

# CHALMERS



## Design of A Localization-Based Collision Avoidance System For Wireless Car

*Master of Science Thesis*

ALIREZA DAVOUDAIN

Chalmers University of Technology  
University of Gothenburg  
Department of Computer Science and Engineering  
Göteborg, Sweden, April 2013

### **Abstract**

In this project, a reliable and inexpensive collision avoidance system was designed for vehicles traversing roads in high speeds. Miniature wireless cars in an indoor traffic model are used to simulate real vehicles movements. Several experiments were done to make the car movement reliable. The selected localization system keeps track of each car's movement. Each car's speed and steer is adjusted by the collision avoidance system, and it is done through sending control commands with regards to the cars location information obtained from the localization system.

# Contents

<b>Contents</b>	<b>v</b>
<b>Table of Figures</b>	<b>vii</b>
<b>1 Introduction</b>	<b>1</b>
Background .....	1
Purpose .....	1
Objectives .....	1
Outline of the thesis .....	2
<b>2 Model Preparation</b>	<b>3</b>
Vaillante Wi-Fi .....	3
Experiments .....	4
First Experiment .....	4
Second experiment .....	7
<b>3 Design of Localization System</b>	<b>8</b>
Introduction .....	8
TinyOS .....	8
MoteTrack .....	8
Plan .....	11
Results .....	12
<b>4 Car Controller</b>	<b>15</b>
Introduction .....	15
Plan .....	15
Algorithms .....	17
Design .....	18
Implementation and results .....	20
<b>5 Summary</b>	<b>21</b>
Achievements .....	21
Limitations .....	21
Future Work .....	21
<b>References</b>	<b>22</b>
<b>Appendix A</b>	<b>24</b>