

# BLOB-FREE

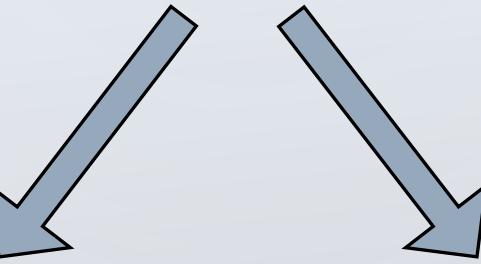
CRITICAL DESIGN REVIEW (CDR)

INTERDISCIPLINARY PROJECT A.Y. 2020/21

PROPOSED BY PROF. DOVIS, PROF. PIRAS AND PROF. DI PIETRA

# BLOB-FREE

**Computer vision system for reducing  
Coronavirus infection risk**



**MASK**  
detection



**ASSEMBLAGE**  
detection



# CHANGES & PERFORMANCE



NVIDIA **Quadro**  
**P1000**



NVIDIA **Jetson**  
**Nano**



**Tensorflow**  
MobileNetV2

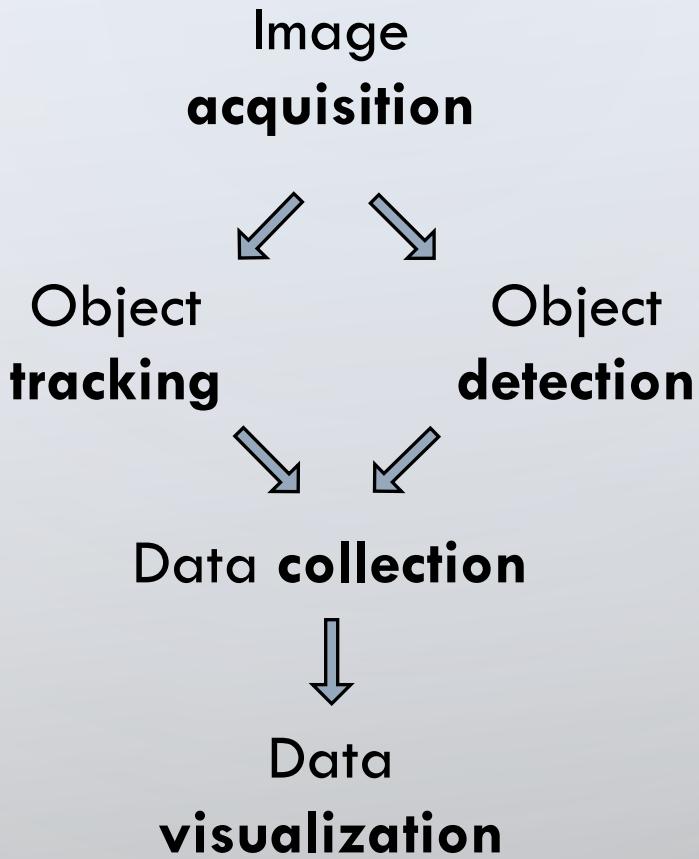


**Darknet**  
YOLOv4-tiny



- Output of object detection and tracking at **2-3 fps**
- Class “no mask”, ap = 75.31%
- Class “mask”, ap = 91.11%
- **mAP@0.50 = 83.21 %**

# HIGH LEVEL DESIGN

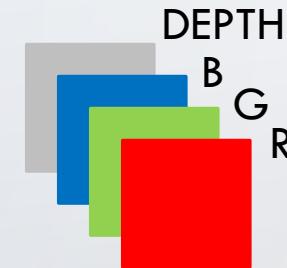


# IMAGE ACQUISITION

## ZED2 Stereo Camera



- **R-G-B-DEPTH** channels
- DEPTH channel sampled at **15 Hz**
- **1920x1080** resolution for improving face mask detection
- **15 fps** for improving brightness



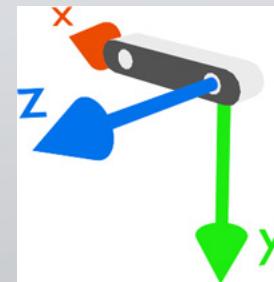
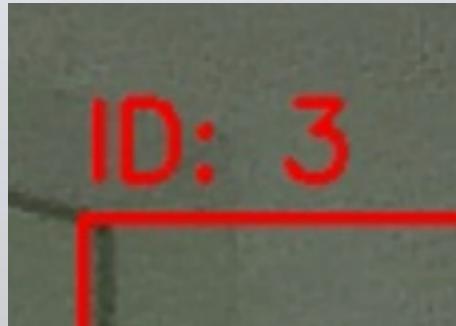
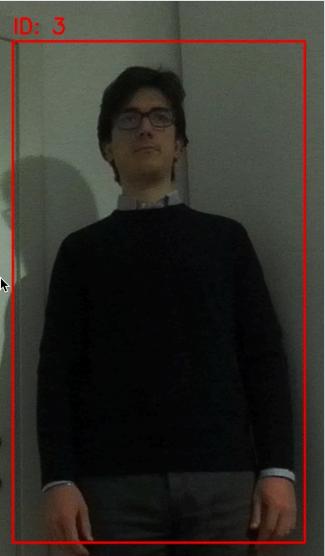
# OBJECT TRACKING

ZED SDK

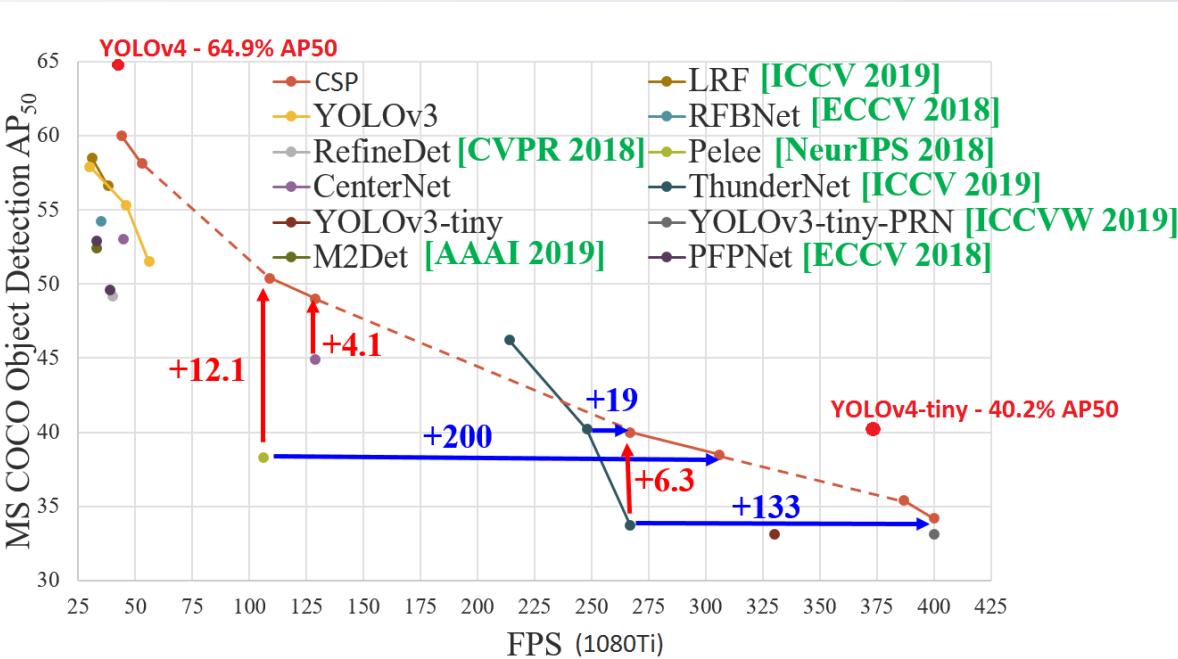
Person recognition  
with **CNN**

→ Progressive ID  
assignment

→ Relative position  
computation



# OBJECT DETECTION



- **Darknet framework**
- Face mask dataset
- **YOLOv4-tiny weights custom training**
- 2 classes: “**mask**” and “**no mask**”
- **Single network evaluation**
- **800x800 network resolution**

# DATA COLLECTION



- Create 1 document for each person detected
- Random **ID**
- **Mask** detection
- **Timestamp**
- Images are not saved (**data anonymity**)

```
db={  
  "detections": [  
    {  
      "_id": 1,  
      "mask": true,  
      "timestamp": 1610365775  
    },  
    {  
      "_id": 2,  
      "mask": false,  
      "timestamp": 1610365775  
    }  
  ]  
}
```

# DATA VISUALIZATION



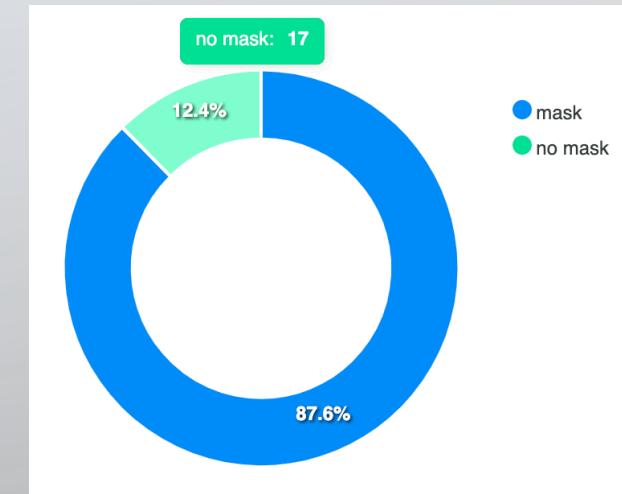
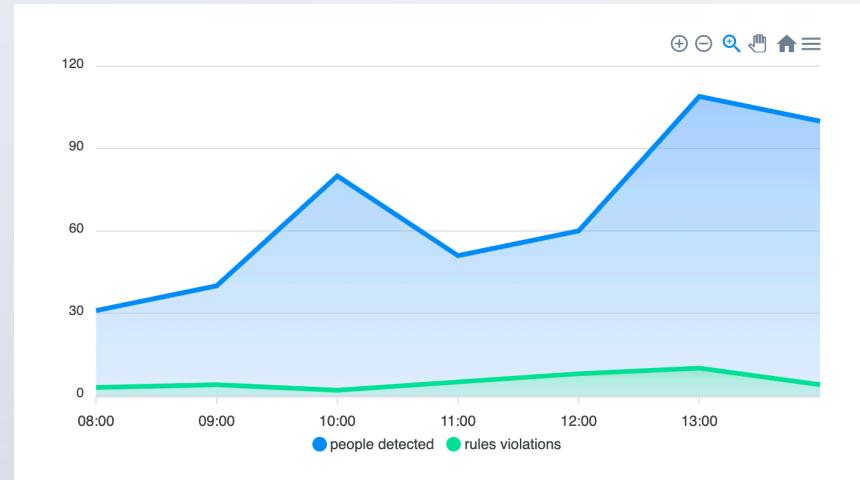
**CherryPy web server for management interface hosting**



**Angular (JS framework) for frontend**



**APEXCHARTS for visualizing charts**



# DEVELOPMENT TOOLS



- **Jetson Nano** in headless mode to save RAM
- **OpenCV** real-time encoding
- **Flask** web server
- **M-JPEG** video stream on LAN visible from browser
- **Development-purposes only**

# WORKPLAN





THANK YOU  
FOR THE  
ATTENTION!

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