Un modello per tesi di laurea magistrale al DEIB

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Here you can put your dedication, like:

To time, that do not go backwards

— A & D & E

ACKNOWLEDGMENTS

Here you can put acknowledgements to people that helped you during the thesis. Remember that helping students to write thesis is part of the job of some of them, and they're also paid for that. Please make sure to thank them for what they weren't supposed to do.

Remember also that this page is part of your thesis. I know that your boyfriend/girlfriend is very important to you and you cannot live without her/him, as it is for me. But there's no need to put her/his name here unless she/he gave a proper contribution to this work. Same goes for friends, parents, drinking buddies and so on.

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ACRONYMS

GRAPE   Ground Robot for vineyArd Monitoring and ProtEction

ROS   Robot Operating System

ABSTRACT

An abstract is a brief of a research article, thesis, review, conference proceeding or any in-depth analysis of a particular subject or discipline, and is often used to help the reader quickly ascertain the paper's purpose. When used, an abstract always appears at the beginning of a manuscript or typescript, acting as the point-of-entry for any given academic paper or patent application. Abstracting and indexing services for various academic disciplines are aimed at compiling a body of literature for that particular subject.

Max 2200 characters, spaces included.

SOMMARIO

Per abstract si intende il sommario di un documento, senza l'aggiunta di interpretazioni e valutazioni. L'abstract si limita a riassumere, in un determinato numero di parole, gli aspetti fondamentali del documento esaminato. Solitamente ha forma "indicativo-schematica"; presenta cioé notizie sulla struttura del testo e sul percorso elaborativo dell'autore.

Max 2200 caratteri compresi gli spazi.

ESTRATTO

"...il testo delle tesi redatte in lingua straniera dovrà essere introdotto da un ampio estratto in lingua italiana, che andrà collocato dopo l'abstract."

PREFACE

A preface is an introduction to a book or other literary work written by the work's author. A preface generally covers the story of how the book came into being, or how the idea for the book was developed.

MOTIVATION

Graduating is not the motivation that one expects here.

BACKGROUND AND TOOLS

In this chapter we are going to describe the general concepts this thesis deals with, together with the main tools we used to address the project. Since this thesis is in the frame of Ground Robot for vineyArd Monitoring and ProtEction (GRAPE) project (see Chapter 2), most of them are typical of the robotic field and, more specifically, of the agricultural robotics. This last is a part of the so-called *E-agriculture*:

ROBOT OPERATING SYSTEM

Robot Operating System (ROS) is the *robotic middleware* used for the development of code ROS is a *middleware* used in software development for robotics, and these are its main purposes:

> It provides the services you would expect from an operating system, including hardware abstraction, low-level device control, implementation of commonly-used functionality, message-passing between processes, and package management. It also provides tools and libraries for obtaining, building, writing, and running code across multiple computers

ROS is actually a *meta-operating system*, that is, it's not an operating system in the traditional sense, but it provides a peer-to-peer network that processes can use to create and process data together. This network is implemented through TCP, and it's called *Computation Graph*. In this section, we're going to describe ROS with more detail, with particular emphasis on the different tecniques that nodes can use to communicate among them.

ROS MASTER
> Even if the Computation Graph is a peer-to-peer network, a central process, called ROS **Master**, is required to exist, to provide naming and registration services to all the user processes In this. Once the processes have located each other through the services offered by the Master, they can communicate peer-to-peer without involving a central entity;

NODES
> The processes that are in the Computation Graph are called **nodes**, and they are the atomic units of the computational graph. The ROS API are available in C++, Python and Lisp, but C++ is the most widely used. One of the aims of ROS is to be modular

at a fine-grained scale, so a complex task should be achieved through cooperation of several different nodes, each with quite narrow tasks, rather than one large node that include all the functionalities. Nodes can use different techniques for communication, depending whether the message is a part of data stream or it is a request message (*i.e.* a response message is expected) and, in this last case, on the (expected) duration of the computation of the response.

ODOMETRY

SENSOR FUSION

NAVIGATION STACK

THE GRAPE PROJECT

The GRAPE project chapter

THE ROBÌ PROJECT

The Robì project chapter

GRAPE SOFTWARE ARCHITECURE

Grape sw architecture

5

LOCALIZATION

Localization Chapter

KINOVA ARM

Kinova Arm chapter

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EXPERIMENTAL RESULTS

The experimental results chapter