

BLOB-FREE

SYSTEM REQUIREMENT REVIEW (SRR)

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

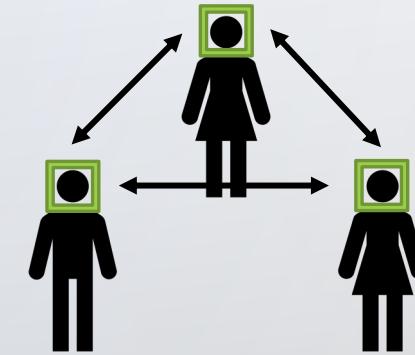


ASSEMBLAGE
detection



USER REQUIREMENTS

- **Facilitate surveillance** where the infection risk could be high (e.g. corridors of a university)
- **Automate warnings** for rules violation
- **Hardware + Software + Web interface**

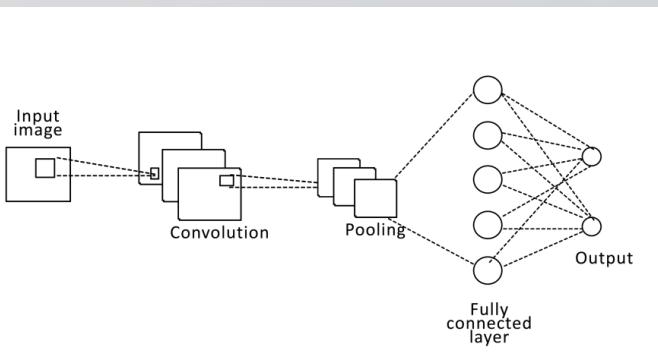


TECHNICAL REQUIREMENTS

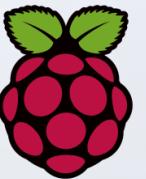
Face detection and localization in 3D space

**Convolutional neural
network (CNN)**

**3D distance between
heads' centroids**



HARDWARE



Raspberry Pi and Pi Camera

- ✓ **Pros:** cheap, small, low power consumption
- ✗ **Cons:** low computational power, lower reliability

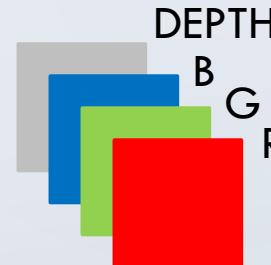
ZED 2

ZED2 Stereo Camera and NVIDIA Jetson Nano

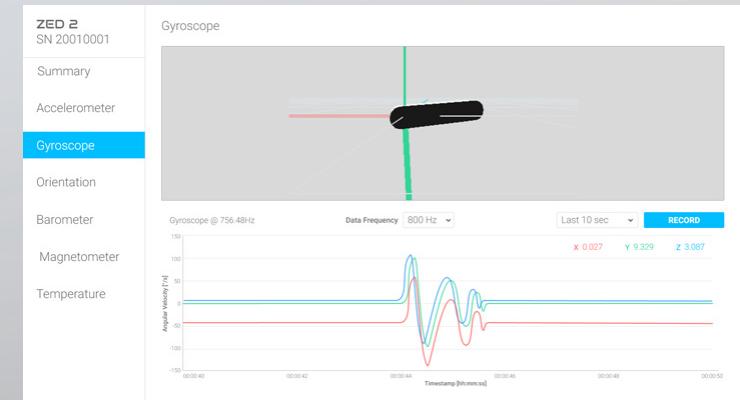
- ✓ **Pros:** high computational power, reliability
- ✗ **Cons:** expensive, bulkier, higher power consumption

STEREOLABS ZED2

- ZED2 Stereo Camera
 - Depth mapping
 - Object tracking
 - Inertial measurement unit (IMU)
 - Neural networks-based SDK exploiting CUDA acceleration (NVIDIA GPU required)



- NVIDIA Jetson Nano
 - Development board with NVIDIA GPU



SOFTWARE

Python



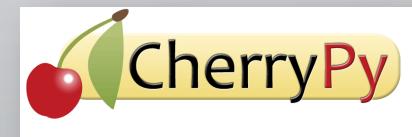
Computer vision:

- Open CV
- Tensorflow
- Numpy
- ZED SDK



Management system:

- CherryPy
- MongoDB



CAMERA TESTING

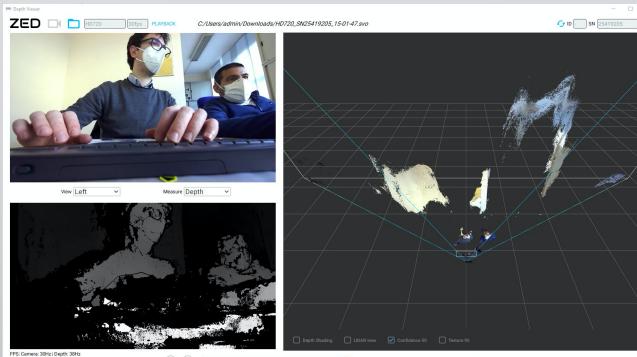
ZED2 Camera
arrived at
Politecnico

Nov. 11, 2020



Preliminary test
of the SDK

Nov. 18, 2020



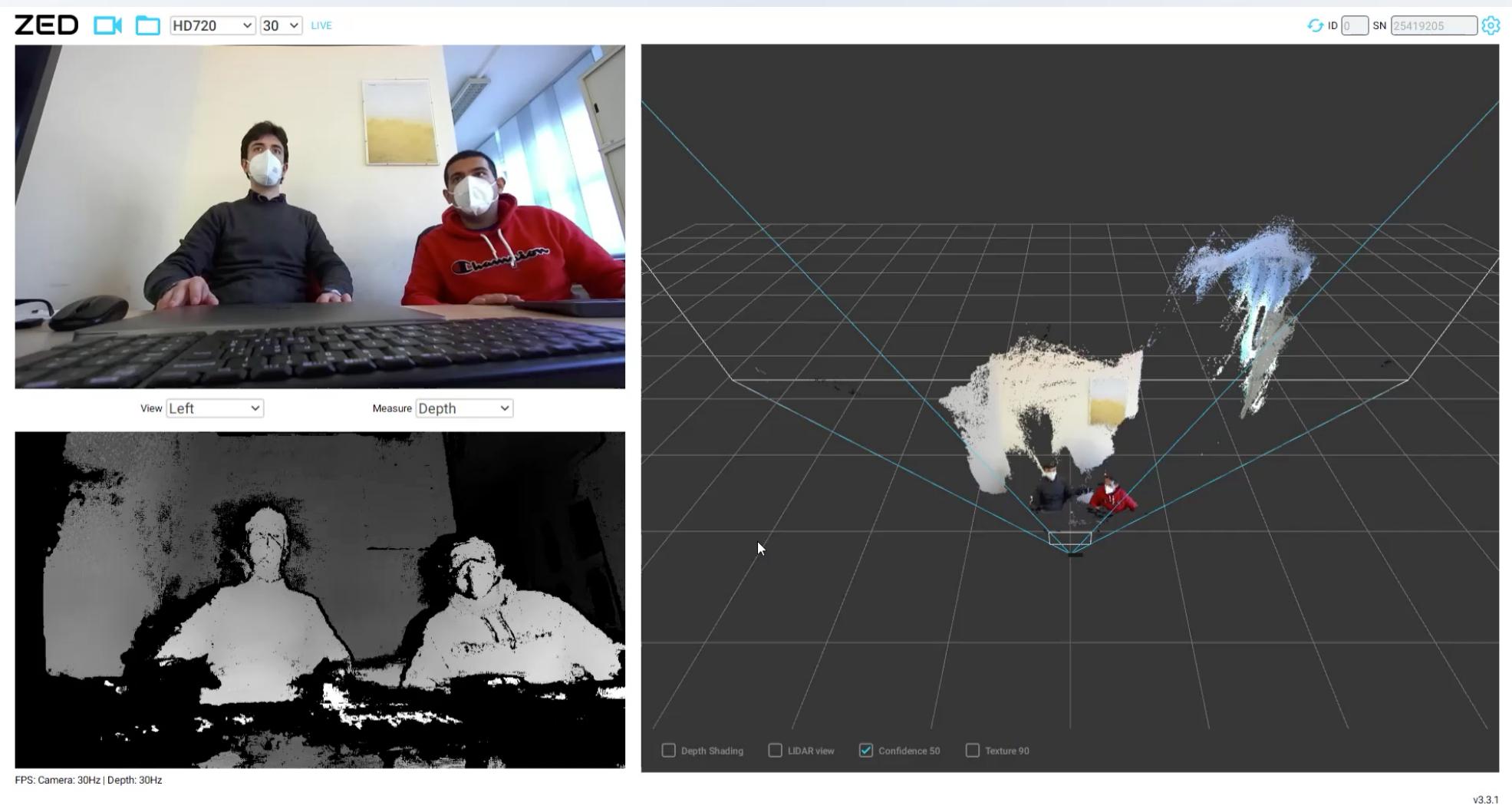
Camera test in different
conditions and **accuracy**
evaluation

Nov. 25, 2020

- Good accuracy (± 10 cm) for short distances (1-6 m)
- Depth sensing working **up to 15 m**



DEPTH MAP



WORKPLAN





THANK YOU
FOR THE
ATTENTION!

Team members:

- Can Akgol (s274948)
- Paolo De Santis (s280398)