Real-time Surveillance Network System for Traffic Monitoring

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In Partial Fulfillment of the Requirements for the Award of Master of Science Degree (MSc) in Computer Science

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Certification

This is to certify that Abiodun AKANNI with matriculation number LCU/PG/002226 carried out this research work titled "Real-time Surveillance Network System for Traffic Monitoring and Reporting" in the Department of Computer Science, Faculty of Natural and Applied Sciences, Lead City University, Ibadan, Oyo State, for the award of Master of Science (MSc) in Computer Science and that this has not been previously submitted.

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Dr. Wilson Sakpere **Date**

Supervisor

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Dr. Wilson Sakpere

Head of Department **Date**

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Dedication

This research work is dedicated to God almighty and my parent Mr Adedolapo Akanni and Mrs Morufat Akanni.

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Acknowledgement

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Abstract

As urban populations continue to surge, the prevalence of traffic-related issues escalates, leading to heightened concerns over public safety, property damage, and various offenses posing significant risks to both life and assets. Traditional solutions have relied heavily on infrastructure-integrated systems, which are often costly to install and maintain, lacking flexibility and scalability. This study aims to develop an approach to address these challenges by creating a low-cost, real-time vehicular monitoring and reporting system. The system employs readily available technology, built on a foundation of electronic architecture, encompassing a Network Unit (Tunnel Server), Mobile Unit (Mobile App), and number plate detection unit. The process involves establishing an HTTP connection between the Tunnel Server and Mobile App. A tunnelling server, a web application, and a number plate detection unit collaborate to detect license plates in real-time. ML5.js and OpenCV.js are employed to process captured frames, identify objects, and extract license plate numbers. The number plate was identified through the utilisation of the find number plate function (Open.js). This function operates by analysing the image, converting it to grayscale, performing edge detection, and subsequently identifying contours to determine the presence of a number plate based on its distinctive feature. The system's performance is evaluated in terms of response time (80%), stability (70%), and usability (84%). The system demonstrates exceptional compatibility with various operating systems and browsers and boasts good scalability and throughput. This research marks a significant technological achievement in the realm of web and mobile applications, computer vision, and artificial intelligence. The developed system successfully detects license plate numbers, promising enhanced public safety, property protection, and traffic management. It is therefore recommendations that future enhancements such as expanding its object recognition capabilities and maintaining a robust testing and quality assurance process to ensure its continued excellence.

Keywords: Computer Vision, Electronic, Infrastructure-Integrated Systems, License Plates, Number Plate Detection, Object Recognition, OpenCV.js, Tunnel Server

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