

Master Degree in Telecommunication Engineering  
Academic Year (e.g. 2019-2020)

*Master Thesis*

# “Embedded solution for person identification and tracking with a robot”

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## SUMMARY

This project describes the development process of an embedded system capable of performing a reactive following of a person. It makes use of convolutional neural networks and probabilistic tracking for processing the perception acquired by a RGB-D camera. This input is processed in a NVIDIA Jetson TX2, an embedded System-on-Module (SoM). This device is capable of performing computationally demanding tasks onboard, coping with the complexity required to run a robust tracking and following algorithm. The full design is implemented on a robotic mobile base, which receives velocity commands from the board, intended to move towards the desired person.

**Keywords:** deep learning, robotics, person following



## **DEDICATION**



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# 1. INTRODUCTION

## 1.1. Motivation

This work is focused on exploring the synergy between two science fields, which are outstanding nowadays: *robotics* and *deep learning*. These are combined for obtaining a robust system capable of following a certain person navigating towards it on a reactive behavioral. This behavioral is composed of two main components: the *perception block*, responsible of processing the images from an RGB-D sensor placed on the system, and the *actuation block*, which moves the robotic base accordingly to the relative position of the person to be followed.

The original idea was proposed on [1], where a neural following system was developed to be run in a standard laptop into which the camera and the robot were plugged. In the following dissertation, we will revisit this work and describe the points of interest which have allowed to enhance the previous version of this work.

The key aspects of this project are included in its title, and can be brought in as follows:

**Embedded system** the system is composed of a battery-powered robot, on a *mobile base* form factor.

## BIBLIOGRAPHY

- [1] I. Condés and J. Cañas, “Person Following Robot Behavior Using Deep Learning: Proceedings of the 19th International Workshop of Physical Agents (WAF 2018), November 22-23, 2018, Madrid, Spain,” in. Jan. 2019, pp. 147–161. doi: [10.1007/978-3-319-99885-5\\_11](https://doi.org/10.1007/978-3-319-99885-5_11).