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# A Self-Driving Car Using Machine Learning

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**Abstract** - This paper aims to represent a mini version of self-driving automotive victimization IOT with Raspberry Pi and Arduino UNO working as the main processor chip, the 08 mp high-resolution Pi camera can offer the specified data and thus the Raspberry Pi can analyze the data (samples) and it will get trained in pi with neural network and machine learning algorithm which could finish in the detection of road lanes, and traffic lights, and thus the automotive can alternate consequently. To boot these options the automotive can overtake with correct LED indications if it comes across an associate obstacle.

***Key Words***: OpenCV, Machine Learning, Artificial Intelligence, and Internet of Things.

## 1. INTRODUCTION

The development of autonomous vehicles has gained significant momentum in recent years. Self-driving cars have the potential to reduce traffic accidents, increase road efficiency, and provide mobility solutions to individuals who cannot drive. Automated vehicles are a unit of technological development in the field of cars. tho' the machine-controlled vehicles sq. measure for ease of man but they are the foremost high priced vehicles. In the paper considering the varied choices and also the worth, on a small scale a four-wheel conveyance Robotic epitome has been designed which can automatically reach the destination of another vehicle. We have targeted a pair of applications of AN Automated Vehicles here and designed an epitome vehicle for that. we've projected a solution to relax the propulsion in this state of affairs by making vehicles sensible enough to build selections mechanically and move by maintaining a specified distance from vehicles and obstacles around. The driver can build his vehicle follow the front vehicle if they are known and share their location to achieve an identical destination.

A machine Mobile automaton is utilized for analysis. The Mobile automaton consists of multiple sensors, that help it to communicate with Google Maps API(Application Program Interface) and makes it make sure obstacles so on follow the route and move smoothly. The Mobile automaton connects directly to Google Maps API exploitation GPRS Module, gets a route, and moves in this direction. Whereas the supersonic sensors, which square measure used for epitome vogue, help to avoid obstacles on run time. The traffic state of affairs in the Asian nation ends up fashionable this project prototype, which aims at relaxing drivers and creating an automated vehicle whose destination is dynamic in distinction to Google car, whose destination is static and fixed.

## 2. LITERATURE SURVEY

1. The paper "Working Model of Self-driving Automotive Victimization Convolutional Neural Network, Raspberry Pi and Arduino" by Hindu deity Kumar religious belief. The planned model takes a picture with the assistance of a Pi cam attached to Raspberry Pi on the automotive. The Raspberry Pi and the laptop computer are connected to the same network, and the Raspberry Pi sends the captured image to the Convolutional Neural Network. The image is gray-scaled before passing it to the Neural Network. Upon prediction, the model provides one amongst the four outputs i.e. left, right, forward, or stop. When the result's expected corresponding Arduino signal is triggered that successively helps the automobile to maneuver in a very particular direction with the assistance of its controller.

2. The paper "Self-driving automotive ISEAUTO for analysis and education" conferred by Raivo Sell, Anton Rassõlkin, Mairo Leier, and Juhan-PeepErnits, describes an ISEAUTO project, the primary self-driving automotive project in Esthonia is enforced at Tallinn University of Technology in cooperation with associate degree Estonian automotive company. ISEAUTO works in analysis and educational projects targeted at the planning and development of a machine-controlled vehicle in cooperation with a personal company and students.

3. The paper conferred by T. Banerjee, S. Bose, A. Chakraborty, T. Samadder Bhaskar Kumar, T.K. Rana "Self Driving Cars: A Peep into the Future". This paper elaborates on a few distinctive techniques embedded controller styles of a self-driving, electrified, accident-proof, and GSM destination-guided vehicle. A GPS module accurately tracks the location of the automotive, supply, and destination, and mapping the coordinates provides navigation Speeds of the vehicle are mechanically controlled by keeping a secure distance, which may be a performance of velocity, having the vehicle before read. Distance of the front and facet vehicle square measure endlessly monitored by a stepper motor controlled rotating distance activity detector and also the ordinance as well as track dynamical square measure done consequently. It conjointly prevents collision because of associated degree obstacles. An 8-megapixel pi-camera with an image processing unit has been used to sense traffic light and traffic density on the road.

4. The paper "Traffic light-weight Detection and Recognition for Self Driving Cars Exploitation Deep Learning", by Ruturaj Kulkarni, Shruti Dhavalikar, Sonal Bangar. There square measure many object detection architectures available like Single Shot Multibox Detector (SSD), Faster Region

primarily based Convolutional Neural Networks (R-CNN), Region primarily based totally (R-FCN) that incorporate feature extractors like ResNet-101, Inception-V2, Inception-V3, Mobile internet etc. The selection of design and extractor is a trade-off between speed and accuracy that your application wants For the stoplight detection considering the appliance demand and available process resources, a quicker R-CNN Inception-V2 model is employed that serves the accuracy and speed trade-offs. The model is trained on top of the mentioned dataset wherever loss is reported at every step of coaching. The model is trained on the NVIDIA GEFORCE 940M GPU exploitation TensorFlow.

5. The paper "Self-Driving and Driver Restful Vehicle", bestowed by Qudsia Memon, Muzamil Ahmed, Shahzeb Ali, Azam Rafique Memon, and Wajiha Shah during this paper they need to design 2 applications of Associate in Nursing autonomous vehicle, which can help the driving force to relax for the restricted length of time. It conjointly presents a thought that focuses on the modified conception of the Google automobile, the Google automobile has to reach the static destination automatically; during this prototype, they created the dynamic destination. Here self-driving automobile can follow a vehicle that is moving on an explicit route. This model can follow that vehicle.

6. The paper "The Problems and the Possible Solutions for Implementing Self-Driving Cars in Bangladesh" was presented by prophet male monarch Bin Ahmed, Md. Saef Ullah Miah, Md. Muneef Anjum Timu, Shakura Akter, Md. Sarker. b. A number of the problems of Bangladeshi roads square measure highlighted in an exceedingly paper published Organization in 2004. Google automobile among other things, will calculate the foremost economical path, abide by native traffic rules, park once necessary, and change lanes if needed.

7. The paper "Real-time multiple vehicle detection and tracking from a moving vehicle", by Margrit Betke, Esin Haritaoglu, and Larry S. Davis. needs enclosed modules for the detection of alternative vehicles on the road. The NavLab project at Carnegie Andrew W. Mellon University uses the chop-chop Adapting Lateral Position Handler to determine the coordinates of the road ahead and the appropriate steering direction. RALPH automatically steered a Navlab vehicle 98% of a visit from Washington DC to the city, of California, a distance that is of over 2800 miles. They have added a module for automobile following. A module is employed for police work reordering vehicles, and a trinocular stereo module (three read vision) for police work distant obstacles were other to reinforce and improvise the Navlab performance of the car.

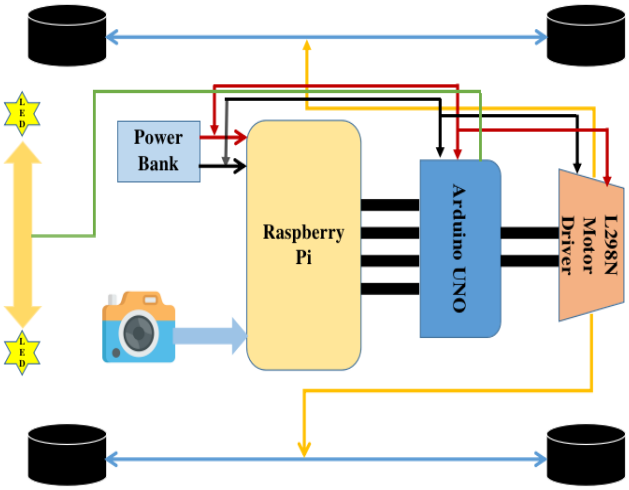
8. The paper bestowed by Giuseppe Lugano "Virtual assistant and self-driving cars", introduced the US The virtual assistant may be a specific code practicality originally planned among the "desktop" computing atmosphere to support the user within the learning and use of a selected code package (e.g. word processor, spreadsheet). the main purpose of virtual assistants was to extend the productivity and potency of the user with a selected product

9. The paper "Driver Help System for Lane Detection and Vehicle Recognition with Night Vision", by ChunChe Wang, Shih-Shinh Huang and Li-Chen Fu, PeiYung Hsiao. It aims to boost driving, by making an Associate in the Nursing help system. To enhance driver's safety in the dead of night time the formula includes lane detection along the vehicle recognition system. It will find Lane that helps to localize the markers. An operation like cagy edge extraction is finished to extract the edge map to that matching technique is applied followed by the selection of potential edge points. Finally linking is done to localize the lane lines

10. The paper "Driverless Intelligent Vehicle for Future Public Transport Supported GPS", by R. Mohanapriya, L.K.Hema, Dipesh Warkumar Yadav, Vivek Kumar Verma. It involves arming GPS and GSM systems on a four-wheeled golem. The GPS steers the robot and is capable of reaching from one purpose to another with no human intervention. In the former with the assistance of the GSM system, they promise to report felonies just in case there's any. An SMS alert is distributed to the vehicle owner coverage about the problem and as a result, the owner of the car will switch the ignition off within the latter one, the project states that the vehicle will solely be turned on if the approved person sends a predefined location to the car.

## 3. PROPOSED APPROACH

### A) Block Diagrams




### 3.1 Raspberry Pi Camera:

The pi-camera we tend to square measure mistreatment is the V2 version that comes with specifications like an 8mp camera and supports up to 1080p 30 resolutions besides IMX219 device and F2.9 aperture. This Pi cam captures pictures of surroundings and sends them to the Raspberry Pi for more processing.

**Fig 1**: Raspberry Pi Camera IMX219

### 3.2 Raspberry pi:

The Raspberry Pi is the main processor here. Popularly called low-value single board PC. we tend to square measure mistreatment Raspberry Pi 3B+ version for the image process. With the assistance of Open CV code, a machine learning algorithmic rule is enforced, and also the pictures square measure trained in numerous lighting conditions mistreatment neural network technology. more the choices taken by the Raspberry Pi square measure sent as commands to Arduino.

**Fig 2**: Raspberry Pi

### 3.3 Arduino UNO:

Arduino Uno is an ATmega329P primarily based microcontroller board. it's wide and well-liked for mini comes. In our project, Arduino is accustomed to the management forward, backward, left, and right movement of a car. All the functions square measure preprogrammed in Arduino mistreatment Arduino IDE. Once obtaining command from pi, the Arduino can send a signal to the motor driver circuit requires suitable movement tutored by Arduino.

**Fig 3**: Arduino UNO

### 3.4 L298N Motor Driver:

It is a basic motor driver module accustomed to driving DC motors similarly to stepper motors. H bridge is employed beside L298 IC to drive motors. H bridge could be a circuit that may drive current in polarity and can be controlled by pulse breadth modulation (PWM).

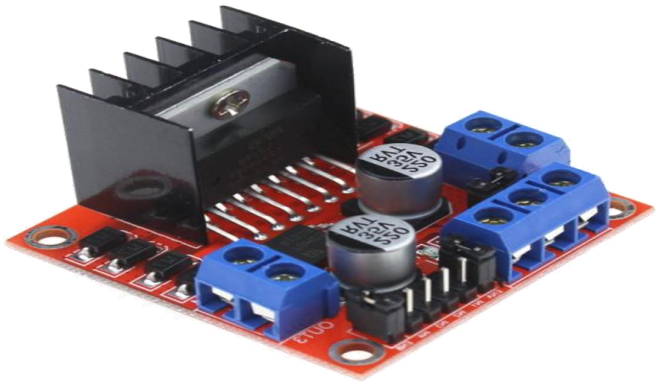


**Fig 4**: L298N Motor Driver

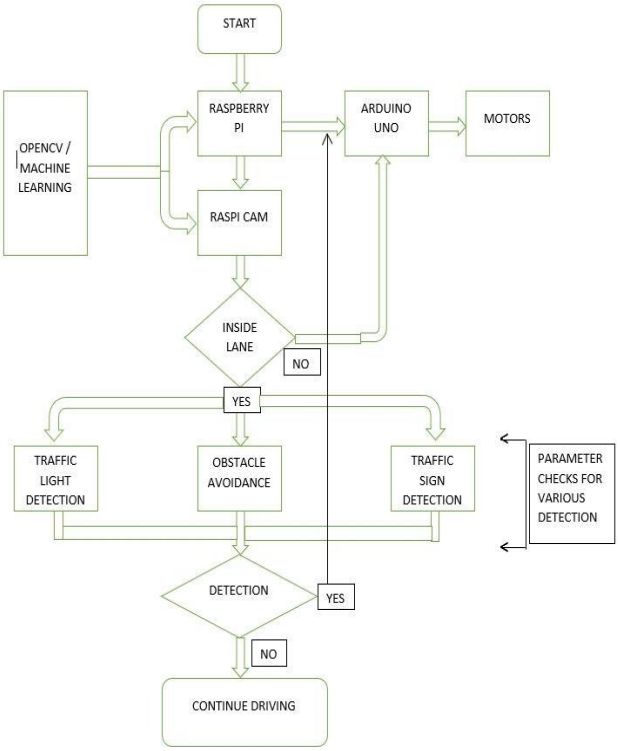
### 3.5 LED indicators:

LED indicators square measure placed at the rear of the chassis. whereas taking U flip or if it detects an Associate in Nursing obstacle indicator can light up to allow correct indications. Its programming is dropped in IC 74LS164 and can be controlled through Arduino commands.

### B) Our Proposed Method

In our system, we have used a pattern-matching approach that uses a camera to recognize a unique pattern printed on the road. The camera collects this pattern, processes it using the Raspberry Pi, and then tells the car to go in the desired direction. The camera also collects images of the surroundings to identify various obstacles in the area. If an obstacle gets too close to the vehicle then the vehicle will stop and change the path accordingly. Special patterns and road signs are placed along the route to determine which type of operations need to be performed on a vehicle.

### C) FLOWCHART




## 5. RESULT AND DISCUSSION

The project was evaluated and tested. The model can identify the specific pattern and can also detect barriers in the environment, as seen in the preceding photographs. As a result, the model is capable of doing all of the aforementioned tasks.

Detections: In this period of the project, we experimented with various types of detections on our trained model which makes it work in autonomous mode.

These detections are as follows.

**Fig 5**: Traffic Light Detection

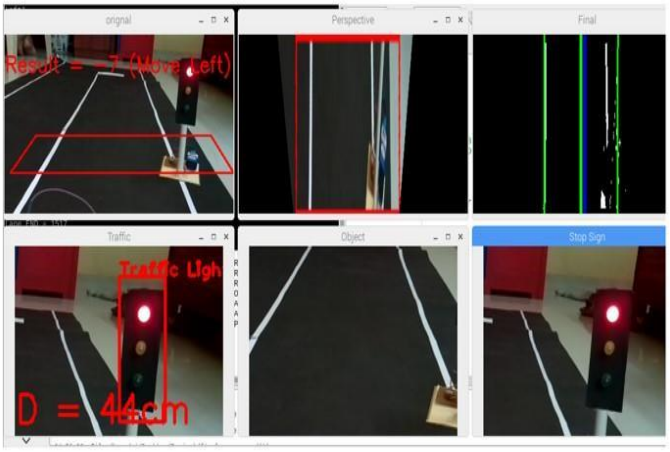



**Fig 6**: Traffic Light Detection

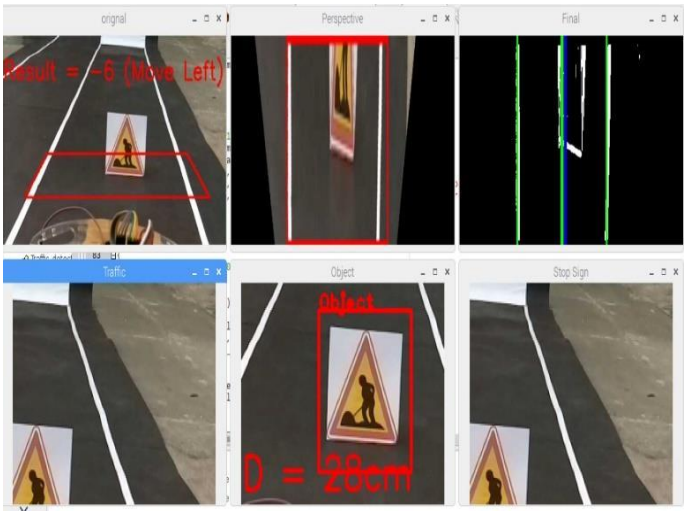



**Fig 7**: Obstacle Detection

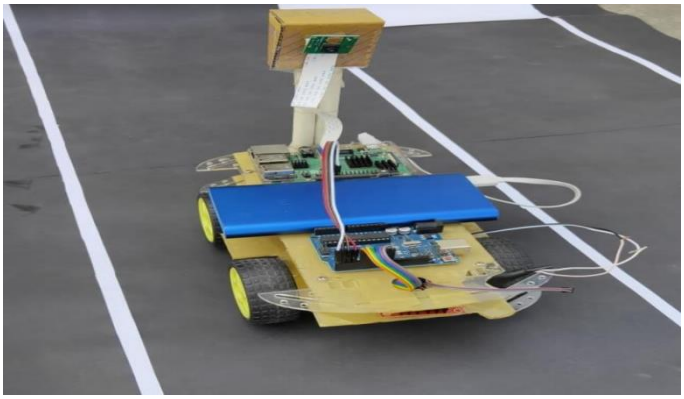


**Fig 8**: Lane Detection

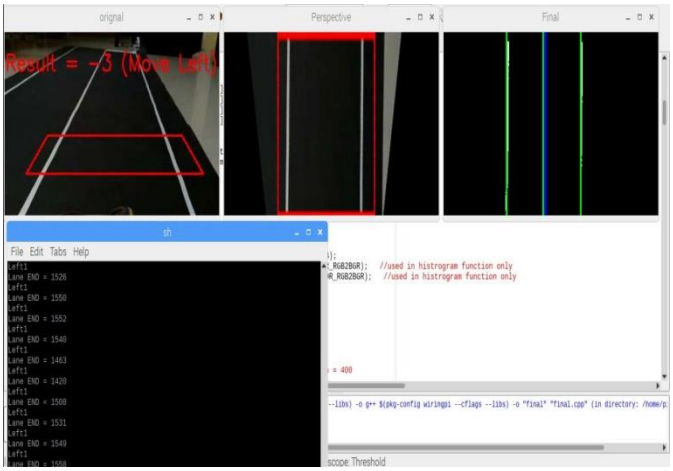



**Fig 9**: Lane Detection


**Fig 10**: Stop Sign Detection

## 6. CONCLUSION FUTURE SCOPE

Self-driving cars are a cost-effective and environmentally friendly means of transportation that can reduce accidents and make commuting more comfortable. Self-driving cars are no longer science fiction novels and will soon become commonplace. We are living in a new era of transportation where human-powered transport vehicles are being replaced by computerized self-driving cars. There are many possibilities for self-driving cars in the future. Some car companies are rapidly developing self-driving cars to make them more accurate and safe. Self-driving cars are a major advance in the automated realm of the future. This project focuses on making changes in road safety and commuting through continuous learning of the system, and significantly reducing accidents and human error.

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## REFERENCES

[1] Raivo Sell, Anton Rassõlkin, Mairo Leier, Juhan-Peep Ernits, “Self-driving car ISEAUTO for research and education” in 19th international conference on Research and Education in Mechatronics (REM), IEEE, 2018, pp: 111-116.

[2] Aditya Kumar Jain, “Working model of Self-driving car using Convolutional Neural Network, Raspberry Pi and Arduino”, Proceeding of the 2nd International Conference on Electronics, Communication and Aerospace Technology (ICECA), IEEE, 2018, pp: 1630- 1635.

[3] Mohammad Faisal Bin Ahmed, Md. Saef Ullah Miah, Md. Muneef Anjum Timu, Shakura Akter, Md. Sarker.b, “The Issues and the Possible Solutions for Implementing Self Driving Cars in Bangladesh” in Regin 10 Humanitarian Technology Conference(R10-HTC), IEEE,2017, pp: 250-254.

[4] T. Banerjee, S. Bose, A. Chakraborty, T. Samadder, Bhaskar Kumar, T.K. Rana, “Self Driving Cars: A Peep into the Future”, IEEE, 2017, pp: 33-38.

[5] Qudsia Memon, Muzamil Ahmed, and Shahzeb Ali, “Self Driving and Driver Relaxing Vehicle”, in IEEE 2016, pp: 170-174.

[6] Aakash Makwana, Prathamesh Patkar, Harsh Amin, Chinmay Nandoskar, and Prof. Shripad Kulkarni, "Self-Driving Car using AI" in IJCRT 2022.

[7] Raivo Sell, Anton Rassõlkin, Mairo Leier, Juhan-Peep Ernits, “Self-driving car ISEAUTO for research and education” in 19th International Conference on Research and Education in Mechatronics (REM), IEEE, 2018, pp: 111-116.

[8] T. Banerjee, S. Bose, A. Chakraborty, T. Samadder, Bhaskar Kumar, T.K. Rana, “Self Driving Cars: A Peep into the Future”, IEEE, 2017, pp: 33-38.

[9] Ruturaj Kulkarni, Shruti Dhavalikar, Sonal Bangar, “Traffic Light Detection and Recognition for Self-Driving Cars using Deep Learning” in 4th International Conference on Computing Communication Control and Automation(ICCUBEA), IEEE, 2018.

[10] Chun-Che Wang, Shih-Shinh Huang and Li-Chen Fu, PeiYung Hsiao “Driver Assistance System for Lane Detection and Vehicle Recognition with Night Vision”, IEEE.

[11] Qudsia Memon, Muzamil Ahmed, and Shahzeb Ali, “Self-Driving and Driver Relaxing Vehicle”, in IEEE 2016, pp: 170-174.

[12] Prof. Omprakash Yadav, Aman Sharma, Dion Philip, Boris Alexander, "A Self Driving Car using Machine Learning and IoT" in IJTRET 2021.

[13] Mohammad Faisal Bin Ahmed, Md. Saef Ullah Miah, Md. Muneef Anjum Timu, Shakura Akter, Md. Sarker.b, “The Issues and the Possible Solutions for Implementing Self-Driving Cars in Bangladesh” in Regin 10 Humanitarian Technology Conference(R10-HTC), IEEE,2017, pp: 250- 254.

[14] Margrit Betke, EsinHaritaoglu, Larry S.Davis, “Real-time multiple vehicle detection and tracking from a moving vehicle”, in Machine Vision and Application, IEEE, 2000, pp: 69-83

[15]A. K. Jain, "Working model of Self-driving car using Convolutional Neural Network, Raspberry Pi and Arduino," 2018 Second International Conference on Electronics, Communication and Aerospace Technology (ICECA), 2018, pp. 1630-1635.