MUHAMMAD ARSLAN WAHEED

01-235142-037

AFFAQ HAYAT

01-235151-022

Vehicular License Plate Recognition and Detection

Bachelor of Science in Information Technology

Supervisor: Mr. Muhammad Umar Khattak

Department of Computer Science
Bahria University, Islamabad

December 17, 2018

Certificate

It is to certify that the final year project of BS (IT) "Vehicular License Plate Recognition and Detection (VLPRD) Project Report", was developed by Muhammad Arslan Waheed and Afaq Hayat under the supervision of "Mr. Umar Khattak" and in his opinion; it is fully adequate, in scope and quality for the degree of Bachelors of Science in Information Technology.

Approved by . . . :

Supervisor: Mr. Muhammad Umar Khattak (Lecturer)

_____

Internal Examiner:

_____

External Examiner:

_____

Project Coordinator: Madam Sumaira Kausar (Sr. Assistant Professor)

_____

Head of the Department: Dr. Faisal Bashir (Associate Professor)

_____

Abstract

Vehicular license plate recognition and detection is the need of the time, keeping in mind the ever growing vehicular traffic and the security situation of the country. An automated system can be much more efficient and cost effective as compared humans. We are looking for ways to make this system more efficient and cost effective so that it could be implemented as a part of various ongoing projects in the country such as the safe city project. By the making the system more efficient and cost effective we would be making it more accessible. We plan on developing a system that is efficient enough to use the existing cameras such as traffic monitoring cameras, cctv cameras and can even be deployed on the squad cars of law enforcement. Moreover the system will be capable of working in all weather conditions and light.

Acknowledgments

Thanks to Almighty Allah who has given us strength not just to compile this project, but strength to accomplish every task of life successfully. Oh Allah we tribute glorify and thanks for everything. We are grateful and thankful to our supervisor “Mr Umar Khattak” for his coordination, support, appreciation and positive behavior throughout this time. Finally yet importantly great appreciation for our families who support use no matters how badly we failed.

MUHAMMAD ARSLAN WAHEED (01-235142-037)

AFFAQ HAYAT (01-235151-022)

Department of Computer Science

Bahria University Islamabad, Pakistan

Contents

Abstract i

Acknowledgments ii

Contents iii

List of Figures iv

List of Tables v

1 Introduction 1
- 1.1 Objective . . . 2
- 1.2 Problem Description . . . 2
- 1.3 Methodology . . . 2
- 1.4 Project Scope . . . 3
- 1.5 Feasibility Study . . . 3
  - 1.5.1 Risks Involved . . . 3
  - 1.5.2 Resource Requirement . . . 4
- 1.6 Solution Application Areas . . . 4
- 1.7 Tools/Technology . . . 4
- 1.8 Expertise of the Team Members . . . 4

2 Literature Review 5
- 2.1 Overview . . . 5
- 2.2 Existing System . . . 5
- 2.3 Limitations and Drawbacks . . . 6
- 2.4 Value Proposition . . . 7

3 Requirement Specifications 8
- 3.1 Application Overview . . . 8
- 3.2 Exixting System . . . 8
- 3.3 Proposed System . . . 9
- 3.4 Requirement Specification . . . 9
  - 3.4.1 Functional Requirements . . . 9
  - 3.4.2 Non-Functional Requirements . . . 10
- 3.5 Use Cases . . . 10
  - 3.5.1 System Use Cases . . . 10

4 Design **17**
4.1 System Architecture . . . 17
4.2 Data Flow Diagram . . . 18
4.3 Sequence Diagram . . . 19
4.3.1 Login Sequence Diagram . . . 19
4.3.2 Recognition Sequence Diagram . . . 20
4.3.3 Data Saving Sequence Diagram . . . 21
4.3.4 Live Detection Sequence Diagram . . . 22
4.4 Block Diagram . . . 23
4.5 Process Model . . . 24

5 System Implementation **25**
5.1 Introduction . . . 25
5.2 System Architecture . . . 25
5.2.1 Desktop Application . . . 26
5.3 System Internal Components . . . 26
5.3.1 Main (manual detection) . . . 26
5.3.2 Login . . . 26
5.3.3 NPR(Stages of recognition) . . . 27
5.3.4 Live Detection . . . 27
5.3.5 Add/Remove data from database . . . 27
5.4 Tools and Technology . . . 27
5.4.1 MATLAB . . . 27
5.4.2 SQL-Lite . . . 27
5.4.3 Digital Image Processing . . . 27
5.5 Processing Logic . . . 28
5.6 Methodology . . . 28

6 System Testing and Evaluation **30**
6.1 Introduction . . . 30
6.2 System Testing and Evaluation . . . 30
6.3 Usability Testing . . . 31
6.4 Easy to use . . . 31
6.5 Compatibility Testing . . . 32
6.5.1 Device Feature . . . 32
6.5.2 Operating System . . . 32
6.6 Exceptional Handling Testing . . . 32
6.7 Security Testing . . . 34
6.8 Test Case for Main Screen . . . 35
6.9 Test Case . . . 36
6.10 Interface Testing . . . 37

7 Conclusions **38**
7.1 Overview . . . 38
7.2 Major Accomplishment . . . 38
7.3 Future Work . . . 38

A User Manual **39**
A.1 Login Screen 39
A.2 Main Screen 40
A.3 ADD or DELETE Vehicle Record 40
A.4 Different Stages 41
A.5 About 41

References **42**

List of Figures

1.1 Scope 3

3.1 Use Case- Main System 11
3.2 Use Case- Login 12
3.3 Use Case- Add/remove record 13
3.4 Use Case- Live Detection Use Case 14
3.5 Use Case- Manual Detection Use Case 15
3.6 Use Case- Stages Use Case 16

4.1 System Architecture Diagram 17
4.2 Data Flow Diagram 18
4.3 Sequence Diagram Login 19
4.4 Recognition Sequence Diagram 20
4.5 Data Saving Sequence Diagram 21
4.6 Live Detection Sequence Diagram 22
4.7 Block Diagram 23
4.8 Process Model 24

A.1 Login Screen 39
A.2 Main Screen 40
A.3 Add or Delete Screen 40
A.4 Different Stages 41
A.5 About 41

List of Tables

2.1 Reference table 7

3.1 UC1- Main System Case 11
3.2 UC2- Login 12
3.3 UC3- Add/remove Record 13
3.4 UC4- Live Detection Use Case 14
3.5 UC4- Manual Detection Use Case 15
3.6 UC6- Stages Use Case 16

6.1 Test Case for usability testing of home screen 31
6.2 Test Case for Functionality testing 32
6.3 Test Case for Exception handling of home screen 33
6.4 Test case for security testing 34
6.5 Test Case for Main Screen 35
6.6 Test case for functionality 36
6.7 Test Case for Main Screen 37