

# Computer Vision

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- BEng in Electrical and Computer Engineering @ FEUP, Portugal
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  - Computer Vision
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  - Biomedical imaging

# Hélder Oliveira

- BEng in Electrical and Computer Engineering @ FEUP, Portugal
- MSc in Automation, Instrumentation and Control @ FEUP, Portugal
- PhD in Electrical and Computer Engineering @ FEUP, Portugal
- Senior Research at INESC TEC

# Program

- Digital image (4 classes)
- Image processing (2 classes)
- Pattern recognition (2 classes)
- Segmentation (2 classes)
- Deep learning (5 classes)

# Methodology

- Theoretical-practical classes:
  - Presentation of content
  - Discussion of examples
  - Practical demonstration of the contents lectured
- Additional work:
  - Java/Android/C/Python/Other Programming
  - Implementation of the studied algorithms

# Evaluation - Theoretical Evaluation

- **Two possibilities:**
  - Final Exam (FE)
    - Theoretical examination with the whole syllabus
    - Minimum score 40%
  - Simplified Final Exam (SFE)
    - For those who presented practical work
    - Theoretical examination with partial syllabus (T1-T8, T10-11)
    - Minimum score 40%

# Evaluation - Practical Evaluation

- **Practical evaluation (PA):**
  - Optional
  - Implementation project done by groups of two students
  - Theme discussed between each group and the lecturers
  - (Optional) Preparation of a small simple report describing the implementation of the project
  - Minimum PA score = 40%

# Evaluation - Final grade

- Option 1
  - Practical Evaluation (PA), Simplified Final Exam (SFE)
  - Final Grade =  $PA * 0.5 + SFE * 0.5$
- Option 2
  - Final Exam (FE)
  - Final Grade =  $FE * 1.0$





<https://www.youtube.com/watch?v=csuS2ibPVtU>

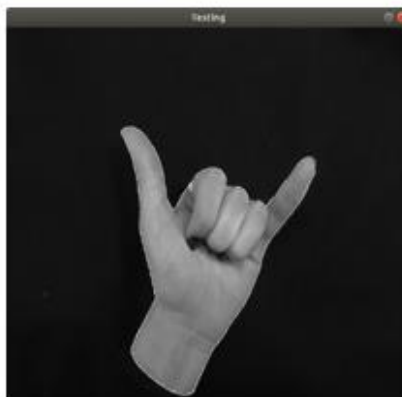
U.PORTO

VC 23/24 - Presentation

## Imagens de teste

## Segmentação da imagem

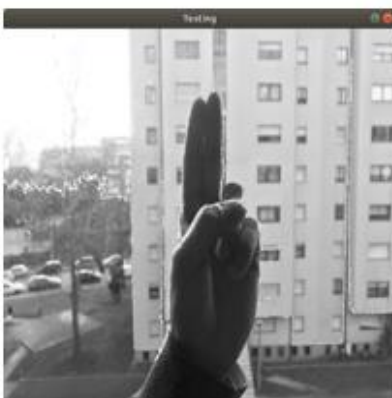
## Resultado/Tradução



# Gesture Recognition



Corresponde -> Y



Várias traduções se assemelham,  
nomeadamente:

| -> Y  
| -> O  
| -> U  
| -> 5  
| -> 5  
| -> 4  
| -> 3  
| -> 2



Corresponde -> O



# Heartbeat Quantification



BPM: 72

(x=331,y=407) ~ R:207 G:197 B:202





# Self-Driving System

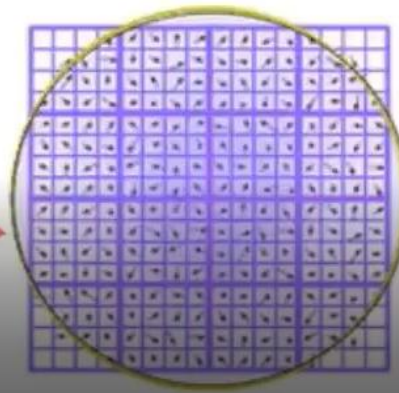
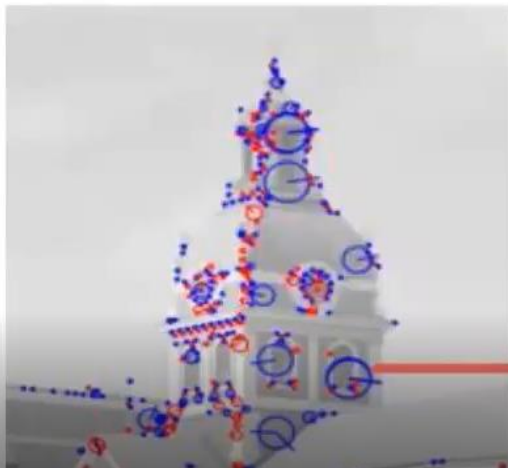
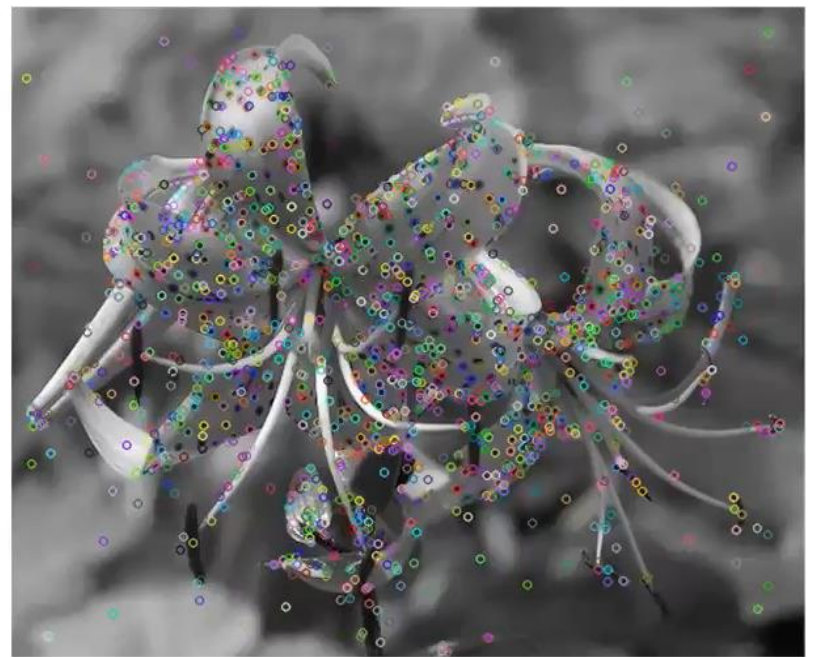
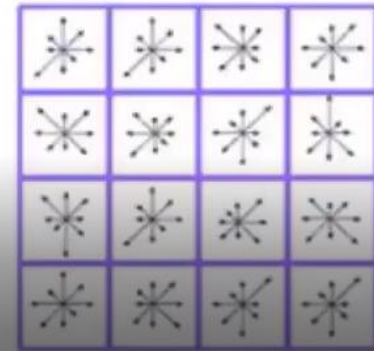


Image gradients



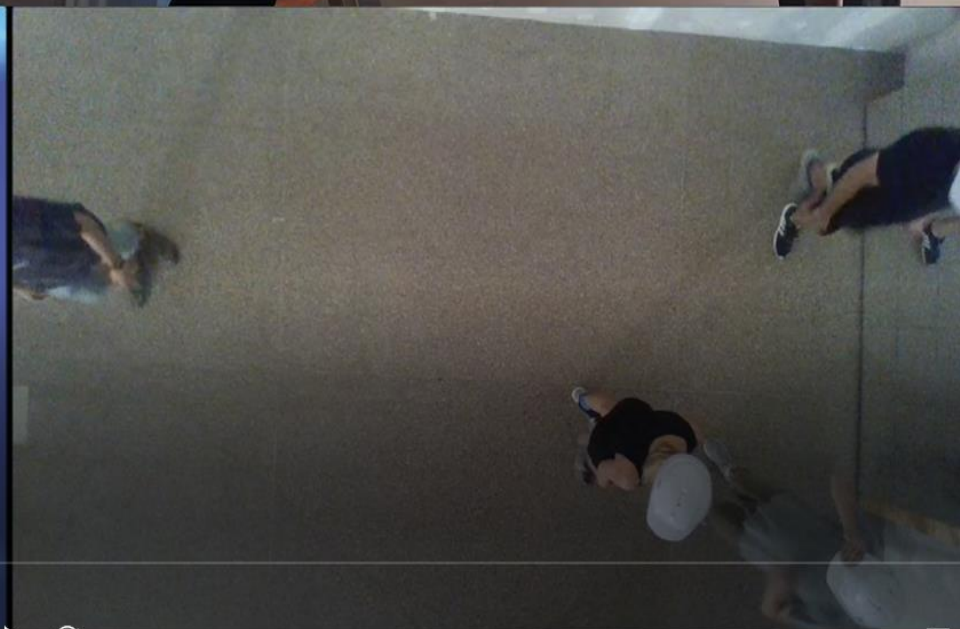
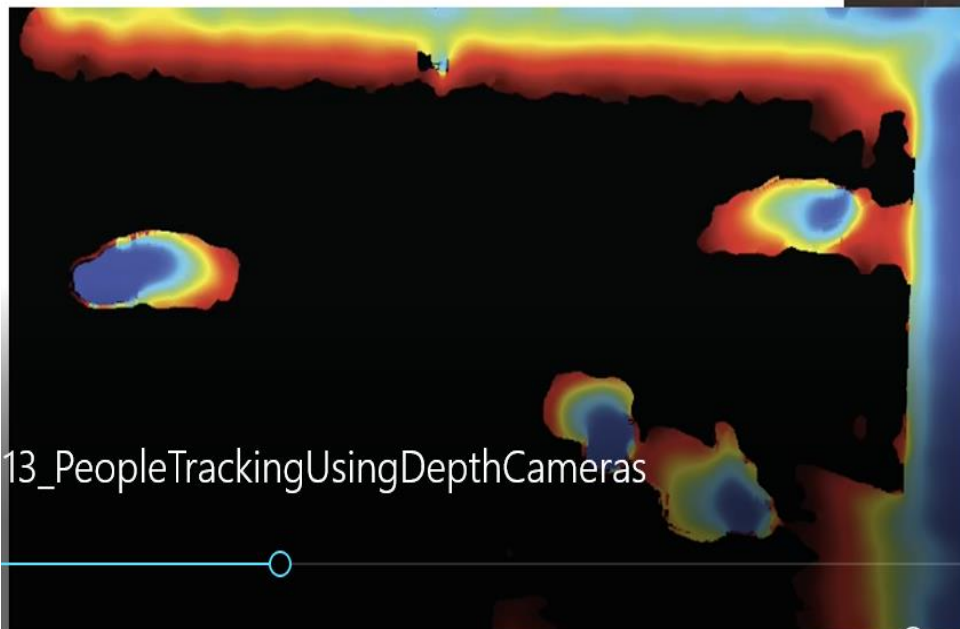
Keypoint descriptor

# Flower Classification



# People tracking using depth cameras

- **6 depth cameras** placed on the ceiling in a matrix
- **already collected** a dataset  
~60 GB of recordings



# Bibliography

1. R. Szeliski, “Computer Vision: Algorithms and Applications”, Springer, 2022, ISBN: ISBN: 978-3030343712 ([link](#))
2. I. Goodfellow, Y. Bengio, and A. Courville. Deep learning. Vol. 1. Cambridge: MIT press, 2016. ([link](#))

# ~~Good Luck~~ Good Work!

- Forget luck
- You work well and you don't need it
- Focus on enjoying classes!
- “Luck favors the bold”
  - John Wick tattooed it so it must be true... right?

