

# Visibility Analysis in Urban Driving Situations

## Master's Thesis of Mohamed Abdelhamid

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### Aim:

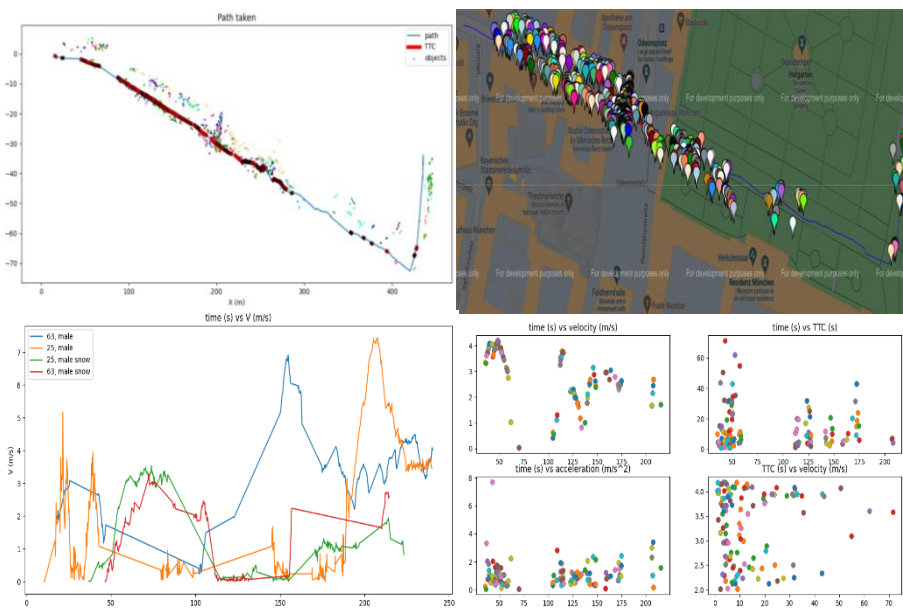
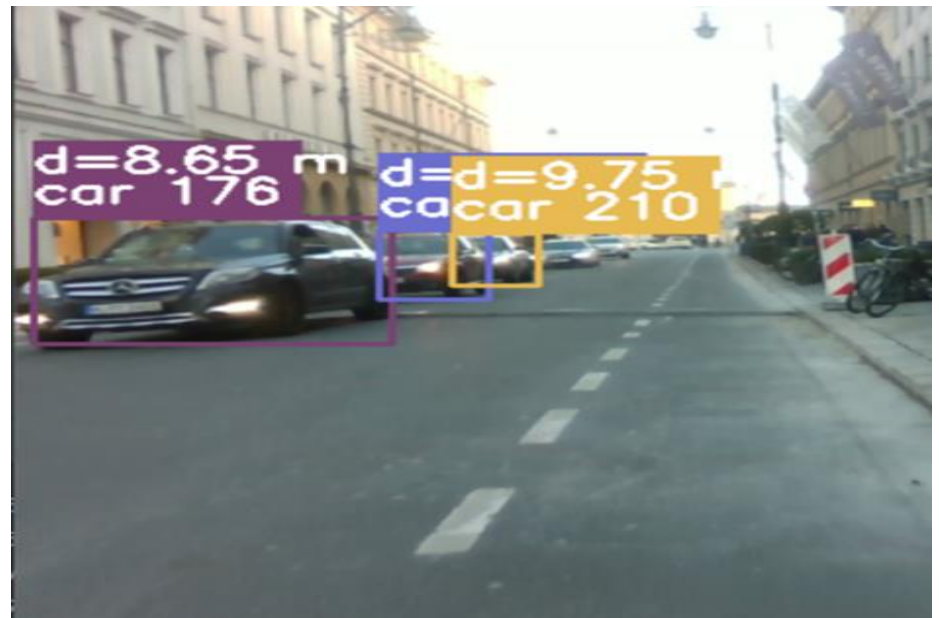
Analyze the behavior of the cyclists, by testing different cameras mounted on a bicycle to analyze their interactions with other road users such as cars and pedestrians from the cyclist's point of view, as a proof of concept of the usage of different types of cameras, analysis methods and mounting techniques, under different conditions, which would hopefully clear the path for more usage of bicycles in road safety analysis and mobile mapping.

### Methodology:

- Mounting The Hardware on the bicycle
- Running field tests from the viewpoint of the cyclist
- Analyze the interactions on the road
- Generate the results

### Analysis:

- Using frame geometry for Determining lateral distances
- Using trigonometry to determine time to collision (TTC)
- Objects recognition: YOLOv4 and COCO dataset libraries
- Objects tracking: TensorFlow and DeepSORT libraries
- Graphical plotting: OpenPyXL and Pandas libraries
- Plotting the data on a map: pyproj and Gmplot libraries



### Conclusion

**Riding in the city vs suburbs:** the road in the city center had more road users on average, lesser TTC, higher acceleration peaks which is due to the frequent stops and slowing down when facing different objects along the way or during signal lights.

**Riding in snow:** the data is showing that when riding on snow the riding behavior would on average change to be slower and the riders would try to maintain more distance to the road users they are interacting with, while the personal behaviors would still manifest themselves to dictate how slower would the rider go and how much distance to other road users would they maintain.

**Total results on average:** the velocity and acceleration tended to increase when the time to collision increased and vice versa. And the cyclists mostly reached the point of maximum acceleration almost exactly after they had the highest time to collision.