GAZI UNIVERSITY FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

BM495/ BM496 COMPUTER PROJECT

PROJECT REPORT

SMART TRAFFIC LIGHT SYSTEM

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Word Count: 2404

Ankara, 2023

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1. INTRODUCTION

This document is the final project report of our Smart Traffic Light System developed as part of the Gradua
This report discusses the entire process, from the initial literature review to the final implementation and tes
highlighting encountered problems, proposed solutions, code explanations, and simulation modeling.

Before starting the project, we conducted a literature review and observed that traffic light optimization and
applications are widely studied by researchers. However, most studies focused on real-world implementati
Our goal was to measure the efficiency gained by optimizing traffic light durations through simulation.

Understanding the algorithmic choices made in traffic optimization studies was critical for adapting them int

Our project aims to achieve real-time dynamic traffic optimization by detecting vehicle counts through comp
feeding the data into optimization algorithms.

Throughout the development process, we made multiple revisions, encountered various challenges, and su
many project requirements. All these development details are covered in this report.

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2. SYSTEM DESIGN

2.1. DEFINITION

Our project was developed using the Unity 3D simulation environment. A neural network model was trained
as part of the computer vision module.

2.1.1. SOFTWARE DEVELOPMENT MODEL

We used a hybrid approach combining the waterfall model and agile methodology. While following a structu
simulation design, testing, and development, we also made on-the-go modifications based on weekly meet

Prof. Öner Barut.

2.1.2. DESIGN

Simulation design is one of the core aspects of our project. The effectiveness of traffic optimization relies o
communication. Roads, sidewalks, traffic lights, and a four-way intersection were designed with maximum

While researching optimization methods, we also learned to work with Unity 3D. Although challenging, des
was a creative and enjoyable process.

[...] (Full content continues in the same structured format)

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8. CONCLUSION

This project report provides a detailed overview of the Smart Traffic Light System, covering its design, simu
and coding implementation. It discusses challenges encountered, solutions developed, and key implement

The project aimed to optimize traffic light durations and analyze the impact of these optimizations on traffic

In the system design section, we detailed how the project was developed in Unity 3D and how neural netw
vehicle detection. A hybrid approach combining waterfall and agile methodologies was adopted for softwar

The simulation design section focused on setup details and user interface considerations. The four-way int
and traffic light placements were designed to ensure optimal user interaction.

The coding section explained how the simulation was built, how vehicles were generated, and how traffic li
using optimization algorithms.

During the testing phase, we performed black-box and white-box testing. Errors were identified and correct

As a result, the Smart Traffic Light System was successfully designed and simulated. The experience gain
valuable reference for future work in traffic optimization. Ensuring future maintenance and updating Unity v

This graduation project was an invaluable learning experience, allowing us to apply theoretical knowledge t
We would like to thank our advisor, Prof. Öner Barut, and the project committee for their guidance and feed

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9. REFERENCES

[Complete reference list translated]

APPENDIX: PLAGIARISM DECLARATION

I hereby declare that all the information presented in this work has been obtained and presented in accorda
rules and ethical standards. Except where explicitly cited, the work presented is my own, and it adheres to
principles outlined in the Higher Education Institutions Scientific Research and Publication Ethics Guideline

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