**VISHWAKARMA INSTITUTE OF TECHNOLOGY, PUNE - 411037**

**COURSE PROJECT MID-SEM REVIEW**

**AY 2021-22 Sem 2**

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**Subject:** Computer Vision

**GD Title:** Vehicle turn detection using Computer Vision

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**Abstract:**

Asour theme is based on autonomous vehicles we are working on the project to enhance the accuracy of the autonomous vehicles. The important aspects of the collision avoidance and the driver's assistance is detecting the car turn signals. Unfortunately the previously studied systems has lacked in the robustness due to huge variability in the shapes and size of the vehicles, variations in the day brightness due to variable environments, cluttered environment

And drivers misbehavioural intents. Also the detection of night time turn signals are hectic to both the assistant driving systems or the autonomous vehicle driving systems. Also the main concern about the project is to detect the vehicle during the night time which is quite difficult due to the challenging problems like low visibility , light distortion caused by the motion of the car and the illuminations in the urban areas. Also the previous studies define the problem of the decreasing intensity of the front turn signals if they are located near the front headlamps. So we need to overcome this problem while working on our model.

**Summary:**  Detection of alert signals of the front vehicle, such as turn signals and brake lights in a robust and lightweight manner is extremely critical, especially in autonomous vehicle applications. Cars that are driven by human beings, automatic detection of these signals can aid in the prevention of otherwise deadly accidents. So, in today’s world, it is necessary to use automatic turn detection signal features to avoid accidents and to increase the safety of car passengers.

Detection of alert signals mainly involves two scenarios: day time turn signal detection and night time turn signal detection. From the complexity point of view, detection of turn signals in day time is more difficult than night time because during day time due to various conditions such as bright sunlight, the reflection of light from the turn signal might not be clearly visible, so it makes it hard to know whether the turn signal is active or not. But in case of night time detection of a turn signal is easy. To detect the turn signal we first need to detect the vehicle. For the detection of vehicles we can use region of interest (RIO) selection algorithm[1]. For an image, Nakagami image combing

with an HSI segmentation method is utilized to locate vehicle light areas. At the same time, a selection of vehicle object proposals are obtained using RPN based on CNN feature maps. Then, the two results are combined to generate the ROIs by eliminating most non-vehicle lights such as street lights and billboard lights. They represent each ROI using a CNN-based feature and classify this feature using a softmax classifier.[1] To continuously monitor the vehicles we need a camera. So we can use embedded smart camera with low power requirements, capable

operating as a standalone device to determine the vehicle turn signal and to count the no of vehicles passing by. Soft color thresholds are used to pre-process a frame of video, image cleanup is performed through a series of tests, and Kalman filter and codebook are used for tracking the lights. The use of a codebook allows for greater robustness.[6]. Detection of vehicles in low visibility conditions and complex situations at intersections in urban environments can be a big challenge. To solve this problem we can use monocular infra-red cameras. As

Some features of vehicles, such as headlight and taillights are more visible at night time. We can define weights for different features in the deformable part model of the vehicle and try to learn the weights through an enormous number of positive and negative samples. Experimental results prove the effectiveness of the algorithm for detecting close and medium range vehicles in urban scenes at night time. [10]. Daylight detection of turn signals is done using mainly three steps like vehicle image detection, extract tail light candidates and estimation of rear light signals[3]. They have proved that by this(three layer structure) approach we can detect turn signals in daylight with different illumination circumstances [3].

Previous studies are more concerned with the relative intensity of the turn signals and the headlamps and tail lamps and also the ,asking effects of these relative intensity. Also the study regarding the phenomenon of the lateral visual masking was studied as it says a visual signal is more difficult to detect when it is placed adjacent to the light source means it is very difficult to detect the turn signals when they are placed near the headlamps.[12]

The major study in the automotive domain was regarding the lateral visual masking in the context to ease to detect the front turn signals in the present of other lights present on the front of the vehicles.From these studied applied in the autonomous cars, various threshold values were evaluated when a headlamp or daytime running lamps are near.These values were sorted out by using various dependant variables such as threshold detection distance (SAE, 1978; Kirkpatrick et al., 1997), maximum peripheral angle for detection(Alferdinck and Varkevisser, 1991). [13]

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