

SMARTHEP

REAL-TIME ANALYSIS FOR
SCIENCE AND INDUSTRY

Mid-term check presentation

ESR 11: Real-Time Analysis through
computer vision on dashcams and
triggers in High Energy Physics

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Background



Personal information

- Henrique Piñeiro Monteagudo
- Born 04/09/1997 in Santiago de Compostela, Spain

Academic background

- MSc in Computer Vision (Universities of Coruña, Santiago, Vigo and Porto, 2022)
- BSc in Industrial Electronics and Automation Engineering (University of Vigo, 2020)



Universidade de Vigo



Affiliation

Recruiting beneficiary

- Verizon Connect, Florence, Italy
- Start of work contract: 26/09/2022
- Supervision: Francesco Sambo,
Leonardo Taccari

PhD granting institution

- University of Bologna, Bologna, Italy
- PhD in Computer Science and
Engineering
- Supervision: Samuele Salti, Luigi di Stefano

verizon^v
connect



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA



Project goals

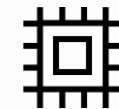
Main goal

- Road scene understanding with video, Inertial Motion Unit and GPS data from dashcams



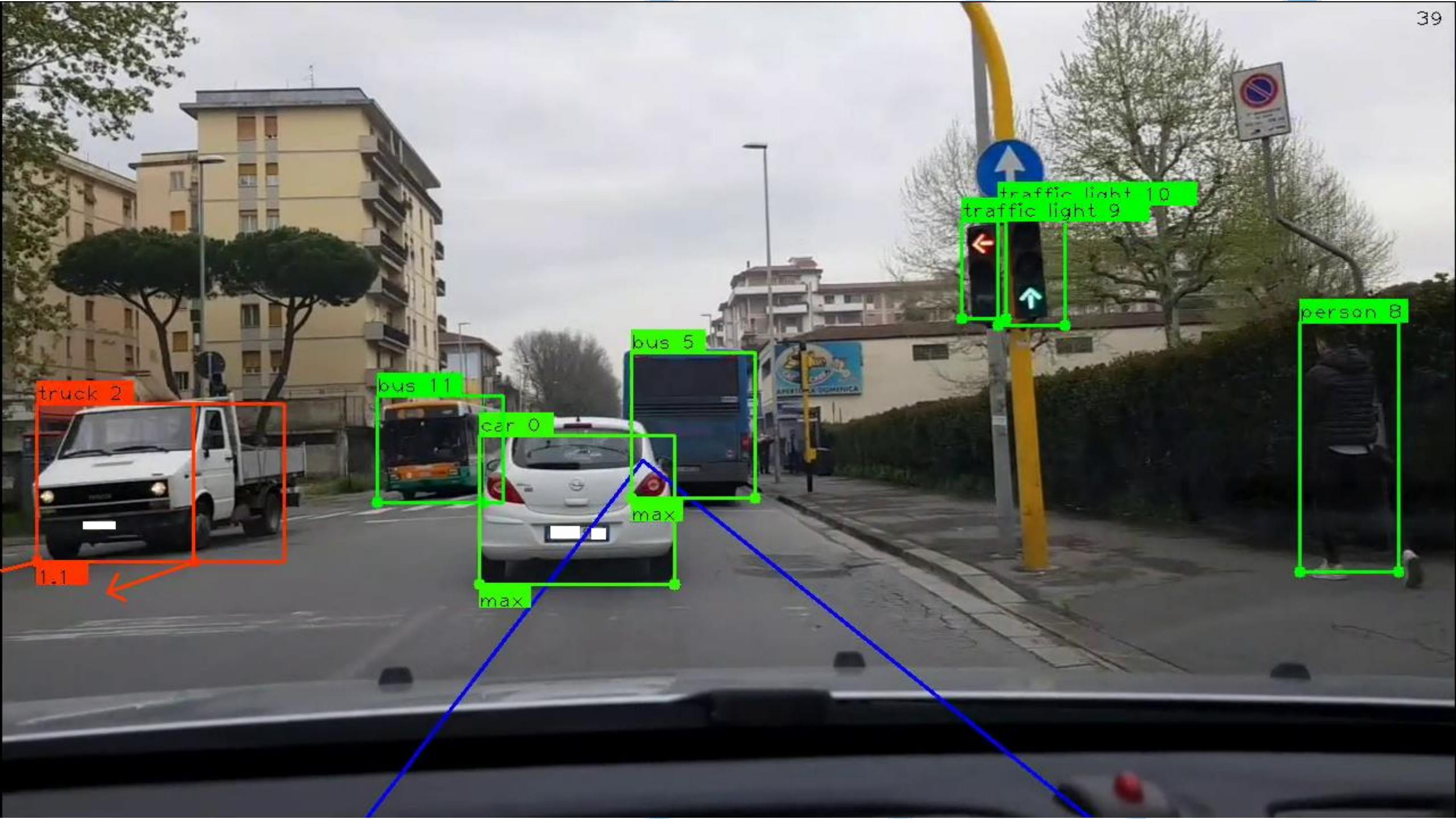
Constraints

- Real-time
- On embedded devices



Example applications and tasks

- Accident anticipation, pedestrian detection



truck 2

1.1

bus 11

car 0

bus 5

max

max

traffic light 10
traffic light 9

person 8

Project methods

Automatic extraction of semantic information

- Machine learning methods (particularly deep learning: CNNs, RNNs, transformers...)
- Sensor fusion techniques

Efficiency for resource-constrained real time performance

- Knowledge distillation
- Pruning, quantization
- Scaling

Training, results, dissemination

- Training on internal tooling and platforms
 - AWS (cloud computing platform)
 - Software used within the company and knowledge bases
- Internal training on data safety and regulations
 - How to manage customer data in safe and compliant way

Training, results, dissemination

- Identification of main trends and relevant gaps in the scientific literature
 - Focus on computer vision on the smart vehicles domain
- Initial assessment of existing methods
- Internal dissemination of literature review
 - Techtalk within the Verizon Connect data group

Career expectations

Industry

- Using machine learning to solve problems with big amounts of data, particularly in computer vision and its applications (e.g., smart and autonomous vehicles), like in this project

Academia

- Machine learning and computer vision research

**THANK YOU
FOR YOUR ATTENTION**

