Department of Electrical and Computer Engineering
North South University

Senior Design Project Report

Project Title: Vehicle Detection, Tracking, and Counting System with Number Plate Recognition in a Petrol Station

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Faculty Advisor:

Dr. Shazzad Hosain

Professor

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Summer, 2023

LETTER OF TRANSMITTAL

November, 2023

To

Dr. Rajesh Palit

Chairman,

Department of Electrical and Computer Engineering

North South University, Dhaka

Subject: Submission of Capstone Project Report on **"Vehicle Detection, Tracking, and Counting System with Number Plate Recognition in a Petrol Station"**

Dear Sir,

With due respect, we would like to submit our Capstone Project Report on "Vehicle Detection, Tracking, and Counting System with Number Plate Recognition in a Petrol Station" as a part of our BSc program. The report deals with effectively managing a petrol station's operations, security, and customer satisfaction, the fusion of vehicle tracking, and number plate recognition systems that stand as an indispensable technological advancement. This project was very valuable to us as it helped us gain experience in the practical field and apply it in real life. We tried to the maximum competence to meet all the dimensions required from this report.

We will be highly obliged if you kindly receive this report and provide your valuable judgment. It would be our immense pleasure if you find this report useful and informative to have an apparent perspective on the issue.

Sincerely Yours,

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Shadman Sakib

ECE Department

North South University, Bangladesh

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Rahul Deb Roy

ECE Department

North South University, Bangladesh

.....

Moriom Islam Mou

ECE Department

North South University, Bangladesh

APPROVAL

Shadman Sakib (ID # 1931024042), Rahul Deb Roy (ID # 1931132042), and Moriom Islam Mou (ID # 1931333042) from Electrical and Computer Engineering Department of North South University have worked on the Senior Design Project titled "Vehicle Detection, Tracking, and Counting System with Numberplate Recognition in a Petrol Station" under the supervision of Dr. Shazzad Hosain partial fulfillment of the requirement for the degree of Bachelors of Science in Engineering and has been accepted as satisfactory.

Supervisor's Signature

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Dr. Shazzad Hosain

Professor

Department of Electrical and Computer Engineering

North South University

Dhaka, Bangladesh.

Chairman's Signature

…….

Dr. Rajesh Palit

Professor

Department of Electrical and Computer Engineering

North South University

Dhaka, Bangladesh.

DECLARATION

This is to declare that this project is our original work. No part of this work has been submitted elsewhere partially or fully for the award of any other degree or diploma. All project-related information will remain confidential and shall not be disclosed without the formal consent of the project supervisor. Relevant previous works presented in this report have been properly acknowledged and cited. The plagiarism policy, as stated by the supervisor, has been maintained.

ACKNOWLEDGEMENTS

The authors would like to express their heartfelt gratitude towards their project and research supervisor, Dr. Shazzad Hosain, Professor, Department of Electrical and Computer Engineering, North South University, Bangladesh, for his invaluable support, precise guidance, and advice pertaining to the experiments, research and theoretical studies carried out during the course of the current project and also in the preparation of the current report.

Furthermore, the authors would like to thank the Department of Electrical and Computer Engineering, North South University, Bangladesh for facilitating the research. The authors would also like to thank their loved ones for their countless sacrifices and continual support.

ABSTRACT

Vehicle Detection, Tracking, and Counting System with Number Plate Recognition in a Petrol Station

The efficient management of vehicles within a petrol station is a critical aspect of ensuring smooth operations, security, and customer service. In this technological age, the integration of vehicle tracking and number plate recognition systems has become imperative. The primary objective of this system is to provide real-time monitoring of vehicle entry and exit, enabling the station management to accurately track the number of vehicles on the premises at any given time. The system utilizes cameras equipped with license plate recognition software to capture and recognize vehicle number plates as vehicles enter and exit the station. Petrol stations, at the heart of transportation networks, serve as vital nodes for the distribution of fuel and energy resources. Efficiently managing the flow of vehicles through these stations is essential for ensuring smooth operations, enhancing security, and optimizing customer service. After conducting extensive market research, we identified a significant gap in the application of vehicle tracking, counting, and classification technology at petrol stations. Our analysis revealed that this technology had not been effectively implemented in the real world, despite its potential to bring substantial benefits to the industry. The intricate process of detecting, tracking, Bangla Number plate detection and tallying vehicle types within a CCTV surveillance system is an inherently sophisticated yet remarkably efficient operation. For the subsequent stage of vehicle counting, we harnessed the capabilities of Python, the Ultralytics library, and OpenCV. Moreover, the datasets are collected from Kaggle and Roboflow for training purposes.

Keyword – vehicle, detection, OpenCV, Ultralytics