IJARETY

International Journal of Advanced Research in Education and TechnologY (IJARETY)

Volume 11, Issue 3, May-June 2024

Impact Factor: 7.394

www.ijarety.in editor.ijarety@gmail.com

International Journal of Advanced Research in Education and TechnologY(IJARETY)

| ISSN: 2394-2975 | www.ijarety.in| | Impact Factor: 7.394| A Bi-Monthly, Double-Blind Peer Reviewed & Referred Journal |

|| Volume 11, Issue 3, May-June 2024 ||

DOI:10.15680/IJARETY.2024.1103052

Smartplate Enhanced Vehicle Identification for Anti-Theft Surveillance

Dr.V.P.Gladis Pushparathi[1], Deepika.L[2], Gandhavalli Chaithanya Sri[3], Likitha.A[4]

Professor, Department of Computer Science and Engineering, Velammal Institute of Technology, Panchetti, Chennai, Tamil Nadu, India[1]

UG Scholar, Department of Computer Science and Engineering, Velammal Institute of Technology, Panchetti, Chennai, Tamil Nadu, India[2 3 4]

ABSTRACT: This system introduces an advanced system tailored for the swift and precise identification of vehicle license plates, integrating cutting-edge techniques like connected component analysis (CCA) and template matching. The process encompasses a streamlined approach to number plate extraction, character splitting, and template matching, ensuring seamless operation across diverse environmental conditions and emphasizing rapid recognition, especially in daylight. The system's versatility extends to various applications, spanning from automatic toll collection to traffic law enforcement, parking lot access control, and road traffic monitoring. Central to its functionality is the utilization of AI-driven templates for character identification, enhancing both accuracy and efficiency in license plate recognition tasks. Noteworthy features include the model's simplicity and swift processing in number plate segmentation and character recognition, contributing to an overall enhanced system performance. This system represents a notable advancement in real-time vehicle plate detection, aligning closely with the concept of Advanced License Plate Recognition for theft vehicle detection. The abstract seeks to provide a comprehensive overview of the system's capabilities, applications, and contributions to the field of vehicle security and surveillance.

KEYWORDS: vehicle license plate, traffic law enforcement, Connected component analysis.

I. INTRODUCTION

In today's dynamic urban environment, effective traffic management and swift emergency response are paramount for ensuring public safety and security. However, traditional traffic control systems often struggle to prioritize emergency vehicles, leading to delays in critical situations. Additionally, the rising instances of vehicle theft pose significant challenges for law enforcement agencies.

To address these issues, this project introduces an innovative solution: Theft vehicle detection system using automatic license plate recognition capabilities. This system leverages advanced sensor technologies, communication infrastructure, and intelligent algorithms to enhance traffic flow, expedite emergency response, and combat vehicle theft in real-time. By automatically clearing intersections for emergency vehicles and identifying stolen vehicles with precision, this system promises to revolutionize urban traffic management and law enforcement. Through this report, we delve into the design, implementation, and evaluation of this cutting-edge solution, highlighting its potential to improve public safety and streamline emergency services.

The introduction of this innovative system represents a significant technological leap, ushering in advancements for the accurate and rapid identification of two-wheeler license plates. Through the integration of advanced techniques like connected component analysis and template matching, the system aims to seamlessly operate under diverse environmental conditions, with a specific emphasis on achieving high-speed recognition, especially in daylight scenarios. This groundbreaking solution bears substantial implications for practical applications, including automatic toll collection, traffic law enforcement, parking lot access control, and road traffic monitoring. By harnessing the power of Artificial Intelligence, the system elevates character identification, authentication processes, and overall efficiency, solidifying its status as a cutting-edge solution in the domain of detection.

II. LITERATURE REVIEW

Literature research is the most important step in the software development process. Before creating a tool, it is important to determine the time factor, profitability, and company strengths. With these in place, the next 10 steps are to

| ISSN: 2394-2975 | www.ijarety.in| | Impact Factor: 7.394| A Bi-Monthly, Double-Blind Peer Reviewed & Referred Journal |

|| Volume 11, Issue 3, May-June 2024 ||

DOI:10.15680/IJARETY.2024.1103052

decide which operating systems and languages you can use to develop your tools. Once programmers start building tools, they need a lot of external support. This support can come from experienced programmers, books, or websites. The above evaluations will be considered in the development of the proposed system before building the system.

Craig B. Rafter, Student Member, IEEE, Bani Anvari, Member, IEEE, Simon Box, and Tom Cherrett" Augmenting Traffic Signal Control Systems for Urban Road Networks With Connected Vehicles",2020.
The paper discusses the challenges posed by increasing traffic volumes in urban areas, particularly regarding network delay and capacity optimization. It introduces a novel traffic signal control algorithm called Multi-mode Adaptive Traffic Signals (MATS) that leverages connected vehicle data to improve traffic flow and reduce delays at urban intersections. The algorithm combines position information from connected vehicles with data from existing infrastructure like inductive loops and signal timing plans to perform decentralized traffic signal control. The MATS algorithm is designed to adapt to scenarios with varying levels of connected vehicle presence, including low numbers of connected vehicles where traditional traffic signal control strategies may be limited.

Keke long, chengyuan ma, zehao jiang, yizhe wang, and xiaoguang yang,"Integrated optimization of traffic signals and vehicle trajectories at intersection with the consideration of safety during signal change",2020.
This paper develops an integrated optimization of traffic signals and vehicle trajectories. The signal is optimized to improve the intersection efficiency and the calculation of intergreen interval (IGI) serves as constraints to guarantee vehicle safety during signal changing. Then the vehicle trajectory in the approach lane and inside intersection is optimized to increase fuel efficiency. The proposed method is evaluated by microscopic simulation, comparing with the actuated signal control (ASC) method and an ad hoc cooperation method between traffic signals and vehicles. Results indicate the proposed control algorithm is effective to prevent conflicts during signal changing periods. Operation Efficiency and fuel efficiency are improved. The benefit is 24.9% on vehicle delay, and is 5.5% on fuel efficiency. The proposed system can potentially be used in real- time.

Mouna zouari mehdi ,habib m. Kammoun,(senior member, ieee),norhene gargouri benayed ,dorra sellami , (senior member, ieee),and alima damak masmoudi,"Entropy-based traffic flow labeling for CNN-Based Traffic Congestion Prediction From Meta-Parameters",2022.
Traffic congestion affects quality of life by inducing frustration and wasting time. The congestion is also critical to vehicles with high emergencies such as ambulances or police cars. Thisleads to additional CO2 emissions. Traffic management requires the accurate modeling of congestion levels. Two main observable parameters identify the congestion state of a city: vehicle speed and density. Congestion has an intuitive definition rather than a quantitative one, and is associated with the disorder and randomness occurring in traffic parameters. Therefore, statistical analysis offers an efficient and natural framework for modeling such disorders. In this study, a differential-entropy-based approach was proposed for labelling purposes. Subsequently, supervised congestion prediction from traffic meta- parameters based on aconvolutional neural network was proposed. Traffic parameters includes node localization, date, day of theweek, time of day, special road conditions, and holidays. The proposed model is validated on the CityPulsedataset, which is a set of vehicle traffic records, collected in Aarhus city in Denmark over a period of six months, for 449 observation nodes. Simulation results on the CityPulse dataset illustrate that the proposed approach yields accurate prediction rates for different nodes considered. The proposed system can preventtraffic congestion by reorienting the drivers to follow other itineraries.

III. METHODOLOGY

The proposed system utilizing advanced AI techniques, including deep learning and neural networks, the system aims to enhance adaptability and accuracy in license plate identification under diverse environmental conditions. By utilizing AI for feature extraction and learning, the proposed system enhances its capability to adapt to varying font styles, plate sizes, and environmental factors, ultimately improving overall accuracy and high-speed recognition. By using a detailed database and smart algorithms, the system can double-check the recognized license plates to make sure they're correct. It's like having a thorough checklist and a smart assistant to help you make sure everything is correct. This improvement helps the system work better and makes it more trustworthy in identifying license plates accurately.

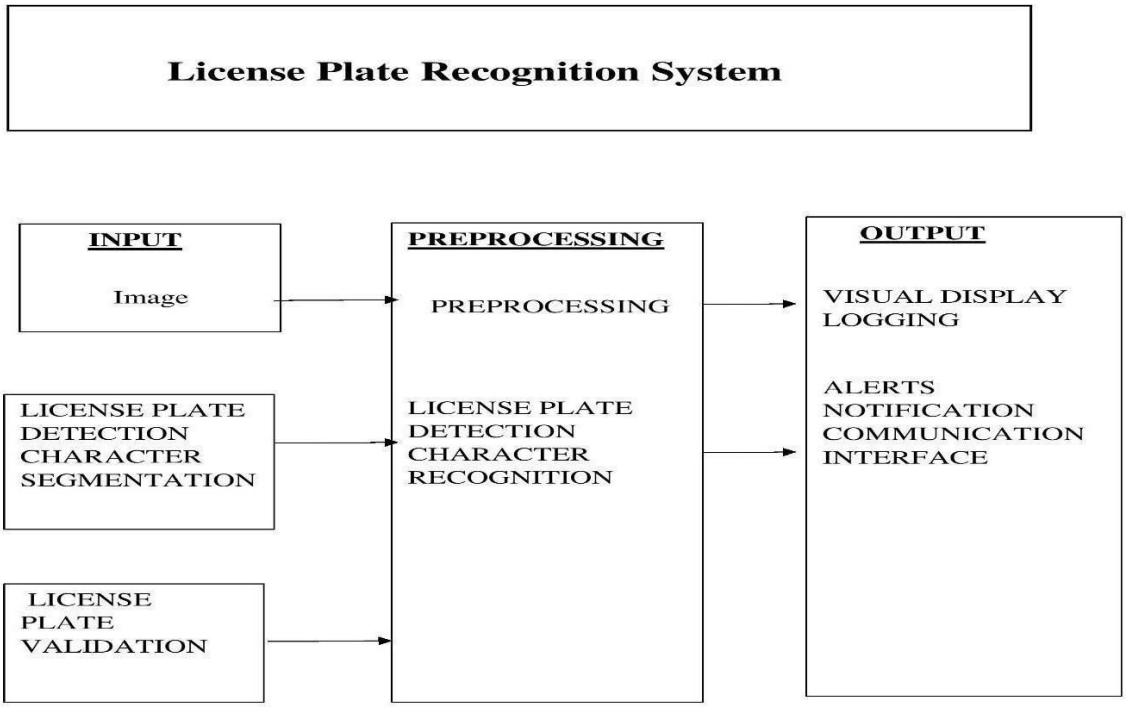
International Journal of Advanced Research in Education and TechnologY(IJARETY)

| ISSN: 2394-2975 | www.ijarety.in| | Impact Factor: 7.394| A Bi-Monthly, Double-Blind Peer Reviewed & Referred Journal |

|| Volume 11, Issue 3, May-June 2024 ||

DOI:10.15680/IJARETY.2024.1103052

ARCHITECTURE DIAGRAM OF THE PROPOSED SYSTEM:



IV. RESULTS AND DISCUSSION

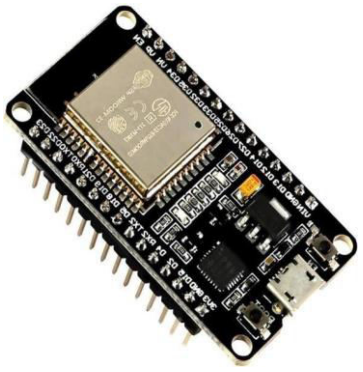
MODULES IDENTIFIED:

Esp32 module, IR sensor module,Traffic signal setup module

ESP32 MODULE:

- Dual-core Microcontroller: ESP32 boasts a dual-core Xtensa LX6 microcontroller, enhancing processing capabilities over its predecessor, the ESP8266.
- Wi-Fi and Bluetooth Connectivity: Equipped with both Wi-Fi and Bluetooth support, ESP32 facilitates a broad spectrum of IOT applications, from household automation to industrial monitoring.
- Low Power Consumption: Engineered for minimal power consumption, ESP32 is wellsuited for battery-operated devices and energy-efficient IOT solutions.
- Rich Peripheral Interface: With a diverse array of peripheral interfaces such as SPI, I2C, UART, ADC, DAC, and PWM, ESP32 seamlessly integrates with various sensors and actuators, catering to a wide range of IOT projects.

DIAGRAM:



| ISSN: 2394-2975 | www.ijarety.in| | Impact Factor: 7.394| A Bi-Monthly, Double-Blind Peer Reviewed & Referred Journal |

|| Volume 11, Issue 3, May-June 2024 ||

DOI:10.15680/IJARETY.2024.1103052

IR SENSOR MODULE:

- IR sensors, also known as infrared sensors, detect infrared radiation emitted by objects.
- They are widely used in various applications, including proximity sensing, motion detection, and temperature measurement, due to their sensitivity and reliability in detecting heat signatures.
- In traffic management systems, IR sensors play a crucial role in detecting vehicle presence and congestion levels at intersections, enabling dynamic adjustments of traffic signals for improved traffic flow. IR sensors are integral to smart home devices, enabling features like automatic lighting control based on occupancy detection and temperature regulation for energy efficiency.

DIAGRAM:

TRAFFIC SIGNAL SETUP MODULE:

- The initial step involves designing the layout of the traffic signals, including the placement of LEDs (Light Emitting Diodes) for each signal head.
- LED lights offer energy efficiency and long lifespan, making them ideal for traffic signal applications. LEDs provide enhanced brightness and visibility compared to traditional incandescent bulbs, especially in adverse weather conditions such as fog or rain.
- Their quick response time allows for rapid switching between signal phases, contributing to smoother traffic flow and reduced congestion.

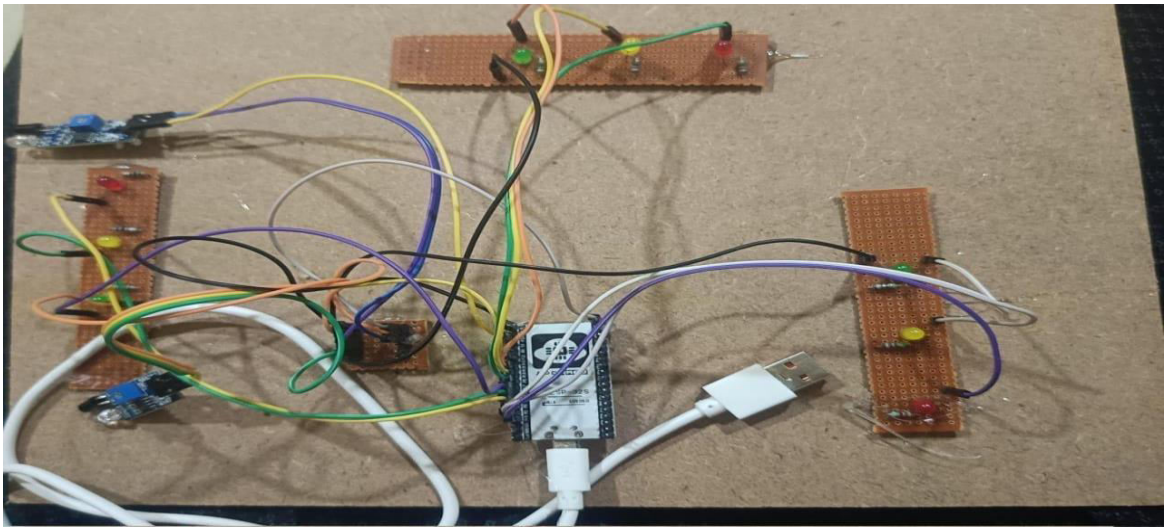
DIAGRAM:

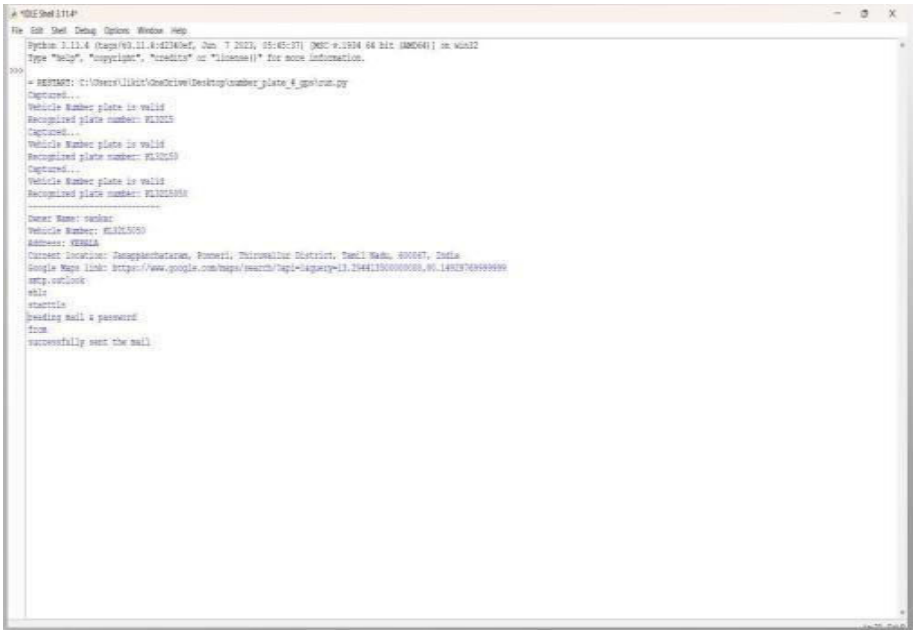
| ISSN: 2394-2975 | www.ijarety.in| | Impact Factor: 7.394| A Bi-Monthly, Double-Blind Peer Reviewed & Referred Journal |

|| Volume 11, Issue 3, May-June 2024 ||

DOI:10.15680/IJARETY.2024.1103052

SAMPLE OUTPUT:



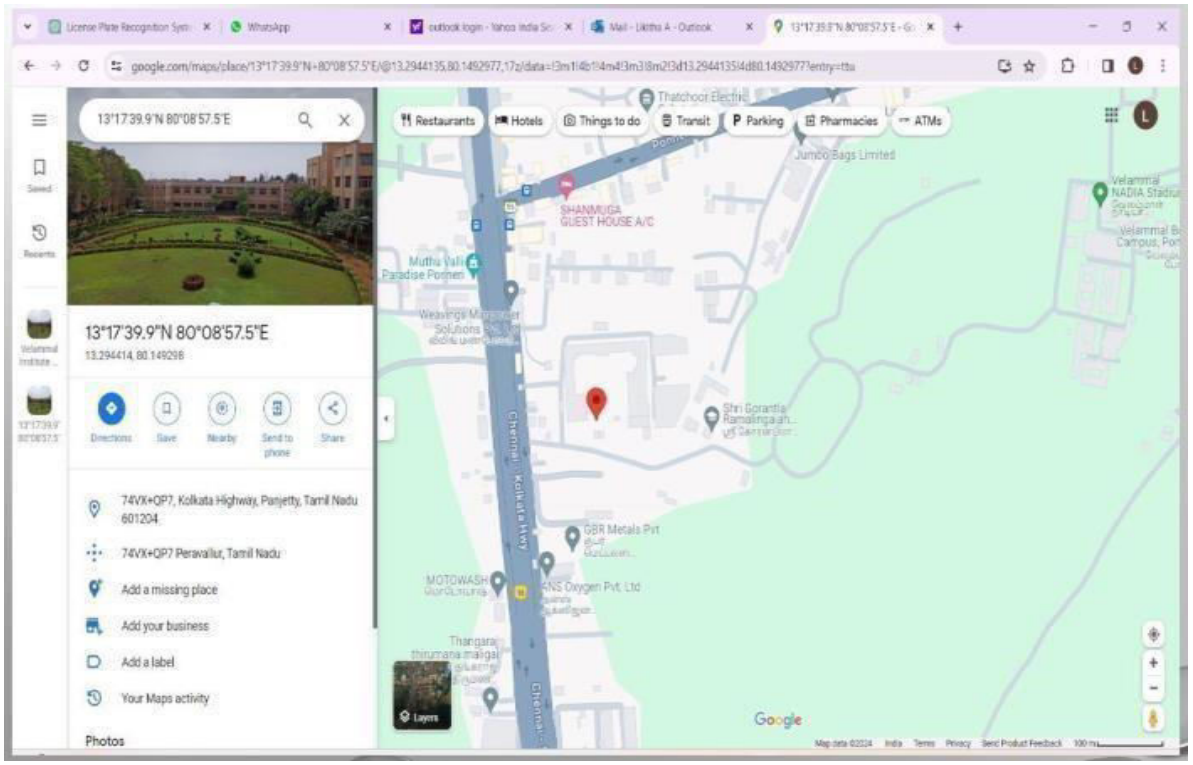


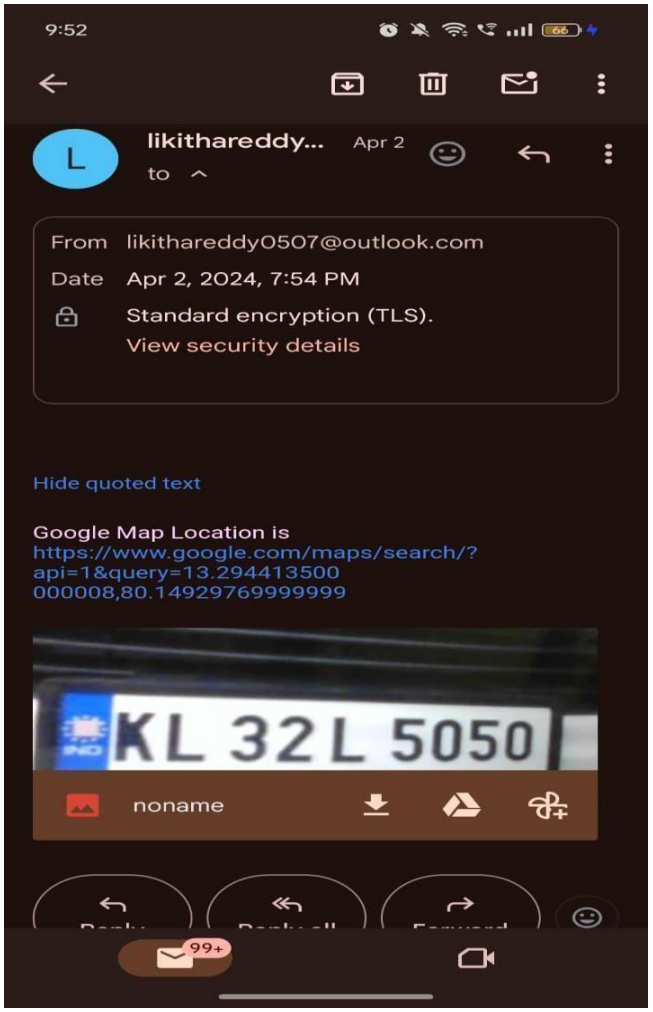
International Journal of Advanced Research in Education and TechnologY(IJARETY)

| ISSN: 2394-2975 | www.ijarety.in| | Impact Factor: 7.394| A Bi-Monthly, Double-Blind Peer Reviewed & Referred Journal |

|| Volume 11, Issue 3, May-June 2024 ||

DOI:10.15680/IJARETY.2024.1103052





| ISSN: 2394-2975 | www.ijarety.in| | Impact Factor: 7.394| A Bi-Monthly, Double-Blind Peer Reviewed & Referred Journal |

|| Volume 11, Issue 3, May-June 2024 ||

DOI:10.15680/IJARETY.2024.1103052

V. CONCLUSION

In conclusion, the integration of automatic license plate recognition (ALPR) technology into theft vehicle detection systems represents a significant advancement in enhancing security measures for various environments, including parking lots, residential areas, commercial premises, and transportation facilities. By leveraging ALPR technology alongside sophisticated detection and tracking mechanisms, such systems offer a comprehensive solution for identifying and deterring unauthorized vehicle access and potential theft incidents.

ALPR technology enables the automatic capture and recognition of license plate numbers from vehicle images, providing valuable data for identifying stolen vehicles or those associated with suspicious activities. When integrated into theft vehicle detection systems, ALPR serves as a critical component, enabling real-time monitoring and analysis of vehicle movements within the monitored area. Furthermore, the inclusion of advanced detection modules, such as sensor-based intrusion detection, vehicle tracking, and geofencing capabilities, enhances the overall effectiveness of theft vehicle detection systems. These modules work in tandem with ALPR technology to provide a multi-layered approach to security, enabling rapid detection, response, and mitigation of security threats related to unauthorized vehicle access or theft incident.

REFERENCES

1. K. Mohi-Alden, M. Omid, M. S. Firouz and A. Nasiri, "Design and evaluation of an intelligent sorting system for bell pepper using deep convolutional neural networks", J.Food Sci., vol. 87, no. 1, pp. 289-301, Jan. 2022
2. O. Bezsonov, O. Lebediev, V. Lebediev, Y. Megel, D. Prochukhan and O. Rudenko, "Breed recognition and estimation of live weight of cattle based on methods of machine learning and computer vision", Eastern-Eur. J. Enterprise Technol., vol. 6, no. 9, pp. 64- 74, Dec. 2021.
3. A. Arshaghi, M. Ashourin and L. Ghabeli, "Detection and classification of potato diseases potato using a new convolution neural network architecture", Traitement Signal, vol. 38, no. 6, pp. 1783-1791, Dec. 2021.
4. M. Kim, J. Jeong and S. Kim, "ECAP-YOLO: Efficient channel attention pyramid YOLO for small object detection in aerial image", Remote Sens., vol. 13, no. 23, pp. 4851, Nov. 2021.
5. P. R. Miranda, D. Pestana, J. D. Lopes, R. P. Duarte, M. P. Véstias, H. C. Neto, et al., "Configurable hardware core for IoT object detection", Future Internet, vol. 13, no. 11, pp. 280, 2021.

International Journal of Advanced Research in Education and Technology

ISSN: 2394-2975 **Impact Factor: 7.394**

www.ijarety.in editor.ijarety@gmail.com