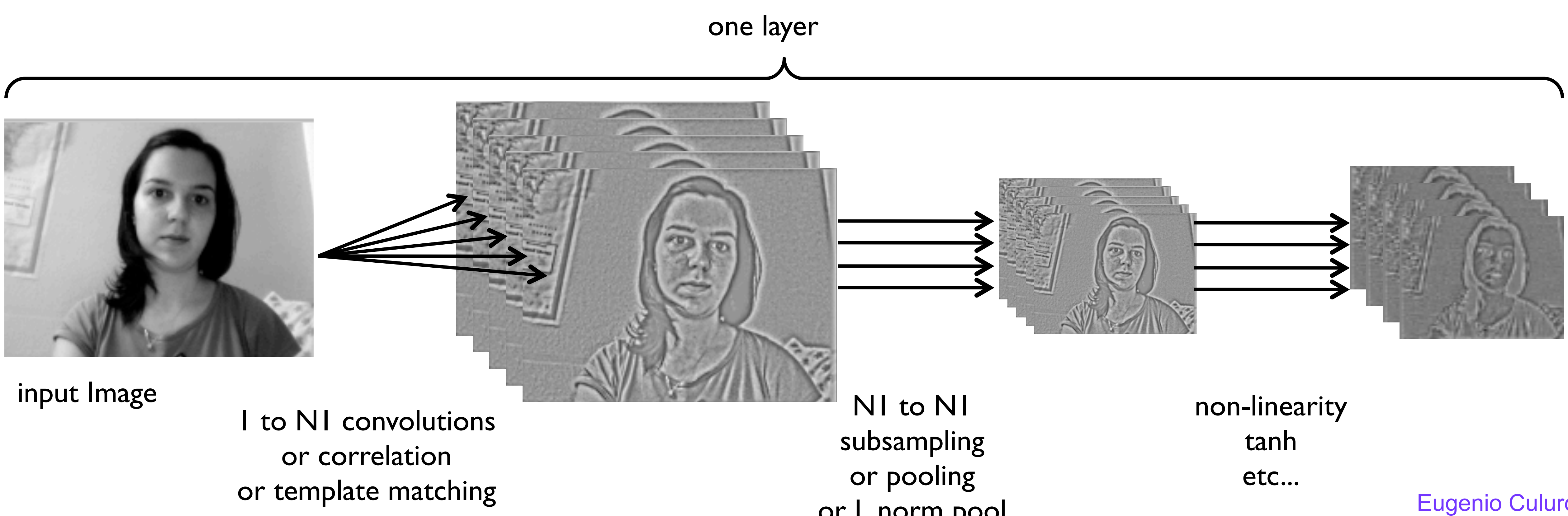
deep networks





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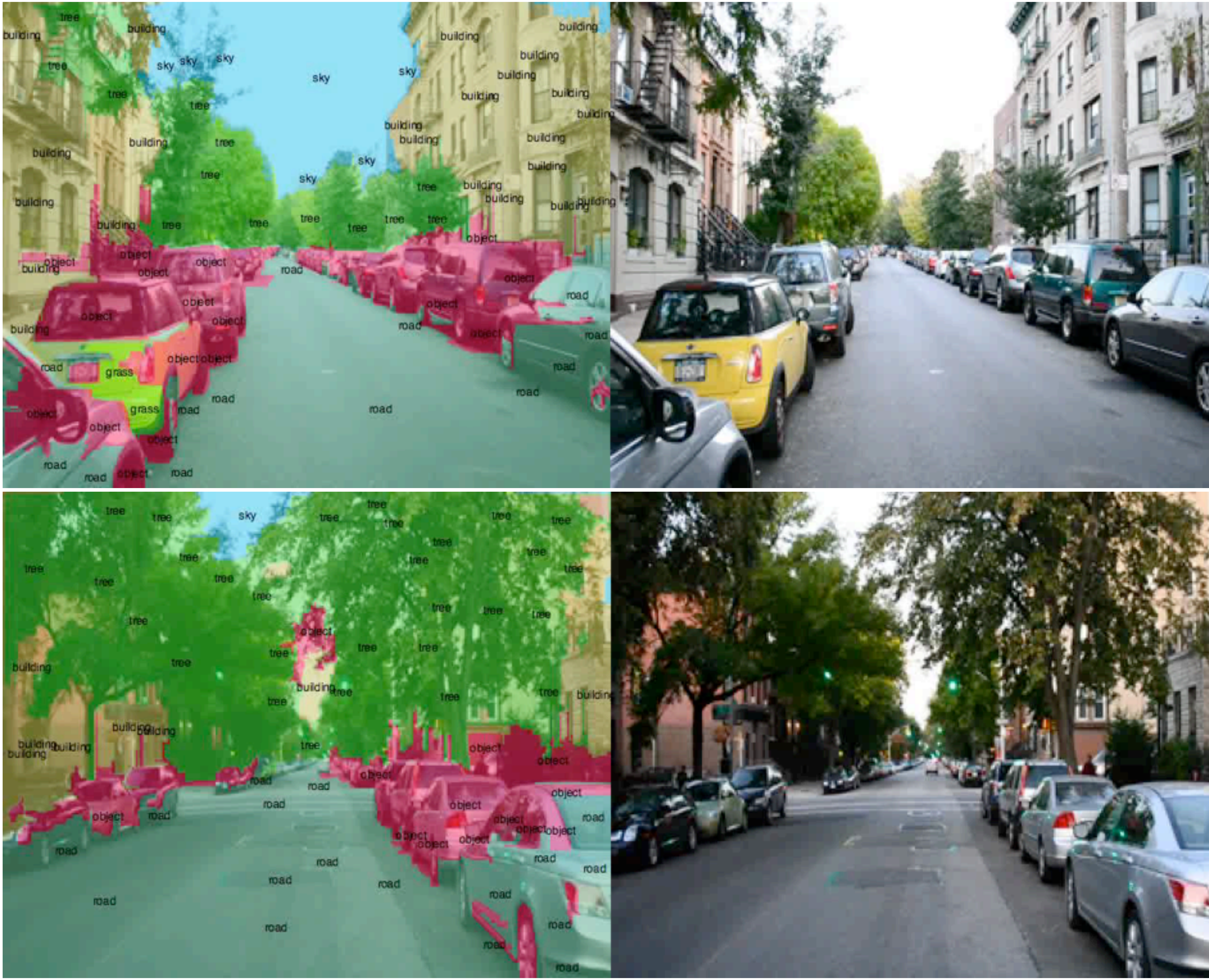
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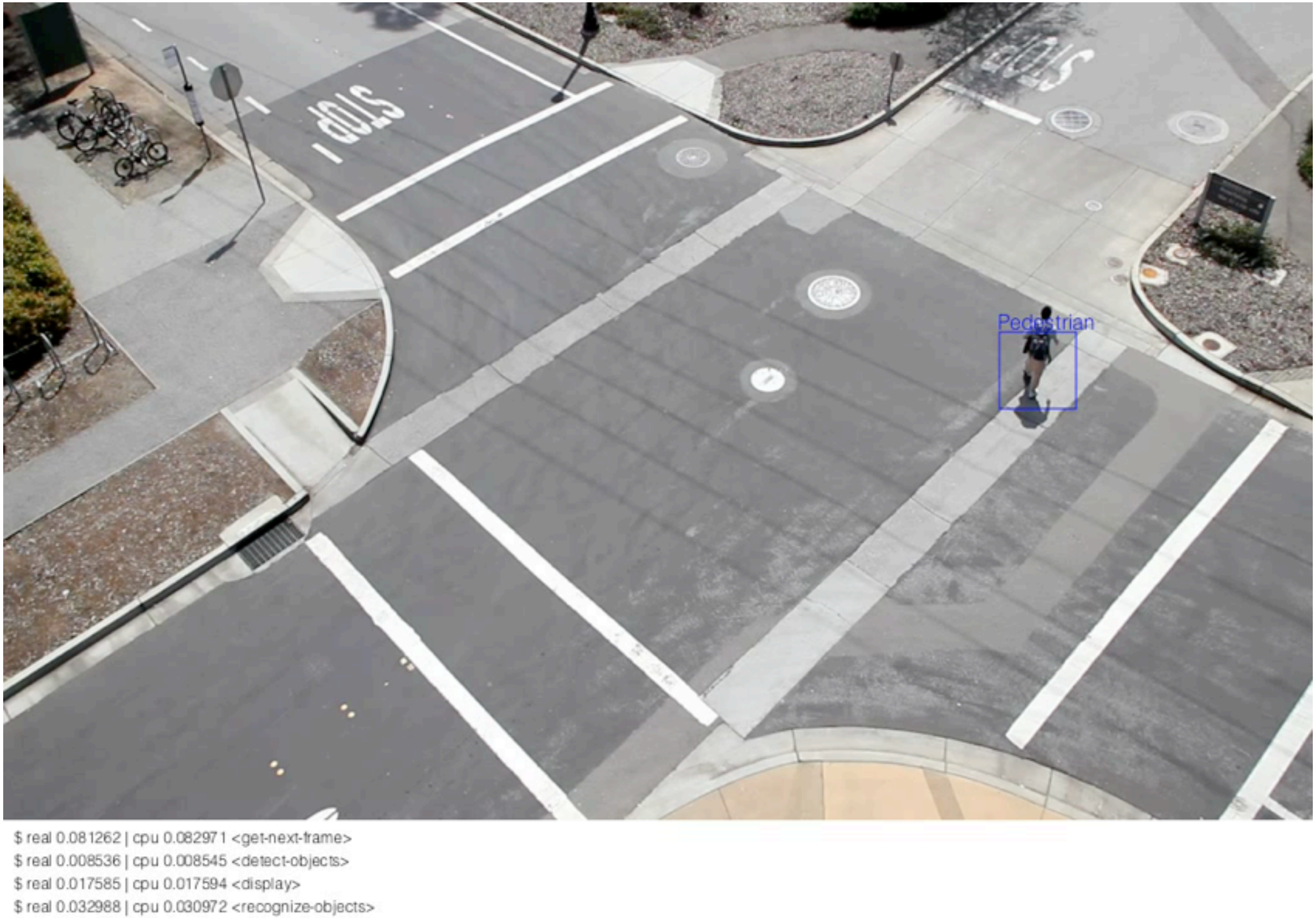
- scene parsing with deep neural networks

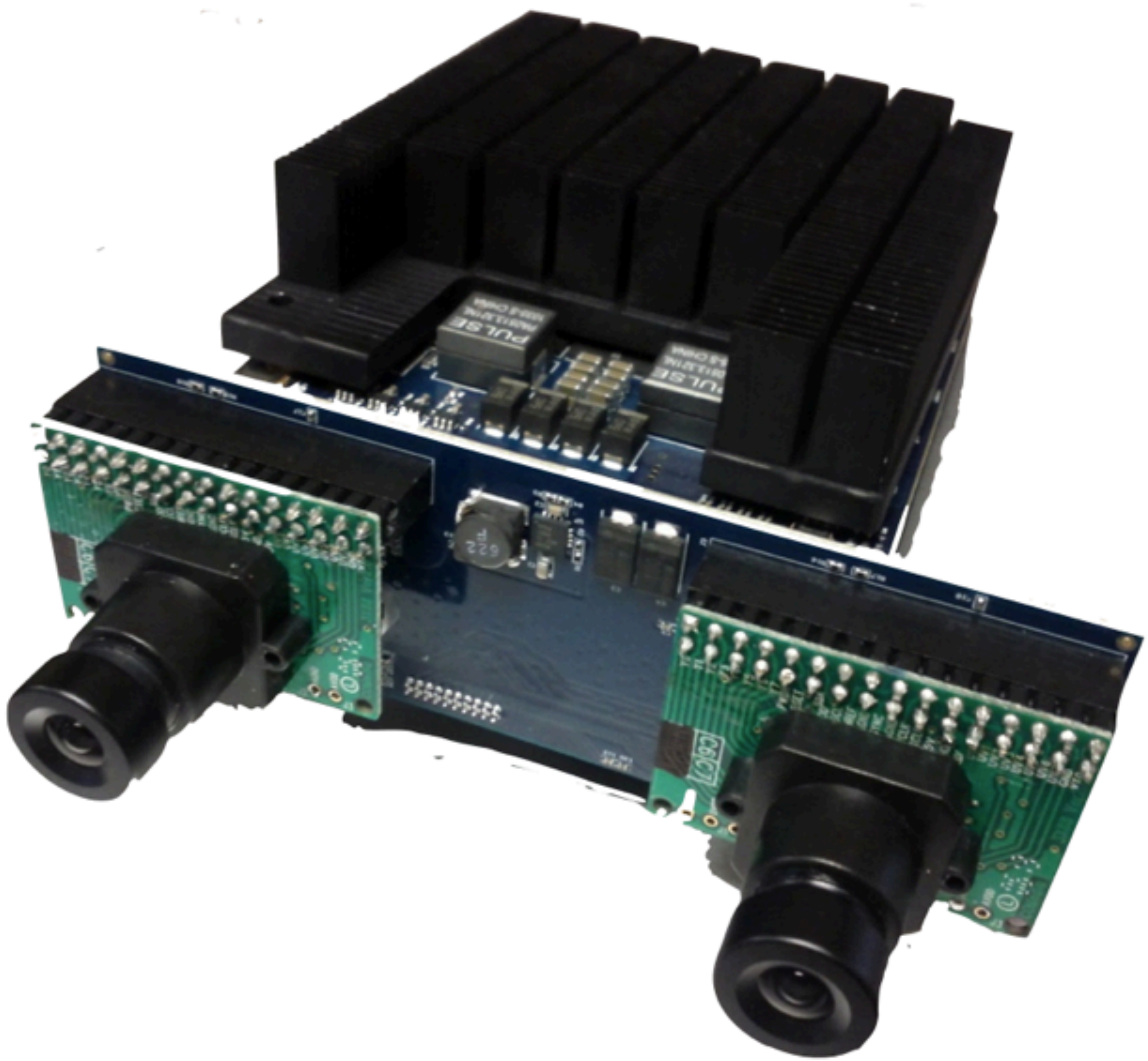


neuFlow 2011

- scene parsing with deep neural networks

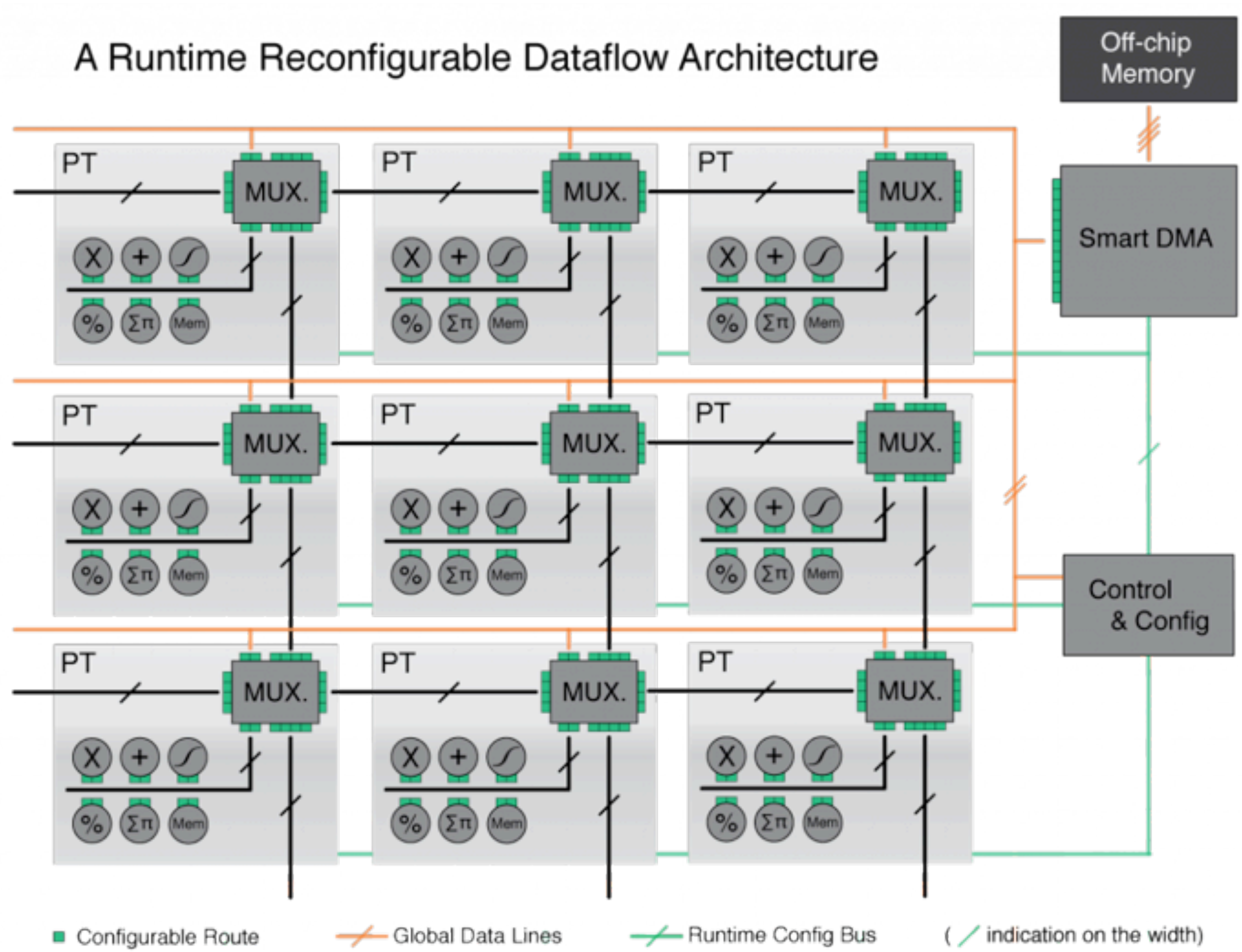
LeCun, Farabet 2012 - on neuFlow

hardware systems



http://www.neuflow.org/

hardware systems



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