



MIDDLE EAST TECHNICAL UNIVERSITY

DEPARTMENT OF
ELECTRICAL AND ELECTRONICS ENGINEERING

EE493 ENGINEERING DESIGN I

Car Chasing Robot Conceptual Design Report

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METU EE / C-112

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Project Budget: \$450

Company Name : Duayenler Ltd. Şti.

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1 Executive Summary

2 Introduction

DUAYENLER is established with the aim of developing autonomous car technologies for near future. To serve that purpose, Car Chasing Project is initiated by the company. The project can be summarized as a vehicle that can autonomously follow a path and detect the other surrounding vehicle as well as communicating them to have a reliable driving environment. With this project, the company aims to accomplish the following objectives:

1. Sensing the environment and other vehicles on the roads
2. Automatic adaptive lane detection
3. Self driving
4. Autonomous wireless communication with surrounding counterparts

A considerable amount of effort and work force has been put on the project to fulfill the required objectives. So far, the team has figured out several important steps towards the realization of the project. To start with, the wireless communication between the vehicles is modeled and implemented. A reliable communication environment is established using Wi-Fi protocol. Currently, the vehicles can communicate with each others by means of associated handshake protocol messages in a race scenario. Secondly, computer vision algorithms are developed and implemented as a solution to lane detection problem. The algorithms are developed based on open source computer vision library OpenCV. To obtain a direction predicting results, color thresholding, edge detection, hough transform algorithms are used respectively. Furthermore, the communication between image processing platform and microcontrollers for motor driving is constructed. It is the essential part of solving the self driving problem. On the mechanical part, different motor&wheel combinations are tested to obtain the best performance. To test the computer vision on board, a prototype vehicle is assembled and necessary equipment is mounted on it. Currently, the team is working on the improvement of computer vision algorithms.

In this report, the company provides technical details about the implemented solutions, other possible solution alternatives with objective comparisons as well as a clear action plan showing the necessary further steps for realization of the project. The emphasis on this report is primarily put on the detailed analysis of proposed solutions, supported with relevant test results in both system and subsystem level. In addition, future plans including new test designs for current solutions as well as for other alternatives, the action plan in case of unexpected outcomes by clearly specifying the responsibilities of each member in the team.

- 3 Solutions**
- 4 Plans**
- 5 Conclusion**
- 6 Disclaimer**