



Visione industriale 2019



SAPIENZA
UNIVERSITÀ DI ROMA



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12 Novembre 2019





TATTILE IN A NUTSHELL...

1988-89-90-91-92-93-94-95-96-97-98-99-00-01-02-03-04-05-06-07-08-09-10-11-12-13-14-15-16-17-18-2019 - 31 YEARS EXPERIENCE



www.tattile.com

Industrial solutions

Traffic solutions

Mechanical engineering

Electronic engineering

Software engineering

Algorithms

Railway solutions

Part of THK group

1,6 billions € over 200 companies

www.tkhgroup.com

 LAKESIGHT

 Tattile

MIKROTRON

chromasens

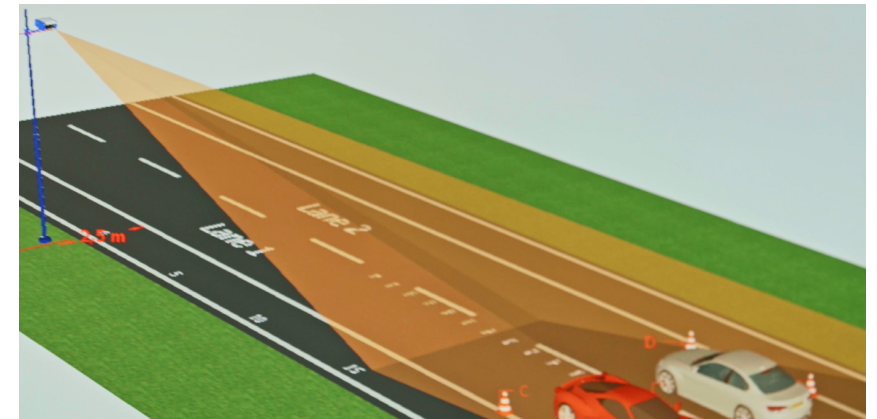
 THK GROUP

TATTLE IN A NUTSHELL...

Camera manufacturers

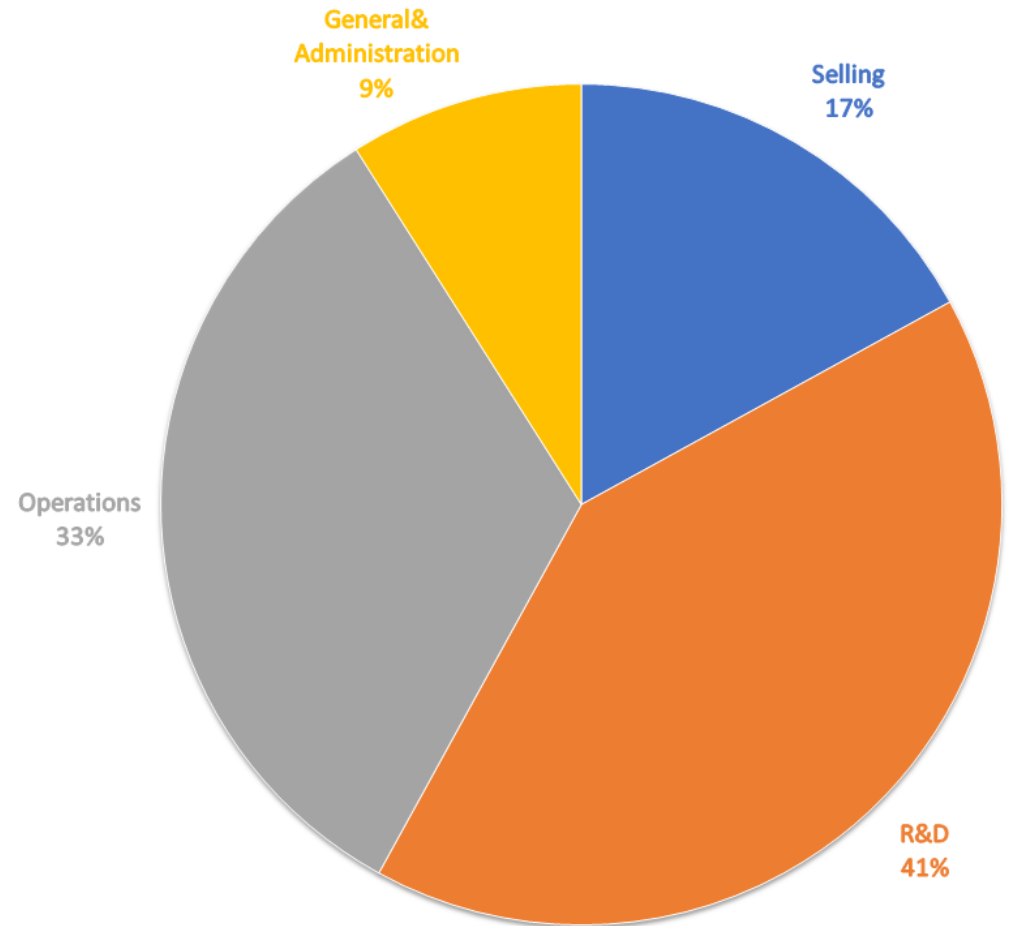


System design

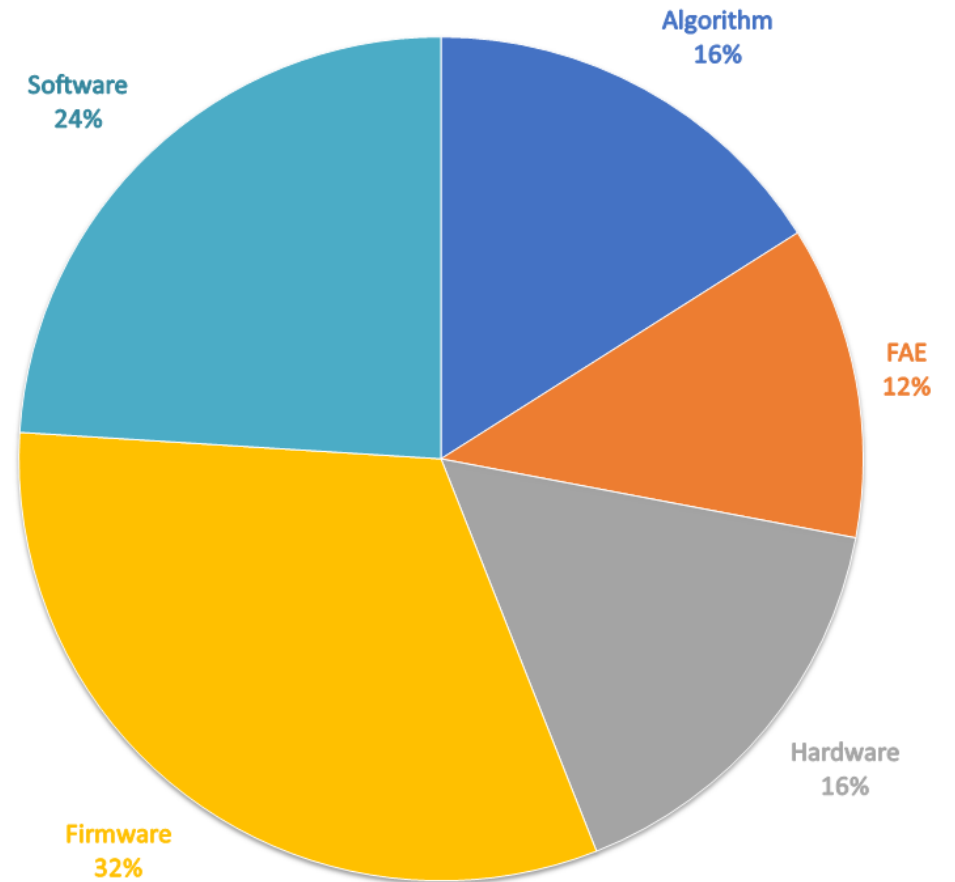
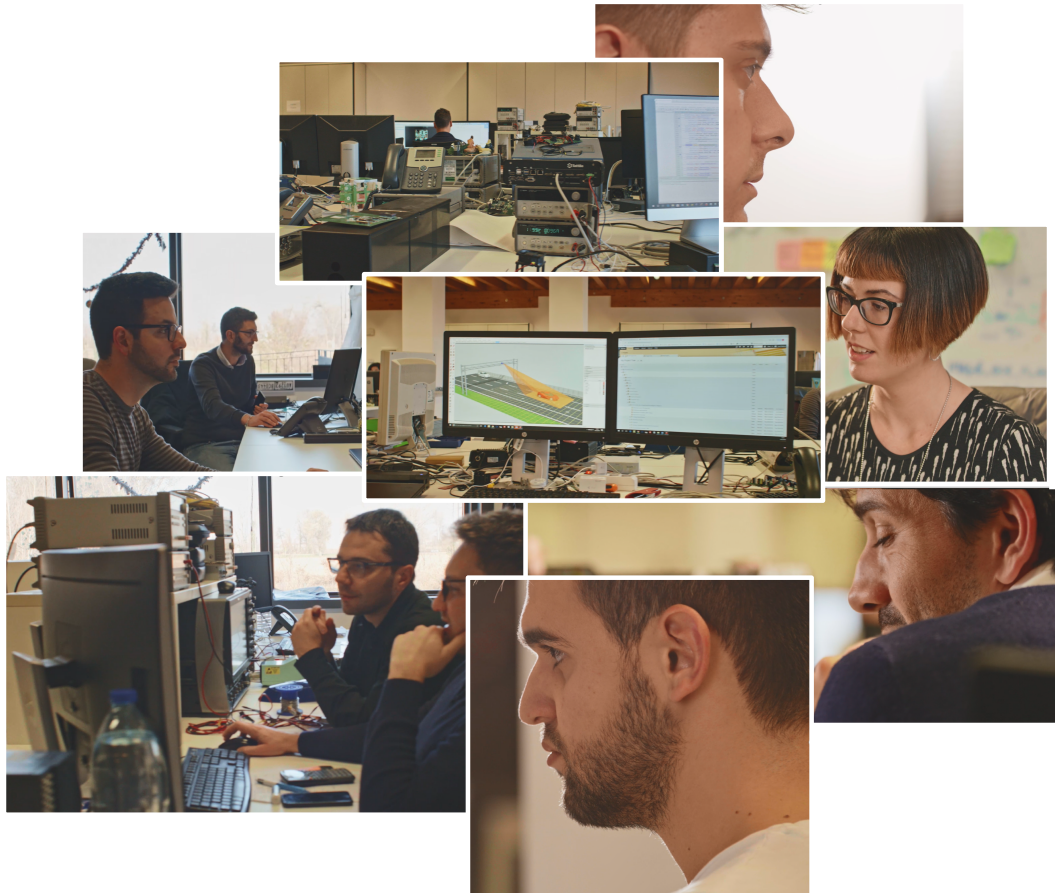


- Optics selection
- Camera selection
- Installation selection

TATTILE TEAM



R&D TEAM



VISION SYSTEMS EXTRACT DATA FROM IMAGES

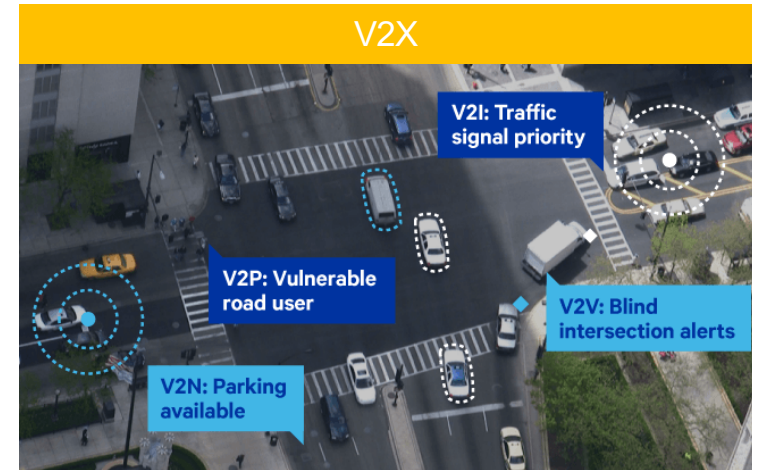
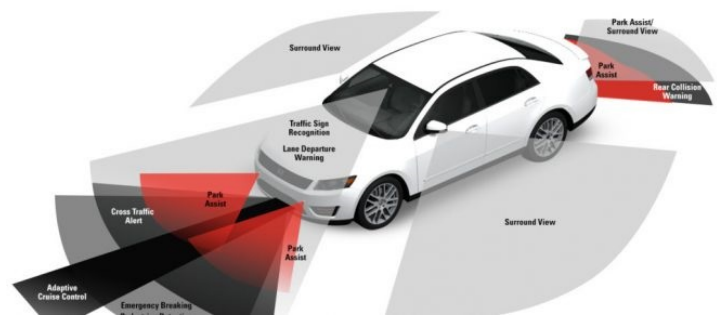
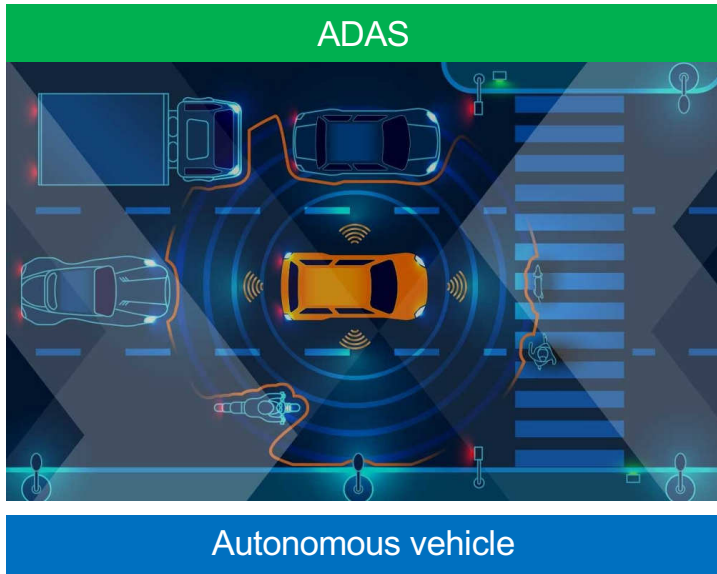
Used to classify the item of interest and *do something* based on the result



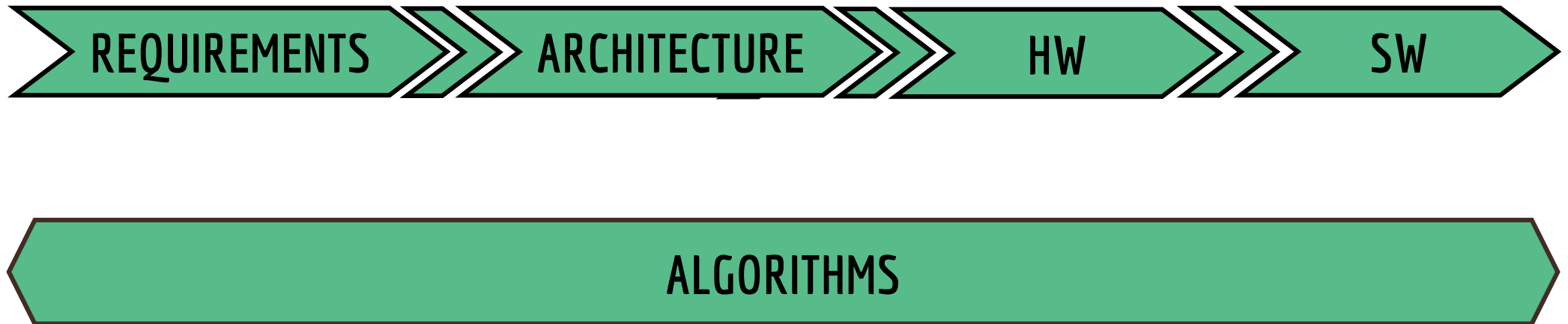
INDUSTRIAL: remove defected samples from production line

TRAFFIC: charge a driver exceeding speed limit

WHAT IS THE ROUTE



HOW TO...MAKE YOUR CAMERA



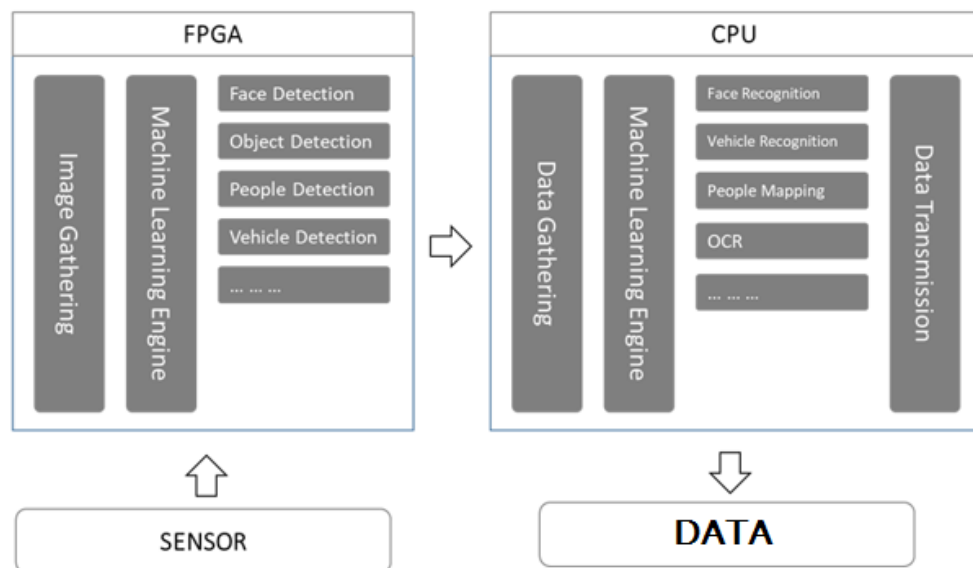
HOW TO...MAKE YOUR CAMERA: REQUIREMENT



- Guarantee plate readout vehicle speed up to 250Km/h
- Provide violation images and context images
- Connectivity: ETH, WI-FI, LTE, Serial
- Easily configurable
- Provide diagnostics
- Extract more data (speed, class, model, ..)
- ... Everything else

HOW TO...MAKE YOUR CAMERA: ARCHITECTURE

Choose the components to fulfill the specification
and design the board



•Sensor resolution: 5Mpx@70fps

3.5Gbps

•Even simple algorithms require a lot of CPU time (consider looking for a feature in an image)



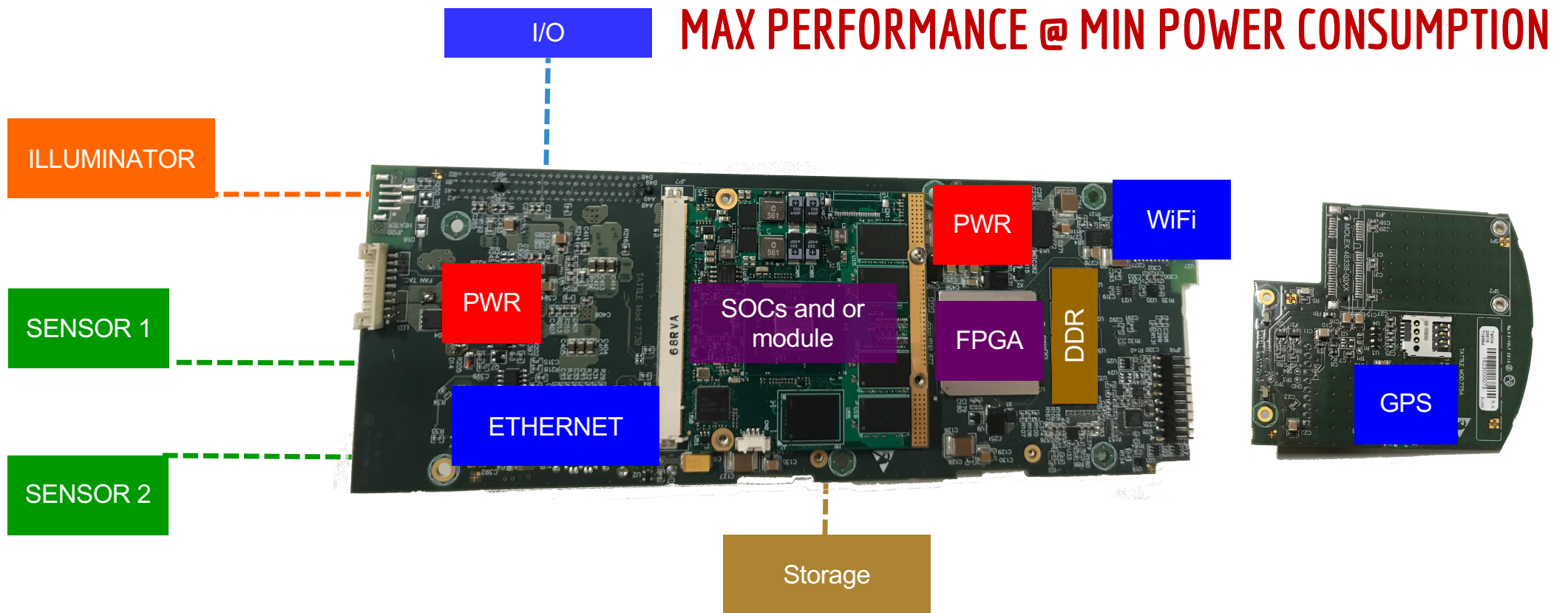
First elaborations are carried out by

FPGA

•Neural networks

Reduce development time and increase the complexity of data that cannot be extracted/processed

HOW TO...MAKE YOUR CAMERA: HW DESIGN



HOW TO...MAKE YOUR CAMERA: FW/SW DESIGN



Bring up everything.

Design the bootloader and customize your kernel

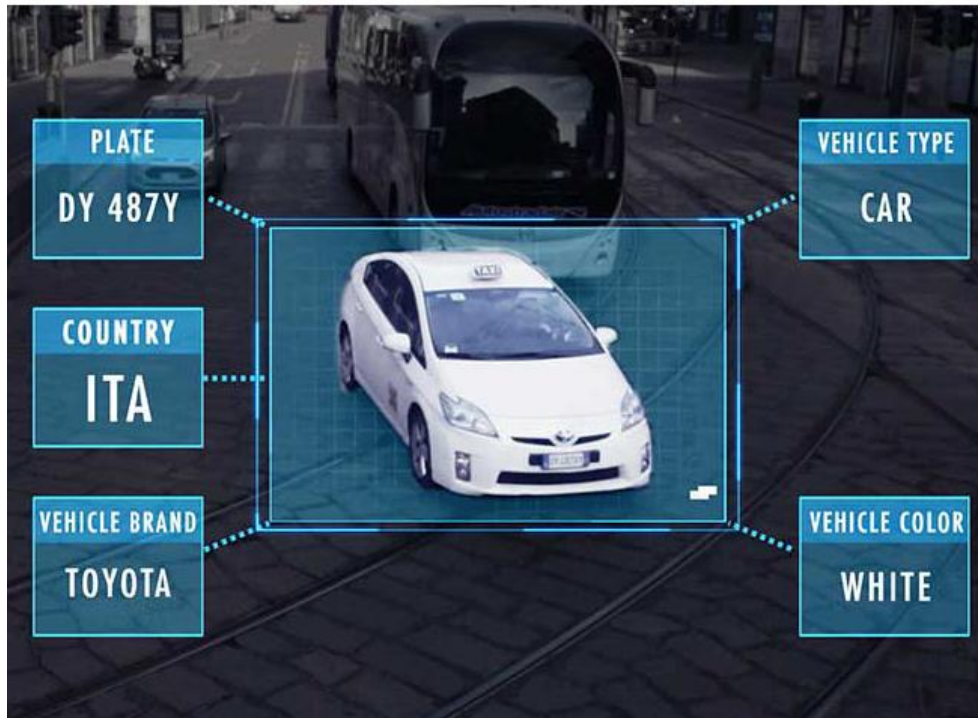
Device driver design is always required: performance are an issue

Customize your image

Create a production flow

**Cameras are embedded devices
everything that's on it is there for a reason!!!**

HOW TO...MAKE YOUR CAMERA: ALGORITHMS



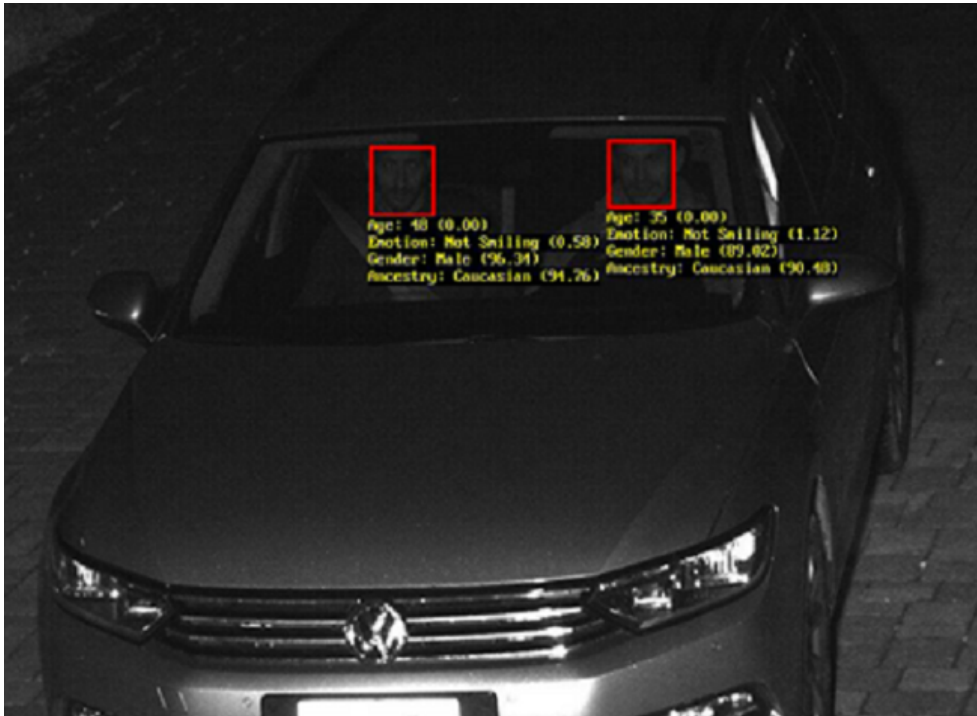
What makes the difference are the algorithms the camera runs

More algorithms = more data = more accurate results

More algorithms = single camera for everything = more flexibility

Traditional algorithms and ANNs => pros and cons on both sides

HOW TO...MAKE YOUR CAMERA: ALGORITHMS



Add complex features

All in an embedded camera. No external devices.

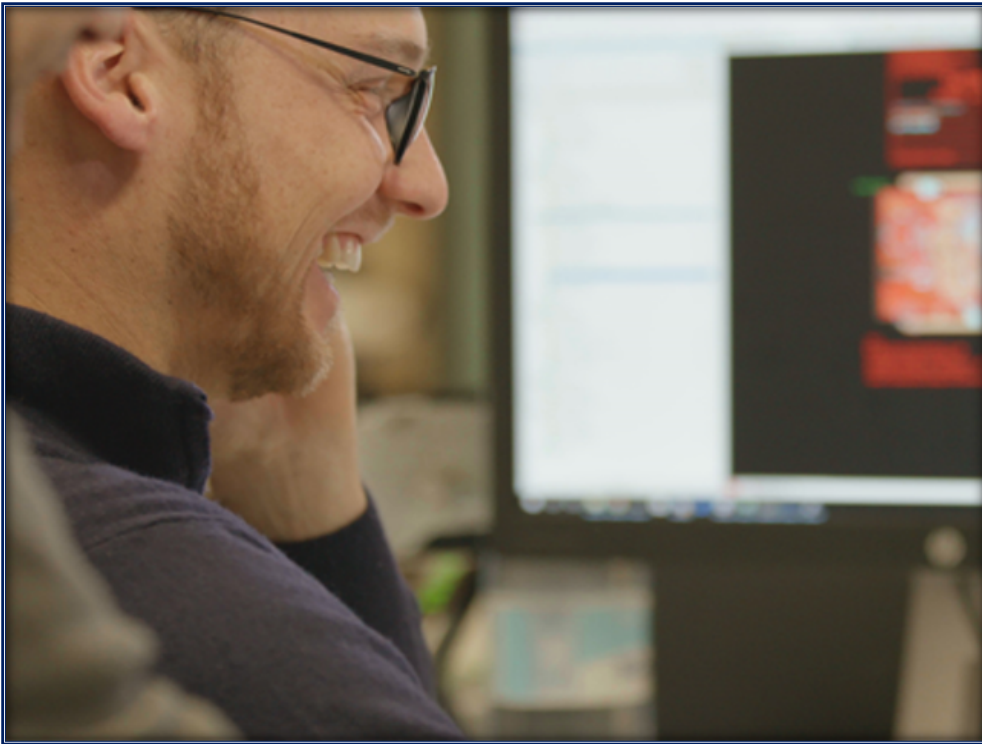
HOW TO...MAKE YOUR CAMERA: ALGORITHMS



Add complex features

All in an embedded camera. No external devices.

WORK WITH US



WORK WITH US

Hardware Design

Mechanical Design

FPGA

Embedded SW

Algorithms

HMI SW - UX / UI

Quality

After Sales



Con...Tattile!

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THANK YOU

Diego Rossini, Hardware Engineer
Lorenzo Arici, Embedded Software Engineer
12 November 2019

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