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# CNN based Efficient Self-Driven Autonomous Car

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**Abstract -** According to the Society of Automotive Engineers there are six international standards set to know the level of driving automation [1]. Few start-up companies are experimenting on the autonomous vehicles, these vehicles fail to reach the roads due to many reasons like improper processing of the input data from the sensors, Environmental causes, highly expensive hardware etc., [2].

In this paper we are proposing a better solution to process the Input data using High Dynamic Ranging technique, in which multiple input data is processed at least bit rate and the captured image data is acquired completely with less distortion. By using Convolution Neural Network, obstacles and traffic signs can be detected perfectly when compared to the conventional methods.

In convolution neural networking all nodes of the system are interconnected to each-other in the system by which we obtain a much responsive output compared to the present techniques for data collection. The processing unit (Master device) and the controller unit (Slave device) are set up on a single board, which makes the system function much faster than the other present systems.

***Key Words*:** Convolution Neural Network (CNN), Image Processing, Region of Interest (ROI), Perspective Wrapping, Thresholding, Cany Edge Detection, Histogram and Vectors, Lane Identification.

## 1.INTRODUCTION

In the recent time many start-ups are into building self-driving cars. Most of them use the conventional sensor system to control the vehicle. All of which most of the time fails to detect the right inputs for processing a perfect output Today we are here with our advancement in acquiring efficient data input through, The LiDAR (WSN) system processing and HDR IMAGING techniques. We also have high priority security protocols being implemented in our design.

There are three major modules:

1. Image Processing.
2. Wireless Sensor Network.
3. High Priority Security Protocols.

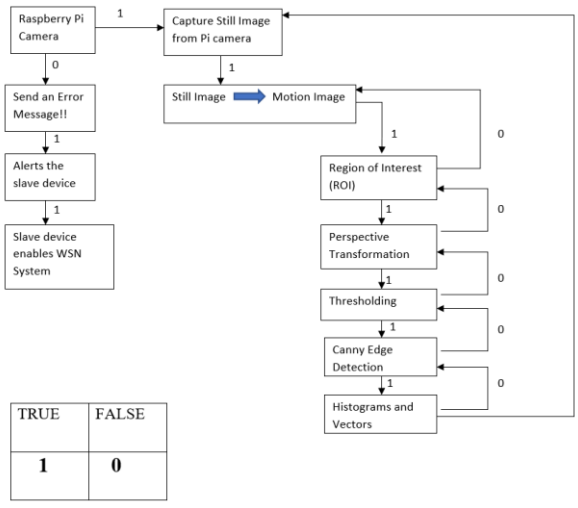
## 2. Methodology and Implementation

### Image Processing:

Digital image processing is the use of a digital computer to process digital images through an algorithm. Image Processing is the analysis and manipulation of a digitized image, especially in order to improve its quality.

Using CNN the vehicle is trained to identify the obstacles.

The Image Processing Algorithm proposed is:

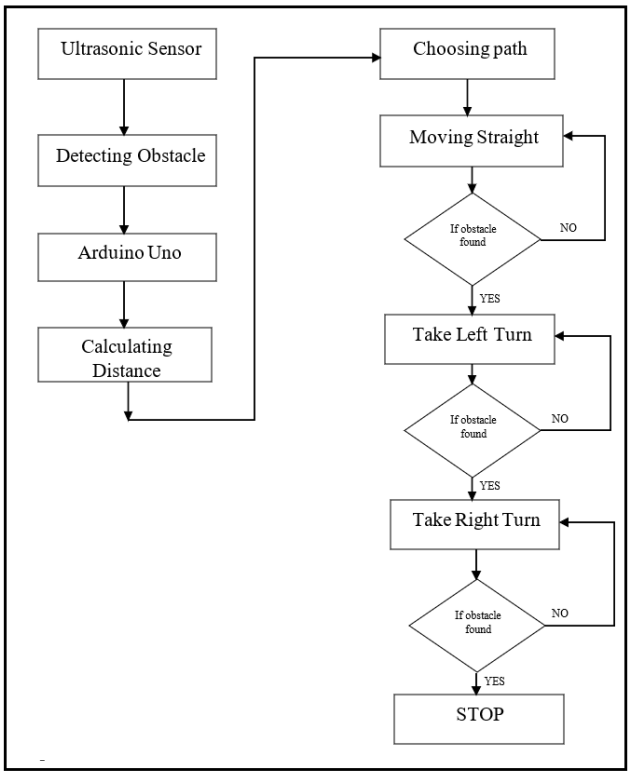



### WSN Network

The WSN Network takes place in the Secondary Master Device Arduino. The Wireless Sensor Network constantly reads the data from the sensors and processes the necessary control signal.

If the Master 1 fails to detect the inputs, the Wireless Sensor Networks control signals are used by the slave to control the Vehicle. The wireless Sensor Network consist of for Ultrasonic Sensor, a Color Sensor and a LDR Sensor.

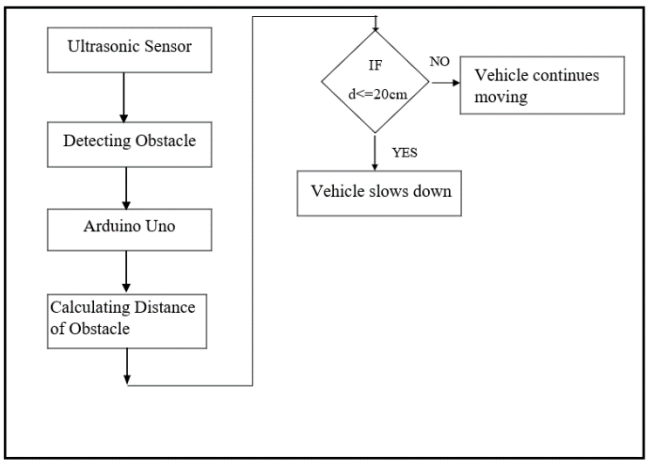
The Ultrasonic Sensors are used to identify the obstacle, the color sensor is used to identify the road and the LDR sensor is used for the adaptive Head light control.




**Safety Protocols**

- **Automatic Braking System**

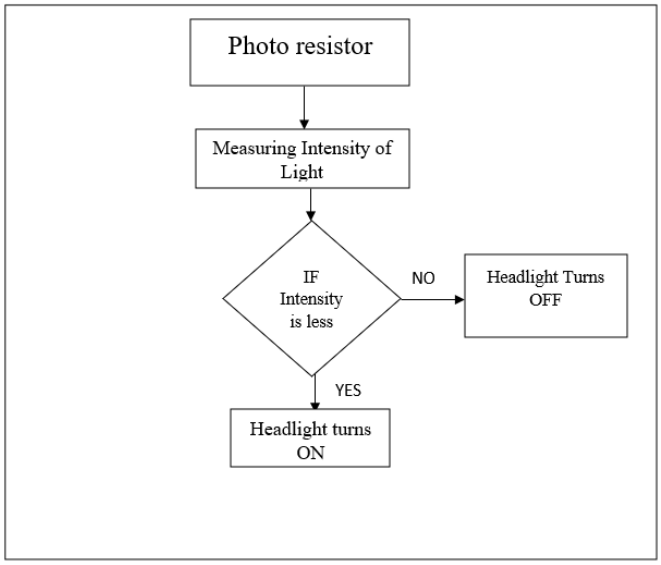
Automatic Braking System enables vehicles to identify the chances of collision, so that necessary action can be taken to avoid collision. In this system we are using an Ultrasonic Sensor to detect the distance between the vehicle. If the distance between the vehicle is less than 20cm then brakes are applied and the vehicle will eventually stop.




- **Adaptive headlight control**

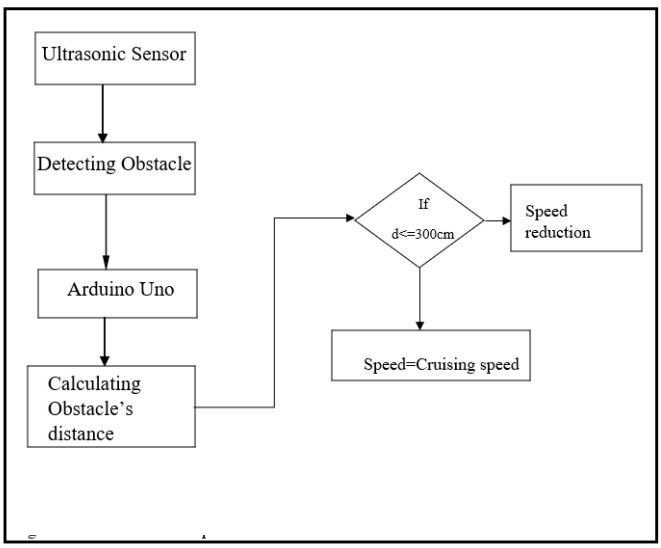
These are Headlights that actively respond to change in conditions their goal is to provide drivers with better visibility and more time to react to conditions

ahead. In this system we are using a photo resistor to detect the light intensity of the surrounding, if the intensity is less then the headlight will turn ON else it will turn OFF.



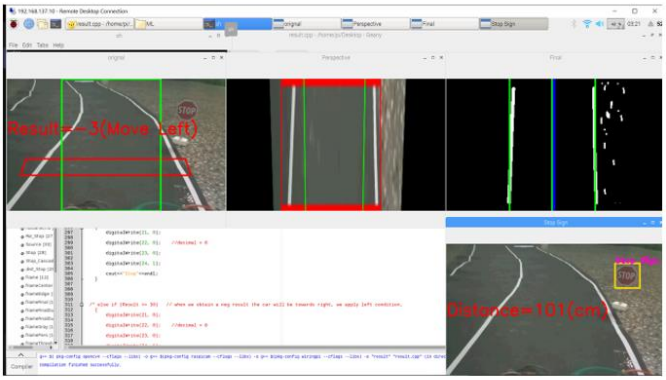

- **Adaptive cruise control**

This protocol enables the vehicle to adjust the speed and helps in maintaining a safer distance from another vehicle ahead. In this protocol ultrasonic sensor is used to calculate the distance between the vehicles. If the distance of the obstacle is greater than or equal to 300cm then, the speed of the car will be equal to the cruising speed and the speed will be reduced down to zero otherwise.



## 3.RESULTS AND OUTCOMES

Thus, we have achieved capturing a still image, converting it into a motion image applied HDR algorithm. With the obtained data Region of Interest is applied and thus Perspective Wrap Transformation is also achieved, along with this Thresholding, Canny Edge Detection and Histograms and vectors. With the vector values we identified the road lane lines and calculated the lane center. And thus, we attained the complete autonomous of the vehicle Along with this, using Wireless Sensor Network, we have achieved to train the car to take appropriate decisions when the raspberry pi system losses control. As part of High priority Security, we have successfully achieved protocols like adaptive headlight system, ABS system, cruise control. Finally using 3 layers of CNN we have successfully achieved identifying the traffic sign on the road.




## 4. CONCLUSIONS

Thus, we have achieved Autonomous Self Driving Car to run on a perfectly maintained road condition. The prototype includes Wireless sensor network, Image processing and Machine learning unit with a slave unit controlling the movement and other protocols of the vehicle.

Hence, the prototype can identify the road, objects, traffic signages and also adaptive head light system is implemented and this system can be adapted for various application like transportation for Disabled community, reduced accidents and Autonomous goods delivery System.

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