

UNIVERSITAT JAUME I

Development of a distributed system for real time traffic analysis using agents

by

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in the
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Department of computer engineering

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Declaration of Authorship

I, Pablo Jiménez Mateo, declare that this thesis titled, ‘Development of a distributed system for real time traffic analysis using agents’ and the work presented in it are my own. I confirm that:

- This work was done wholly or mainly while in candidature for a master degree at this University.
- Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated.
- Where I have consulted the published work of others, this is always clearly attributed.
- Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work.
- I have acknowledged all main sources of help.
- Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself.

Signed:

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“Write a funny quote here.”

If the quote is taken from someone, their name goes here

UNIVERSITAT JAUME I

Abstract

Escola Superior de Tecnologia i Ciències Experimentals

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The Thesis Abstract is written here (and usually kept to just this page). The page is kept centered vertically so can expand into the blank space above the title too...

Acknowledgements

The acknowledgments and the people to thank go here, don't forget to include your project advisor...

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Abbreviations

GPS **G**lobal **P**osition **S**ystem

IoT **I**nternet **O**f **T**hings

For/Dedicated to/To my...

Chapter 1

Introduction

In this first chapter, the motivation of the project and its main objectives are stated. After that the time planification, employed technologies and the structure of the rest of the thesis are presented.

1.1 Motivation

Nowadays, with the penetration of new technologies such as smartphones and self driving cars, it is possible to share information about the state of the traffic on the transportation networks. This is very useful to have real time path finding algorithms that avoid congestion.

Furthermore, vehicle to vehicle and vehicle to infrastructure communications has been researched for a long time[1] and is still being researched nowadays [2], and this is a direct application of it.

One of the main concerns with this technology is its possible use for surveillance purposes, given the kind of data this system collects and uses privacy should not be overlooked.

The motivation of this project comes from the necessity of developing a tool that allows us to study the behavior of simulated agents in a real scenario. This system is distributed due to its nature, and keeps the privacy of the users at every moment.

The motivation of this project comes from the necessity of studying autonomous vehicles and how they behave depending on traffic. To achieve this goal a multiagent system that supports the usage of distributed agents will be developed. On it, multiple rerouting algorithms will be tested based on [3] and results will be analyzed based on the real time state of the traffic.

1.2 Objectives

The main goals of the final master projects are:

- Analyze multiagent systems for traffic management
- Analyze the existing algorithms for traffic routing
- Propose an algorithm that analyzes the traffic in real time
- Study and analysis of the proposed algorithm

1.3 Planification

Task	Planned hours	Goal
Study and installation of the JADE library	10 hours	Understand how the library JADE works
Development of a graph to represent the urban network	5 hours	Complete the classes and files needed to represent the network
Development of a communication protocol and its ontologies	20 hours	Understand how the inter agent communication will be done
Development of agents	-	-
- Development of the first mobile agents with JADE	15 hours	Implement the vehicles
- Development of the behaviour of the vehicles	15 hours	Implement the logic of the vehicles
- Development of segment agents	15 hours	Implement the segments
- Development of the agent that keeps the time	10 hours	Implement a reliable and deterministic model of time
- Development of the agent that launches the events	10 hours	Implement an agent able to read events from file and launch them to the simulator
Development of the graphical user interface	25 hours	Implement a graphical user interface to view the results in real time
Development of routing algorithms	35 hours	Implement various routing algorithms
Testing and optimizing the application	40 hours	Stress testing the application
Gathering of results	10 hours	Running simulations and creating the graphs
Documentation	10 hours	Documentation of the communication protocols, ontologies and classes
Writing the thesis	80 hours	Writing of the thesis
TOTAL	300 hours	

TABLE 1.1: Time planification

1.4 Employed technologies

1.5 Structure

Chapter 2

State of the art

This chapter gives an overview of previous work, and how this thesis fits within those studies.

2.1 Smart cities

In the last few years, smart cities have been a hot topic in research [4] given the quantity of available data provided by the internet of things [5] and big data [6] and the newest infrastructures that allow cities to track activities in real time. This leads to the use of this data to improve the quality of life of the citizen, employment[7] and also saving on unused services when they are not necessary.

Smart cities is a general idea of which smart transport is only a small part, but that is the part that this thesis is focusing on.

2.2 Smart transport

Smart transport is a topic that only recently has started to be researched. [8] defines Smart transport as „adequate human–system symbiosis to realize effective, efficient and human-friendly transport of goods and information.“

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