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ADVANCED DRIVER ASSISTANCE SYSTEM (ADAS) FOR TRUCKS

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Abstract: A primary collision avoidance technology is the Advanced driver assistance system, ADAS with the use of many electronically advanced sensors and technologies to perceive the environment around the vehicle to assist the driver by providing vital information about objects, Lane discipline, and Blind spots. Driver's Fatigue, distraction, and Stress can also be monitored to assess the driving performance and make necessary alerts to prevent any potential collision. To assist the driver while the vehicle is moving or whether it is stationary ADAS has been proved to be an efficient technology that can reduce collisions and provide a safer driving experience.

KEYWORDS – Advanced Driver assistance system, Blind spot, Lane Detection, collision, Raspberry Pi, Arduino UNO, OpenCV, BBD100K, MS COCO, iBUG 300-W, Tensor Flow.

I. INTRODUCTION

The Advanced Driver Assistance Framework (ADAS) has come to be a necessary phase of a brand-new endeavor framework. ADAS for inexperienced riding has these days acquired a lot of attention, but driver help structures that enhance the security and relief of activities are generally the majority of the attention. For any of the ADAS goals, ADAS effects need to be considered and evaluated regarding the security of the activity, the herbal impact and gain ranges of the lone rider, and the average framework of the activity. This placing focuses on amassing passenger driver behavior at the recreation framework level. You can use the software programming interface (API) to combine ADAS functionality and related driver conduct into a business software package (API). Often it is a condensed model of the application used in a real car, however, in most cases, this requires the most updated utilization of ADAS. Certain ADAS types might also be allowed to use such relocations. In any case, such relocations can result in invalid representations of ADAS inside ADAS undertaking updates that principally manipulate driving. This method makes the undertaking simulation consequences extra legitimate because the ADAS utility is now not relocated. This approach has the gain that whilst preserving the confidentiality of ADAS usage, endeavor reproducibility approves you to suppose about exceptional ADAS plans in the early levels of improvement.

II. MOTIVATION

Most of the bystanders of major truck accidents are touring vehicle renters. The biggest problem is the helplessness of people traveling in small cars. Trucks often weigh 20 to 30 times more than touring trucks, and their ground clearance is noticeably higher, which can lead to small vehicles traveling under the truck in an accident. The braking ability of a truck can affect a truck accident. Stacked articulated lorries require 20-40% longer stopping distances than trucks, and parallax becomes more pronounced on wet or elusive roads, or when braking fails. In addition, truck driver weaknesses can pose a well-known risk of accidents. In 2019, a total of 4,119 people died in serious truck accidents. 16% of these passers-by were truck employers, 67% were resident of trucks and other touring vehicles, and 15% were pedestrians, cyclists, or motorcyclists.

III. MODEL DESIGN

The problem of road diversity can be solved by a good framework that promotes capacity and safety. Both destinations can be combined as additional levels. The main goal of this extension is a driver assistance frame tailored for intercity situations, which is one-way only for specific issues and some special issues that follow this tuned path. Is to create. It's about improving productivity and security through the creation of applications. These applications are considered acceptable frameworks and rely on multisensory perception and communication between vehicles and with infrastructure to provide additional data for driving activity. Therefore, the framework uses a combination of s of information from many sources, including the B. Way location, protest location, driver laziness framework, and communication framework between vehicle and architecture.

Second, whether it's the nature of the obstacle or the fact that other cars have a communication system, the first two provide natural data quickly. This means that they provide independent data and identify barriers that are difficult to discover when using communication innovations due to their unusual nature. In addition, communication frames provide data in situations where detection frames appear to be struggling, expanding the range of possible activities.

As a result, both sources complement each other, and the integration greatly expands the potential for increased efficiency and security. Also, if a dangerous situation is detected and the driver does not react properly, the frame has the mechanization function of the vehicle, which allows you to drive the vehicle with qualifications.

A. Object Detection and Sharp Sensor Configuration:

To ensure the safe driving of vehicles at high speeds, it is necessary to pinpoint the exact position of all objects on the road in real-time. To this end, a sharp sensor is combined with another object detection kit to calculate the distance of an object, as shown in Figure 1.

MS-COCO (Microsoft Common Protest in Setting) needs to recognize many categories, and the settings are very diverse.

The BDD100k is a large and diverse open driving dataset, later released by Berkeley AI Investigate (BAIR), covering different day and night climatic conditions, different lighting conditions, and occlusions. The BDD100k dataset consists of 70,000 preparation sets, 10,000 permit sets, and 20,000 test sets, with 10 classes of individuals, drivers, cars, transport, trucks, bicycles, motors, activity lights, activity signs, and trains.

The ratio of preparation and confirmation is 7: 1.

OpenCV and TensorFlow-based object identification systems use trained CNN-based models to identify objects such as cars, road signs, and pedestrians. This data is combined with sharp sensor data to warn the driver of an imminent accident. The object detection model determines if a given set of objects can be displayed in an image or video stream and can provide points of near interest in those areas within the image, as shown in Fig2. can do.

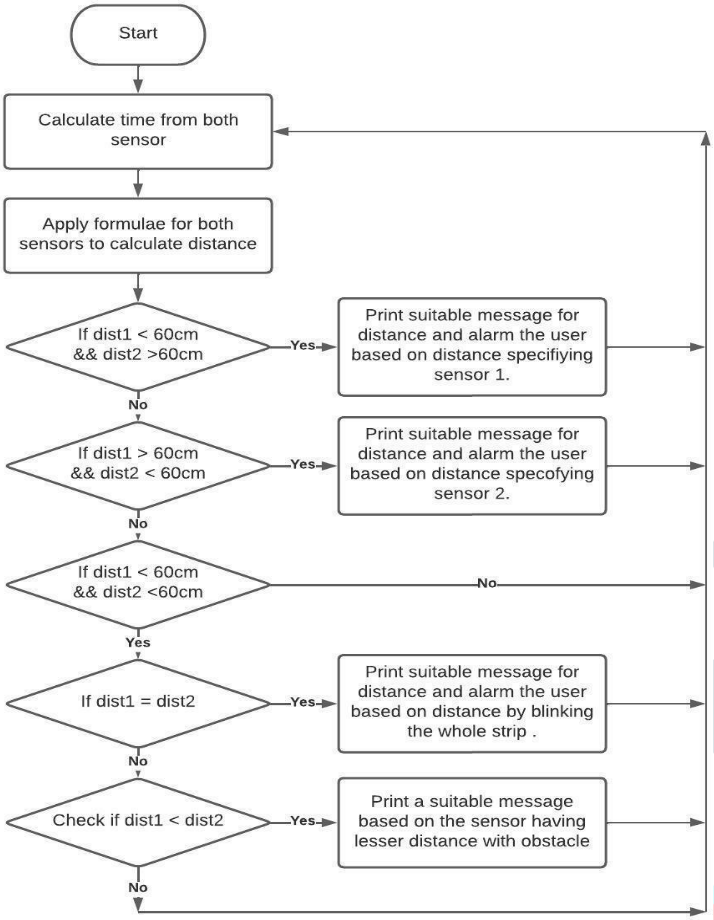


Figure 1: Flow chart for sharp sensor configuration

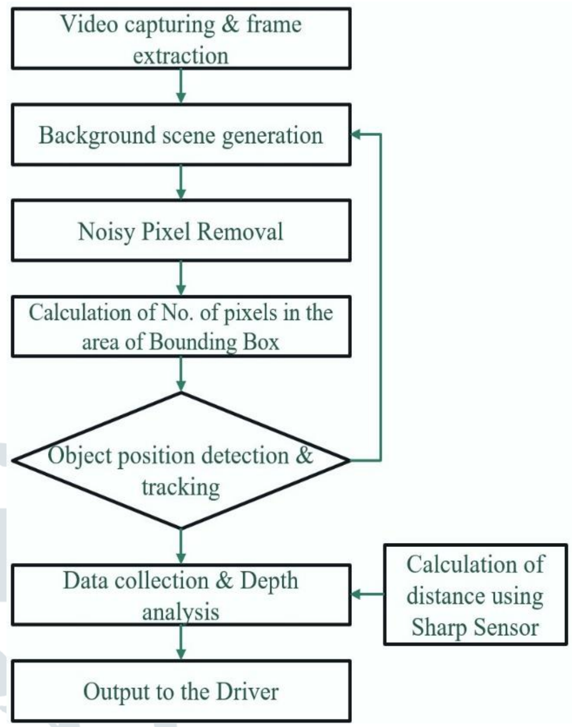


Figure 2: Flow chart for Object Detection

B. Lane Detection

Lane detection also works similarly to object detection. The only difference is the model is trained to recognize only the lanes present on the roads. The major steps in lane detection as shown in the above Fig 3 are:

- Reading frame information
- Image processing and segmentation
- Feature extraction
- Clustering of lane features in the frame
- Fitting the lane curve for direction analysis
- Creation of a tracking model for lanes
- Providing the output to the driver.

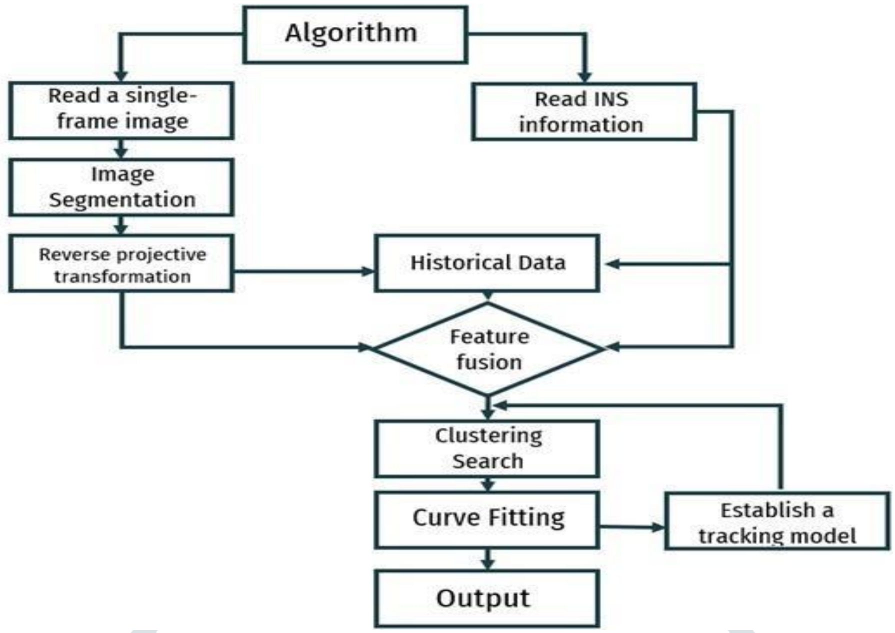


Figure 3: Flowchart for Lane Detection

C. Overall Incorporated Model

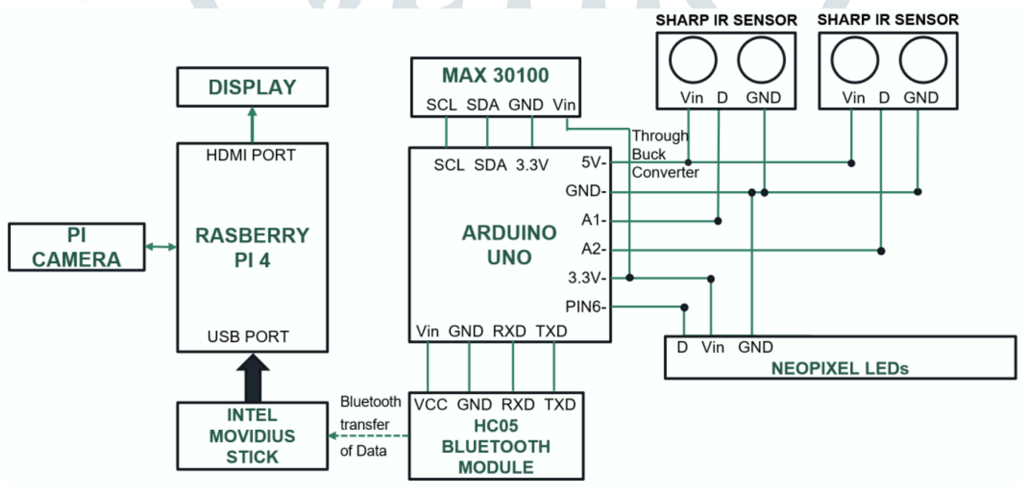
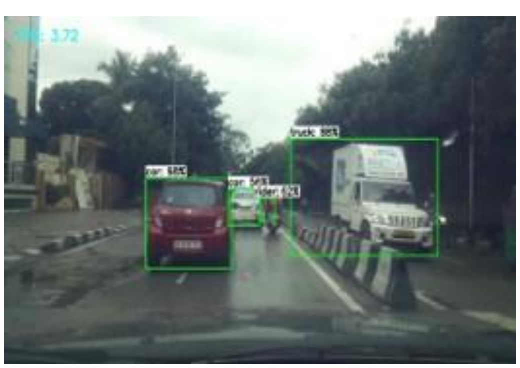


Figure 4: Circuit Diagram

IV. Results

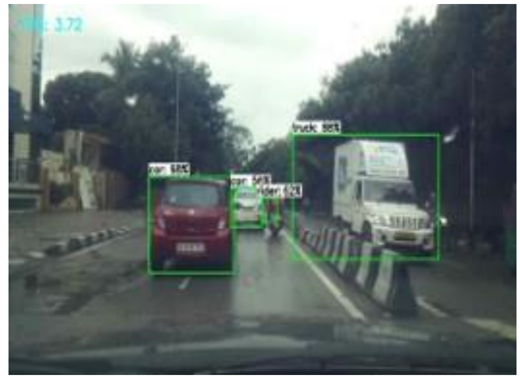
The project has considered three conditions during the testing. Consider A- The project model with the Driver seated for testing, and B- Other objects on the road. So, the conditions are i) A moving, B moving, ii) A stationary, B Moving, iii) A moving, and B Stationary.



(a)

(b)

(c)



(d)

Figure 5: Object detection and lane detection on-road results

The results mentioned in Fig 5 (a) showcase (i), Fig 5(b) shows case (ii), and case (iii) is portrayed in Fig 5(c).

The machine was able to classify and predict the objects on the road, lanes and an alarm was turned ON when the vehicle gets too close to any other vehicle on the road as shown in Fig 5 to avoid a possible collision with help of Neo pixels which are installed on the windshield as shown in Fig 5.

V. References

[1] Yu-Cheng Fan, Chitra Meghala Yelamandala, Ting-Wei Chen, Chun-Ju Huang, "Real-Time Object Detection for LiDAR Based on LS-R-YOLOv4 Neural Network", Journal of Sensors, vol. 2021, Article ID 5576262, 11 pages, 2021. https://doi.org/10.1155/2021/5576262.

[2] Srinivasan, A. Ayub Khan, T. Prabu, M. Manoj, M. Ranjan, K. Karthik, "HEARTBEAT SENSOR USING FINGERTIP THROUGH ARDUINO", Journal of Critical Reviews, ISSN- 2394-5125 Vol 7, Issue 7, 2020.

[3] Mimi Suriani Mat Daud, Zuhra Junaida Mohd Husny Hamid, Mohd Saipuddin Suliman, Rozelin Abdullah, Ilyas Iskandar Zulkarnain, "The Awareness of Blind Spot Area in Heavy Goods Vehicle (HGV)", International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8 Issue-12, October 2019.

[4] Sahayadhas A, Sundaraj K, Murugappan M. Detecting driver drowsiness based on sensors: a review. Sensors (Basel). 2012 Dec 7;12(12):16937-53. DOI: 10.3390/s121216937. Erratum in: Sensors (Basel). 2021 Jan 11;21(2): PMID: 23223151; PMCID: PMC3571819.

[5] Wang, Jun & Zhang, Li & Huang, Yanjun & Zhao, Jian & Bella, Francesco. (2020). Safety of Autonomous Vehicles. Journal of Advanced Transportation. 2020. 1-13. 10.1155/2020/8867757.

[6] Reschka, Andreas. (2016). Safety Concept for Autonomous Vehicles. 10.1007/978-3-662-48847-8_23.