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ROADEYE – A SAFER DRIVE

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Abstract : Potholes are a major nuisance for drivers, and can also cause significant damage to vehicles. RoadEye is a pothole detection system that uses dashcam footage to identify and report potholes to road maintenance authorities. This system can help to make roads safer and more efficient, and can also save drivers money on repairs. RoadEye uses a deep learning model to identify potholes in dashcam footage. The model has been trained on a large dataset of images of potholes. When the model is presented with a new image, it can identify whether or not it contains a pothole, and if so, it can easily add its location on a map, so that users can be alerted while approaching a pothole. RoadEye can help to improve data collection on road conditions. This data can be used to make informed decisions about road maintenance and infrastructure planning. RoadEye can be used to create a crowdsourced database of potholes. This database can be used by drivers to plan their routes and avoid potholes.

IndexTerms **– Dashcam footage, Driver alert, Location mapping, Pothole detection, Road maintenance, Road safety.**

I. INTRODUCTION

INTRODUCTION

Road safety remains a paramount concern in modern society, with road conditions playing a significant role in ensuring the safety and efficiency of transportation systems. Potholes, a ubiquitous and recurrent issue, pose threats not only to vehicle integrity but also to the safety of road users, necessitating timely and effective intervention. This paper introduces RoadEye, an avant-garde pothole detection system that epitomizes the convergence of technology and community-driven initiatives to enhance road safety. Utilizing dashcam footage, RoadEye serves as a proactive guardian, meticulously identifying and reporting potholes to maintenance authorities, thereby fostering a proactive approach to road maintenance. Beyond its functional prowess, RoadEye stands as a testament to the power of community collaboration in addressing public safety concerns. It transforms individual users into active contributors towards a collective mission, creating a synergistic network of drivers dedicated to improving road conditions. This research paper aims to explore the multifaceted impacts of RoadEye, examining its potential to revolutionize road safety measures, enhance communal engagement, and foster a more connected and proactive society. By unraveling the societal benefits and transformative capabilities of RoadEye, this study seeks to underscore the significance of innovative technology in sculpting a safer, more efficient, and collectively empowered future for road transportation. The integration of RoadEye into daily road use, facilitated by an uncomplicated setup of its application along with a dashcam, introduces a paradigm shift in how road maintenance and safety are approached. This system is not just a technological solution; it embodies a proactive strategy that anticipates and addresses road safety issues before they escalate into more severe problems. Through its continuous monitoring and precise geolocation capabilities, RoadEye not only identifies potholes but also provides real-time, navigable alerts to users, thereby mitigating the risk of accidents and vehicle damage.

II. REVIEW OF LITERATURE SURVEY

2.1 Literature Survey

The following chapter is a literature survey of the previous research papers and research which gives detailed information about the previous system along with its advantages and disadvantages.

Deisy Chaves, Eduardo Fidalgo, Enrique Alegre, et.al [1]. The paper proposes a real-time pothole detection system using deep learning. The system achieves high accuracy and can detect potholes at distances reaching a hundred meters. It has the potential to improve road safety by alerting drivers to potholes ahead of time. The real-time pothole detection system using deep learning proposed in the paper has the potential to significantly improve road safety by alerting drivers to potholes ahead of time. This can help to reduce the number of accidents caused by potholes, which can lead to serious injuries and even fatalities. In addition to improving road safety, the system can also help to reduce vehicle maintenance costs. Potholes can cause significant damage to

vehicles, such as damaged tires, wheels, and suspension components. By quickly and efficiently detecting and repairing potholes, the system can help to prevent the damage

Sujy Han, Tae Bok Lee, et.al [2]. The paper presents an Android-based pothole detection application with notable advantages: cost-effectiveness through smartphone use, real-time detection, and accurate algorithms. However, it depends on smartphone availability, faces accuracy challenges, and has a narrow focus on pothole detection. The application is relatively inexpensive to develop and deploy, as it uses smartphones, which are already widely available. This makes it a cost-effective solution for improving road safety in developing countries and other regions where resources may be limited. The application uses accurate algorithms to identify potholes in smartphone images. This helps to reduce the number of false positives and negatives, ensuring that drivers are only warned about actual potholes. Additionally, the application could be integrated with existing transportation systems, such as public transportation systems and ride-sharing services. This would make the application accessible to people who do not have their own smartphones.

Dilnoza Mamieva, Akmalbek Bobomirzaevich Abdusalomov, et.al [3]. The paper proposes a simple and fast method for detecting potholes in dash-cam videos using spatio-temporal saliency. The method is effective in detecting potholes in the presence of other objects and is based on the dash-cam camera, making it a cost-effective solution for monitoring civil infrastructure. In other words, the paper proposes a new way to detect potholes in dash-cam videos that is fast, simple, and effective. The method uses spatio-temporal saliency, which is a measure of how conspicuous a region is in both space and time. This allows the method to detect potholes even when they are surrounded by other objects, such as cars, pedestrians, and road signs. The method is also based on the dash- cam camera, which is a relatively inexpensive and widely available device. This makes the method a cost-effective solution for monitoring civil infrastructure, such as roads and bridges.

Viktor Denes Huszar, Vamsi Kiram Adhikarla, (Member, IEEE), Imre Negyesi, Csaba Krasznay, et.al [4]. The paper introduces a cost-effective pothole detection system with efficient communication and wide coverage. It fosters public responsibility. However, it relies on continuous internet, high-quality images, and needs a larger training dataset. Smartphone placement affects accuracy. The system could be made more robust to low- quality images by developing more sophisticated algorithms that can better account for factors such as lighting conditions and noise. Additionally, the system could provide users with feedback on the quality of their images, so that they can take steps to improve the quality of future images. The system's accuracy could be improved by training it on a larger dataset of pothole images. This dataset could be collected from a variety of sources, such as government agencies, private companies.

Shivalila Hangaragi, Tripty Singh, Neelima N, et.al [5]. The paper discusses the use of artificial intelligence and the SSD algorithm to detect potholes and bumps on roads, which can improve road safety, fuel economy, and reduce traffic congestion. Potholes and bumps can cause a number of problems for drivers, including damage to vehicles, increased fuel consumption, and accidents. By using AI and the SSD algorithm to detect potholes and bumps, we can develop systems that can alert drivers to their presence and help them to avoid them.It Improves road safety by alerting drivers to the presence of potholes and bumps, we can help them to avoid accidents. This is especially important for drivers who are traveling at high speeds or who are not familiar with the road. Overall, the use of AI and the SSD algorithm to detect potholes and bumps is a promising new technology with the potential to make a significant impact on road safety, fuel economy, and traffic congestion. As this technology continues to develop, we can expect to see even more innovative and effective ways to use it to improve our roads and make them safer for everyone.

Raghda Awad Shaban Naseri, Ayça Kurnaz, Hamee Mutlag Farhan, et.al [6]. The paper discusses three pothole detection methods: vision-based, sensor-based, and 3D reconstruction based. Vision-based is real-time but imprecise, sensor-based is real-time with shape limitations, and 3D reconstruction is accurate but costly. Sensor- based pothole detection uses sensors to measure the vibrations or impacts caused by potholes. This method is also real-time, but it is limited by the shape of the potholes that it can detect. Sensor-based methods are more expensive than vision-based methods, but they are also more accurate. 3D reconstruction-based pothole detection uses lasers or other sensors to create a 3D model of the road surface. This method is the most accurate of the three methods, but it is also the costliest. Vision-based pothole detection is a real-time method that uses cameras to capture images of the road surface. The images are then processed using computer vision algorithms to identify potholes.

Nadia Mumtaz, Naveed Ejaz, Shabana Habib, et.al [7]. The proposed solution for pothole detection from dash camera images using YOLOv5 achieves higher detection accuracy at faster detection speeds, while enabling tradeoffs between accuracy and speed with three different model size options. By detecting potholes more accurately and quickly, the proposed solution can help to alert drivers to hazards ahead of time, giving them more time to react and avoid accidents. Potholes can cause significant damage to vehicles, such as damaged tires, wheels, and suspension components. By detecting and repairing potholes more quickly, the proposed solution can help to reduce vehicle maintenance costs.The proposed solution can help to improve the efficiency of road maintenance by providing real-time data on the location and severity of potholes. Overall, the proposed solution for pothole detection from dash camera 6 images using YOLOv5 is a promising new technology with the potential to make a significant impact on road safety, vehicle maintenance costs, road maintenance efficiency, and flexibility.

Tao Wang, Kaihao Zhang, Xuanxi Chen, Wenhan Luo, et.al [8]. The paper proposes an automatic pothole detection system using deep learning algorithms to improve road safety by detecting potholes in real-time. The system could be integrated with navigation apps to provide real-time alerts to drivers about potholes on their route. This would help drivers to avoid potholes and improve the overall driving experience. The system could be used to create a crowd-sourced database of potholes. This database could be used by drivers to plan their routes and avoid potholes. It could also be used by road maintenance authorities to prioritize

repairs. The system could be used to identify areas where potholes are more likely to form. This information could then be used to target preventive maintenance efforts, which can help to reduce the number of potholes that form in the first place.

Aparna, Yukti Bhatia, Rachna Rai, Varun Gupta et.al [9]. The presence of potholes on the roads is one of the major causes of road accidents as well as wear and tear of vehicles. In order to solve this problem, various techniques have been implemented ranging from manual reporting to authorities to the use of vibration-based sensors to 3D reconstruction using laser imaging. But all these techniques have some drawbacks such as the high setup cost, risk while detection or no provision for night vision. Therefore, the objective of this work is to analyze the feasibility and accuracy of thermal imaging in the field of pothole detection. After collecting a suitable amount of data containing the images of potholes under various conditions and weather, and implementing augmentation techniques on the data, convolutional neural networks approach of deep learning has been adopted, that is a new approach in this problem domain using thermal imaging. Also, a comparison between the self-built convolutional neural model and some of the pre-rained models has been done. The results show that images were correctly identified with the best accuracy of 97.08% using one of the pre-trained convolutional neural networks based residual network models.

Pratiksha Chavan, Dhanashri Mane, Diksha Chavan, et.al [10]. There are over 64 or more million kilometers of road in the world. India is the second-largest road network in the world. Potholes are not a new issue. All countries almost have the similar problem. One of the major problems in countries is maintenance of roads include potholes. Detecting and reporting the existence of potholes to responsible departments can save the roads from getting worse. However, detecting potholes manually is a labor-intensive and time-consuming task as well as 7 expensive procedures. In order to solve this problem, various techniques have been implemented ranging from manual reporting to authorities to the use of vibration-based sensors to 3D reconstruction using laser imaging. But all these techniques have some drawbacks such as the high setup cost, risk while detection or no provision for night vision. Because of this we designed a smart pothole reporting system, so that all the problems could be reported to the concerned authorities as soon as the problem arises. In this paper we present our approach to building a generalized learning model for pothole detection. We apply four data-sets that contain a range of image and environment conditions. Using the Faster RCNN object detection model, we demonstrate the extent to which pothole detection models can generalize across various conditions.

Kaushik Goswami, Soumyadip Chattopadhyay, et.al [11]. The paper is intended to study and develop a custom trained machine learning model which can detect potholes on road in real-time. Potholes and Road Craters are one of the key contributors of the numbers of accidents take place each year. A comparison for selection of object detection algorithm has been done in this paper. The proposed solution uses You Only Look Once (YOLO) version 7 object detection algorithm to train and be able to detect potholes and road craters. After training the model with the custom dataset, the model has achieved a precision of 0.94, recall value of 0.98. The map of the proposed solution 94.76%. The solution is able to detect potholes in both daylit and low-light real-time scenarios. The proposed solution has been found working with an average accuracy of almost 95%. Although, there is many scopes of improvements in the solution. As it has been found out that the proposed solution is unable to detect some of the potholes in low-light environments or in night. An ecosystem of detection and alerting process can be developed by storing the Geo Locations of the potholes detected by the proposed solution, with the help of GPS, and the locations can be stored on a cloud database, which can be used to alert any vehicle coming within the proximity of that particular pothole by constantly comparing the locations of the pothole and the vehicle.

Mohan Prakash B1, Sriharipriya K.C, et.al [12]. The road is the most commonly used means of transportation and serves as a country's arteries, so it is extremely important to keep the roads in good condition. Potholes that happen to appear in the road must be repaired to keep the road in good condition. Spotting potholes on the road is difficult, especially in a country like India where roads stretch millions of kilometers across the country. Therefore, there is a need to automate the identification of potholes with high speed and real-time precision. YOLOX is an object detection algorithm and our main goal of this article is to train and analyze the YOLOX model for pothole detection. The YOLOX model is trained with a pothole dataset and the results 8 obtained are analyzed by calculating the accuracy, recall and size of the model which is then compared to other YOLO algorithms. The experimental results in this article show that the YOLOX-Nano model predicts potholes with higher accuracy compared to other models while having low computational costs. We were able to achieve an Average Precision (AP) value of 85.6% from training the model and the total size of the model is 7.22 MB. The pothole detection capabilities of the newly developed YOLOX algorithm have never been tested before and this paper is one of the first to detect potholes using the YOLOX object detection algorithm.

Young-Mok Kim, Young-Gil Kim, Seung-Yong Son, Soo-Yeon Lim et.al [13]. Potholes, a kind of road defect, can damage vehicles and negatively affect drivers' safe driving, and in severe cases can lead to traffic accidents. Efficient and preventive management of potholes in a complex road environment plays an important role in securing driver safety. It is also expected to contribute to the prevention of traffic accidents and the smooth flow of traffic. In the past, pothole detection was mainly performed via visual inspection by human experts. Recently, automated pothole-detection methods apply various technologies that converge basic technologies such as sensors and signal processing. The automated pothole-detection methods can be classified into three types according to the technology used in the pothole-recognition process: a vision-based method, a vibration-based method, and a 3D reconstruction-based method. In this paper, three methods are compared, and the strengths and weaknesses of each method are summarized.

Ramsha Suhail, Harleen Boparai, et.al [14]. Roadways have gained immense popularity and preference worldwide among other means of transportation. Orderly and well-maintained roads provide vital contribution to economic growth. They pervade areas and helps to simulate economic and social development. In developing countries like India, maintenance of roads is an emerging concern as it creates disturbances to smooth travel and cause damage to vehicles. The key to monitor road conditions is by detecting road irregularities including potholes, humps, roughness levels etc. These irregularities have major impact on traffic safety and driving comfort to passengers. This study proposes a cost effective and power efficient solution for pothole detection. Here, a vision-based approach is utilized to form an advanced piezoelectric sensor system in an unstructured habitat with the aim

to prefect road surface, discover potholes and predict their extremity. Further, GPS determines the area of the potholes at local servers.

Veronika Adamova [15]. In recent years, there has been a huge boom in the market in terms of both supply and demand for dashcams. This stems from the purpose of the camera installed in the vehicle. Dashcams are currently becoming an important aid in solving various adverse incidents, such as detecting violations of traffic regulations and other laws and recording and clarifying the course of a traffic accident or other criminologically relevant event. The purpose of this camera is to monitor the space in front and behind the vehicle, or the situation inside the vehicle. The content of this article is aimed at acquainting the reader with basic information about dashcams. Specifically, the individual parts of the article will discuss the importance and significance of the dashcams, the benefits of its use, and the legislative framework that regulates its use. The paper will conclude with a brief overview of innovative approaches based on the application of a dashcam for the purpose of increasing the level of safety of road users while driving a vehicle.

2.2 Analysis Table

Table 1 Analysis Table

Title	Summary	Advantages	TechStack
Real-Time Pothole Detection Using Deep Learning. [1]	This paper proposes a real-time pothole detection system using deep learning. The system achieves high accuracy and can detect potholes at distances reaching a hundred meters. It has the potential to improve road safety by alerting drivers to potholes ahead of time.	1.Real-time detection with high accuracy. 2.Can detect potholes at distances reaching a hundred meters.	SSD, YOLOv3-Darknet53, and YOLOv4-CSP Darknet.
Super-Resolution of Low-Quality Dashcam Images for Realtime Pothole Detection.[2]	The face deblurring advancements use GANs to enhance sharpness. A new approach combines sharp face images and segmentation labels in GANs	1.Improved accuracy. 2. Reduced Co	Super-Resolution Generative Adversarial Networks (SRGANs) and YOLO.
Pothole detection using spatio temporal saliency.[3]	This paper proposes a simple and fast method for detecting potholes in dash-cam videos using spatiotemporal saliency. The method is effective in detecting potholes in the presence of other objects and is based on the dash-cam camera, making it a cost-effective solution for monitoring civil infrastructure.	1.Simple and fast method for real-time pothole detection in dash-cam videos. 2.Uses spatiotemporal saliency making it effective in detecting potholes.	Convolutionary Neural Network and SSD.
An Intelligent Pothole Detection and Alerting System using Mobile Sensors and Deep Learning. [4]	The paper introduces a cost-effective pothole detection system with efficient communication and wide coverage. It fosters public responsibility. However, it relies on continuous internet, high-quality images, and needs a larger training dataset.	1.Cost-effective solution for pothole detection. 2.Wide coverage, even in remote area.	Deep Learning, YOLOv3, sensors, accelerometer.
Enhancement of Potholes Detection using SSD Algorithm.[5]	This paper discusses the use of artificial intelligence and the SSD algorithm to detect potholes and bumps on roads, which can improve road safety, fuel economy, and reduce traffic congestion.	1.Efficient detection of potholes and bumps on roads using artificial intelligence and SSD algorithm. 2.Improved road safety and reduced accidents.	YOLO, CNN, Single Shot Detection.

Review of recent automated pothole detection using YOLO. [6]	This paper discusses three pothole detection methods: vision-based, sensor based, and 3D reconstruction-based. Vision-based is real-time but imprecise, sensor based is real-time with shape limitations, and 3D reconstruction is accurate but costly.	1.The vibration-based method is the most cost- effective and allows real time data processing. 2. These methods can benefit road management and intelligent transportation systems.	YOLO, SSD, CNN and Sensors.
Pothole Detection from Dash Camera Images using YOLOv5. [7]	The proposed solution for pothole detection from dash camera images using YOLOv5 achieves higher detection accuracy at faster detection speeds, while enabling tradeoffs between accuracy and speed with three different model size options.	1. Achieves higher detection accuracy at faster detection speeds compared to previous solutions. 2. Enables tradeoffs between accuracy and speed with three different model size option.	YOLOV5, Convolutionary Neural Network and GPS.
Importance of dashboard camera (Dash Cam) analysis in fatal vehicle–pedestrian crash reconstruction. [8]	The reconstruction of traffic crash dynamics is often challenging, especially when there are no eyewitnesses or the involved parties are unable to provide accurate information. Dash Cams, which are digital video recorders installed in vehicles, can provide objective evidence continuously.	1. Provide objective evidence. 2.Capture specific data for easier reconstruction.	YOLOV5 and CNN.
Convolutional neural networks-based potholes detection using thermal imaging. [9]	The presence of potholes on the roads is one of the major causes of road accidents as well as wear and tear of vehicles. In order to solve this problem, various techniques have been implemented ranging from manual reporting to authorities to the use of vibration-based sensors to 3D reconstruction using laser imaging.	1.Thermal cameras are relatively inexpensive and easy to use. 2. Thermal cameras can detect potholes that are filled with water.	Thermal imaging and convolutional neural networks (CNNs).
Pothole Detection Using Deep Learning. [10]	The pothole detection using artificial intelligence methods can help in better maintenance of the road conditions especially in developing countries where resources are limited. For this purpose, the proposed system based on convolutional neural networks using thermal imaging.	1. Uses thermal imaging which is not affected by lighting conditions. 2. Achieves high accuracy.	Thermal imaging and convolutional neural networks (CNNs).
A Deep Learning Based Approach to Detect Potholes Using YOLO Version 7. [11]	All countries almost have the similar problem. One of the major problems in countries is maintenance of roads include potholes.	1. The proposed approach can detect potholes in real time, which is important for practical applications. 2. The proposed approach is robust to different lighting conditions	YOLO, CNN, Single Shot Detection.
Enhanced pothole detection system using YOLOX algorithm. [12]	Potholes that happen to appear in the road must be repaired to keep the road in good condition. Spotting potholes on the road is difficult, especially in a country like India where roads stretch millions of kilometers across the country. YOLOX is an object detection algorithm and our main goal of this article is to train and analyze the YOLOX.	1.YOLOX is robust to different lighting conditions and road surfaces. 2. YOLOX is a single- stage object detection algorithm, which means that it can detect objects in a single pass.	YoloOX and CNN.

Review of recent automated pothole detection.[13]	This paper discusses three pothole detection methods: vision-based, sensor based, 3D reconstruction-based. Vision-based is real-time but imprecise, sensor- based is real-time with shape limitations, and 3D reconstruction is accurate but costly.	1. The vibration-based method is the most cost- effective and allows real- time data processing. 2. These methods can benefit road management and intelligent transportation systems.	Sensors and GPS.
Automated Sensor based Pothole Detection System for Preventing Unfortunate Causality. [14]	Roadways have gained immense popularity and preference worldwide among other means of transportation. Orderly and well-maintained roads provide vital contribution to economic growth.	1. The system can be powered by a battery or solar panel, making it suitable for use in remote areas. 2. The system can detect potholes in real time.	Piezoelectric sensors and GPS.
Dashcam as a device to increase road safety. [15]	In recent years, there has been a huge boom in the market in terms of both supply and demand for dashcams. This stems from the purpose of the camera installed in the vehicle. Dashcams are currently becoming an important aid in solving various adverse incidents, such as detecting violations of traffic regulations and other.	1. Evidence for accidents and insurance claims. 2. Increased safety.	YOLO and GPS.

III. RESEARCH METHODOLOGY

The methodology adopted for this research encompasses a multifaceted approach integrating dashcam video analysis, deep learning algorithms, GPS mapping, and a driver alert system to bolster road safety measures. Initially, an extensive dataset of dashcam videos will be compiled from a diverse array of vehicles traversing various road conditions. These videos will undergo meticulous preprocessing to ensure data quality and consistency. Subsequently, advanced deep learning models will be developed and fine-tuned to accurately detect and classify potholes in real-time from the dashcam footage. To augment the precision of pothole localization, GPS data will be incorporated, enabling precise geotagging of identified road hazards. This geospatial information will be further integrated with mapping technologies to generate comprehensive visualizations of pothole distributions and hotspots. Concurrently, a robust driver alert system will be devised, leveraging real-time communication protocols to promptly notify drivers of impending road hazards detected along their routes. This system will be meticulously evaluated through rigorous testing scenarios, assessing its effectiveness in providing timely alerts and enhancing driver awareness. By employing this comprehensive methodology, we aim to not only advance technological capabilities in road safety but also contribute to the ongoing efforts in infrastructure maintenance and accident prevention.

3.1 Block Diagram

A block diagram is a diagram of a system in which the principal parts or functions are represented by blocks connected by lines that show the relationships of the blocks.

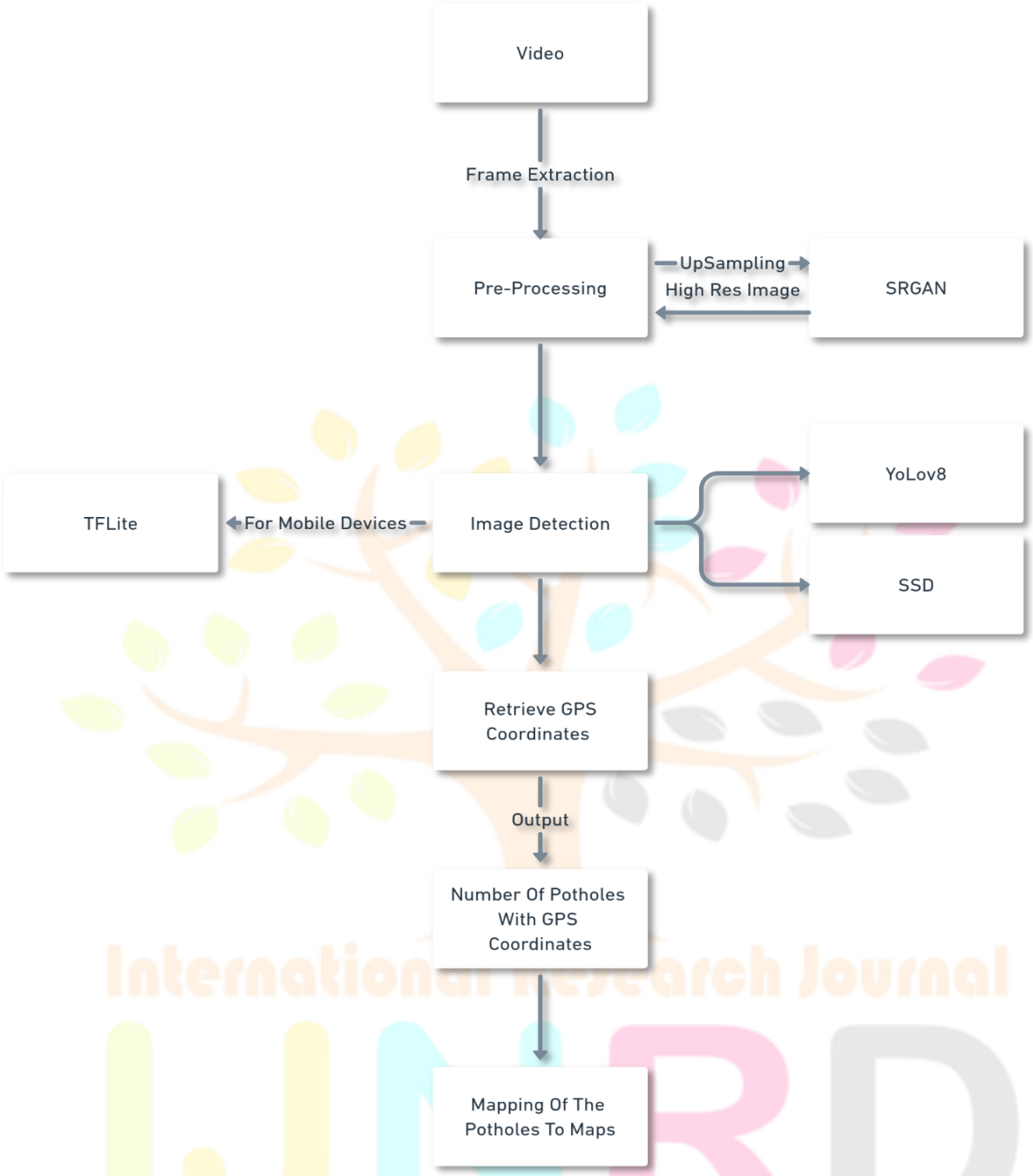

Fig 3.1 Block Diagram

Figu 3.1 depicts the block diagram of Road-Eye. First, capture a video using a camera or smartphone, then extract frames from the video to process individually. Pre-process the frames using upsampling and SRGAN to enhance their resolution, followed by employing object detection algorithms such as YOLOv8 or SSD to detect potholes within the images. Once identified, optimize the detection model using TFLite for mobile devices and retrieve GPS coordinates of the potholes either from embedded metadata or additional GPS tagging. Count the number of potholes detected, and finally, map the potholes onto a geographic map, presenting a visual output showcasing the number of potholes and their respective GPS coordinates.

3.2 Flow Diagram

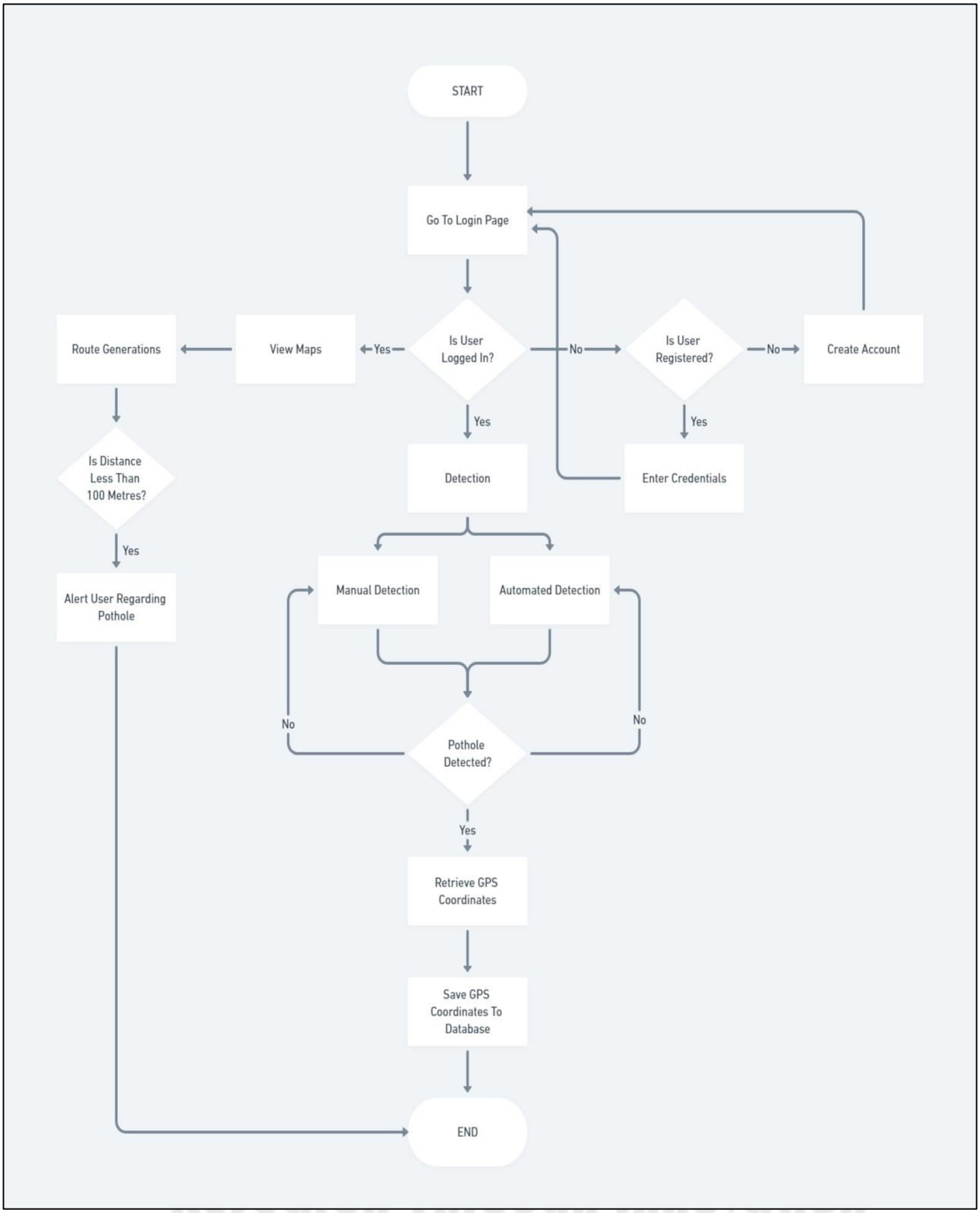

Fig 3.2 Flow Diagram

Fig 3.2 depicts the Flow diagram of Road-Eye. The process begins with the user accessing the application and proceeding to the Login Page. If the user is logged in, they proceed directly to route generation; otherwise, they are prompted to check if they're registered or create an account. Upon entering credentials, users are presented with route generation options, including viewing maps, manual detection, or automated detection. If "View Maps" is selected, users can navigate through the map interface. Additionally, if the user opts for automated detection, the application utilizes its algorithms to detect potholes along the route. In the event of a pothole detection, users are promptly notified, ensuring awareness of road conditions. The seamless integration of route generation and pothole detection enhances user experience and promotes safer travels. In the case of manual detection, if the distance to a potential pothole is less than 100 meters, the user is alerted. Subsequently, if a pothole is detected, the user is alerted again, and the GPS coordinates of the pothole are retrieved and saved to the database.

4.1 Results

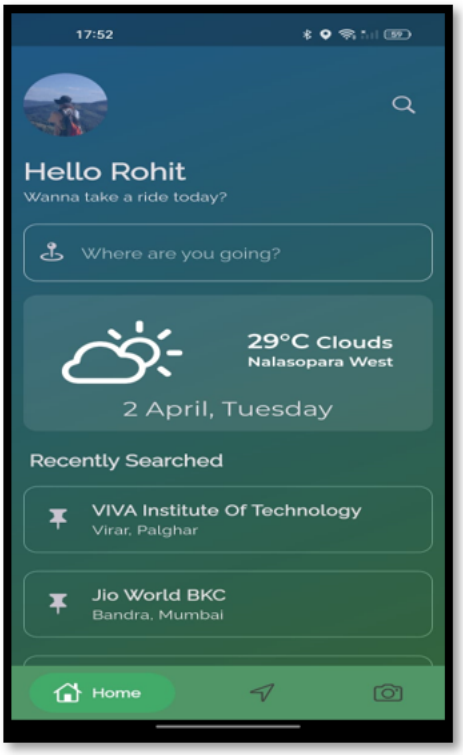

Fig 4.1. Home Page

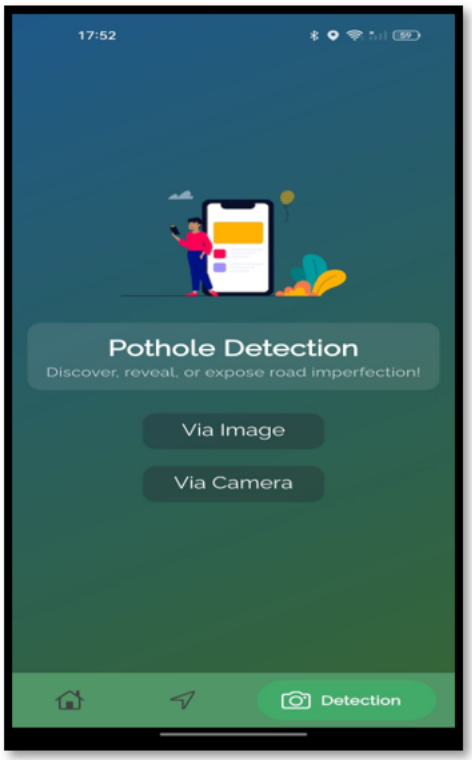

Fig 4.2. Detection Page

Fig 4.1 illustrates the Home Page of Road-Eye, serving as a one-stop destination for travelers. With easy access to guides, trip details, and a log of recently visited places, users can efficiently plan, reminisce, and navigate their journeys. This user-friendly interface offers a seamless experience, ensuring travelers have all the necessary tools to make the most of their adventures, whether they're exploring new destinations or revisiting cherished memories.

Fig 4.2 shows the detection page provides users with the option to detect potholes either by uploading an image or capturing footage directly from their device's camera. This intuitive interface empowers users to actively contribute to identifying road hazards, fostering a collaborative approach to improving roadway safety. Whether users choose to upload existing images or capture real-time footage, the detection page facilitates seamless interaction, enhancing the effectiveness of pothole detection efforts.

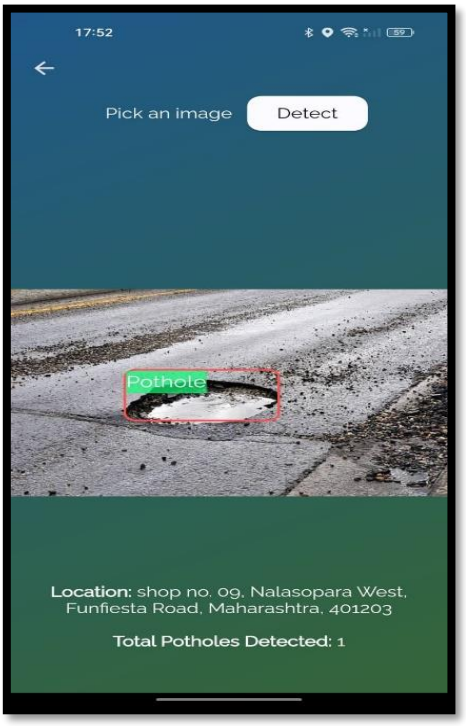

Fig 4.3 Pothole Detected Page

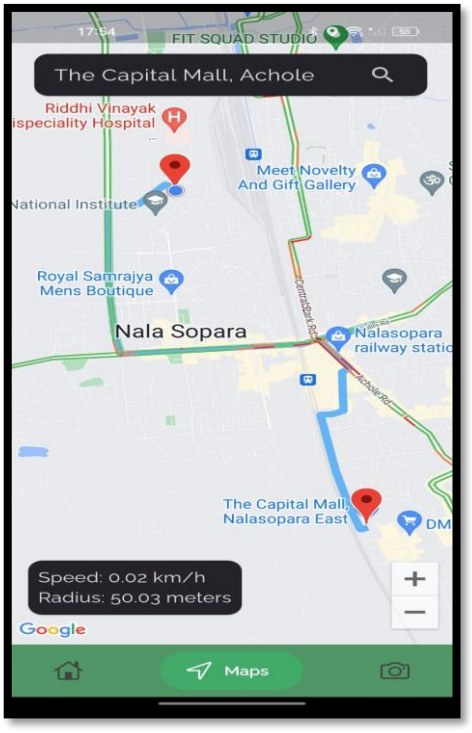

Fig 4.4 Map Page

Fig 4.3 shows the visual representation of pothole detection spots alongside their respective locations and the count of potholes detected offers a comprehensive insight into road conditions. This depiction not only highlights areas prone to road hazards but also provides valuable data for road maintenance teams and authorities to prioritize repairs effectively. By accurately mapping the locations and quantifying the number of potholes detected, Road-Eye facilitates proactive measures to address infrastructure issues, ultimately contributing to safer and more efficient travel experiences for all road users.

Fig 4.4 shows the depiction of map alongside identified pothole locations, vehicle speed, and radius adds a layer of context crucial for understanding road conditions comprehensively. By overlaying pothole spots with real-time vehicle speed and radius information, Road-Eye offers a dynamic visualization of potential hazards and their impact on driving conditions. This integrated approach not only aids in pinpointing areas requiring immediate attention but also assists in assessing the severity of road damage. With this detailed insight, road maintenance authorities can prioritize repairs effectively, enhancing road safety and overall driving experience for motorists.

V. CONCLUSION

In conclusion, RoadEye will transcend the boundaries of a conventional pothole detection app, emerging as a holistic and indispensable companion for the modern driver. With its advanced automated detection system, the app will not only identify potholes but also seamlessly pinpoint them on an interactive map, creating a visual roadmap for users to navigate around potential road hazards effortlessly. Real-time alerts and updates, coupled with live safety alerts, will ensure that drivers stay informed and proactive on their journeys, fostering a secure and efficient driving experience. Moreover, RoadEye's commitment to community-driven collaboration will create a shared responsibility for road safety, encouraging users to actively contribute insights and report road conditions. The user-friendly interface will elevate RoadEye beyond a mere tool, it will become a tailored, personalized solution that aligns with each driver's unique needs and preferences. As we navigate the roads of the future, RoadEye will stand not just as an app but as a transformative force, shaping the driving experience into one that is safer, more connected, and collectively driven.

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