



# PROJECT'S PRESENTATION

Vehicle Recognition at Night Based On Tail Light Detection Using Image

processing

Course Title : Artificial Intelligence  
Course Code : 418

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# Abstract

- ▶ **Automatic recognition of vehicles in front can be used as a component of systems for forward collisions prevention**
- ▶ **When driving in dark conditions, vehicles in front are generally visible by their back lights.**
- ▶ **Develop an image processing systems that can efficiently spot vehicles at different distances and in weather and lightning conditions.**

# INTRODUCTION

## ▶ IN 2018

- 7,221 people were killed
- 15,466 injured

## ▶ IN 2017

- 7,397 people were killed
- 16,193 others

**# 40 percent of car accidents occur at night**

# INTRODUCTION

- ▶ **While in Europe and North America the situation is generally improving many developing countries face a worsening situation.**
- ▶ **Pedestrians and cyclists are often the most vulnerable in night time .**
- ▶ **The developed countries are now on their way .**



# ► INTRODUCTION

**so to avoid accidents during night time detect the vehicle by using their lamp pair , the concepts such as morphological processing and light edge detection are used .these concepts come under Digital Image Processing area .**

# STATE OF ART

- ▶ **As rear lights must be red by law, several systems have utilized color to aid vehicle detection.**
- ▶ **Detect rear lights by color filtering in RGB space to detect red and white regions .**
- ▶ **If a white region is surrounded for most of its perimeter by red pixels, it is regarded as a potential rear-light.**



# STATE OF ART

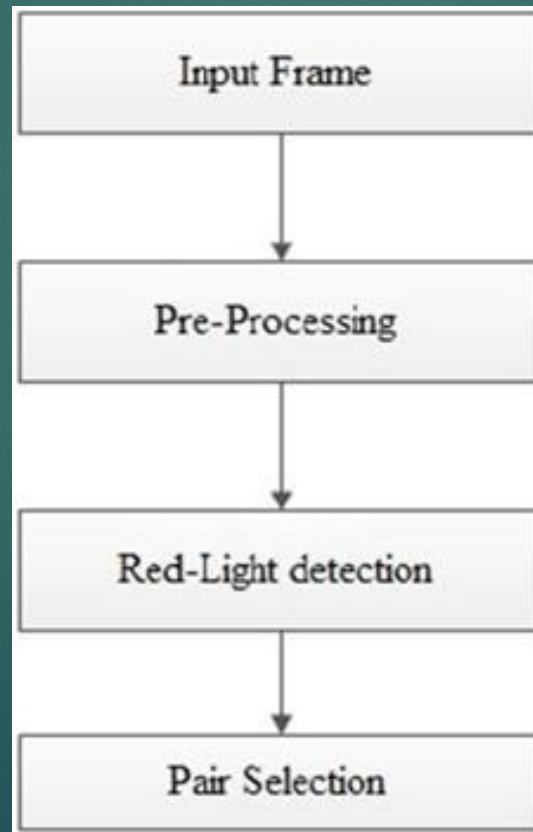
- ▶ **The bearing of the target vehicle is estimated by the horizontal position of the centroid of the tail lights.**
- ▶ **A signal is taken directly from the red channel of the RGB sensor, filtered and threshold in hardware.**
- ▶ **This method has a zero processing overhead, but is not adaptable .**

# STATE OF ART



# METHODOLOGY

## ► Architecture of Proposed Work in 4 steps





# METHODOLOGY

- ▶ **A digital camera fitted in the car captures the front vehicles. The input video is of the form mpeg, avi etc .**
- ▶ **The captured video is converted into number of frames.**
- ▶ **The numbers of frames are based on the format of the video .**

# METHODOLOGY

## ► Input frame



# METHODOLOGY

- ▶ **Preprocessing**
- ▶ **Preprocessing is the process can be carried out into the following list of steps**
  - ▶ **-- Binarization .**
  - ▶ **-- Noise removal**



# METHODOLOGY

- ▶ **In Binarization,**
- ▶ **RGB frames are converted into the binary image.**
- ▶ **It converts the input image to a binary image.**
- ▶ **The output image BW replaces all pixels in the input image with luminance greater than level with the value 1 (white) and replaces all other pixels with the value 0 (black).**

# METHODO LOGY

- ▶ **In Noise removal**
- ▶ **we calculate the weight of the object.**
- ▶ **Morphological operation employed here for reduce the noise .**
- ▶ **In Morphological Operation the technique such as erosion and dilation used.**

# METHODOLOGY

## ► Binary Image



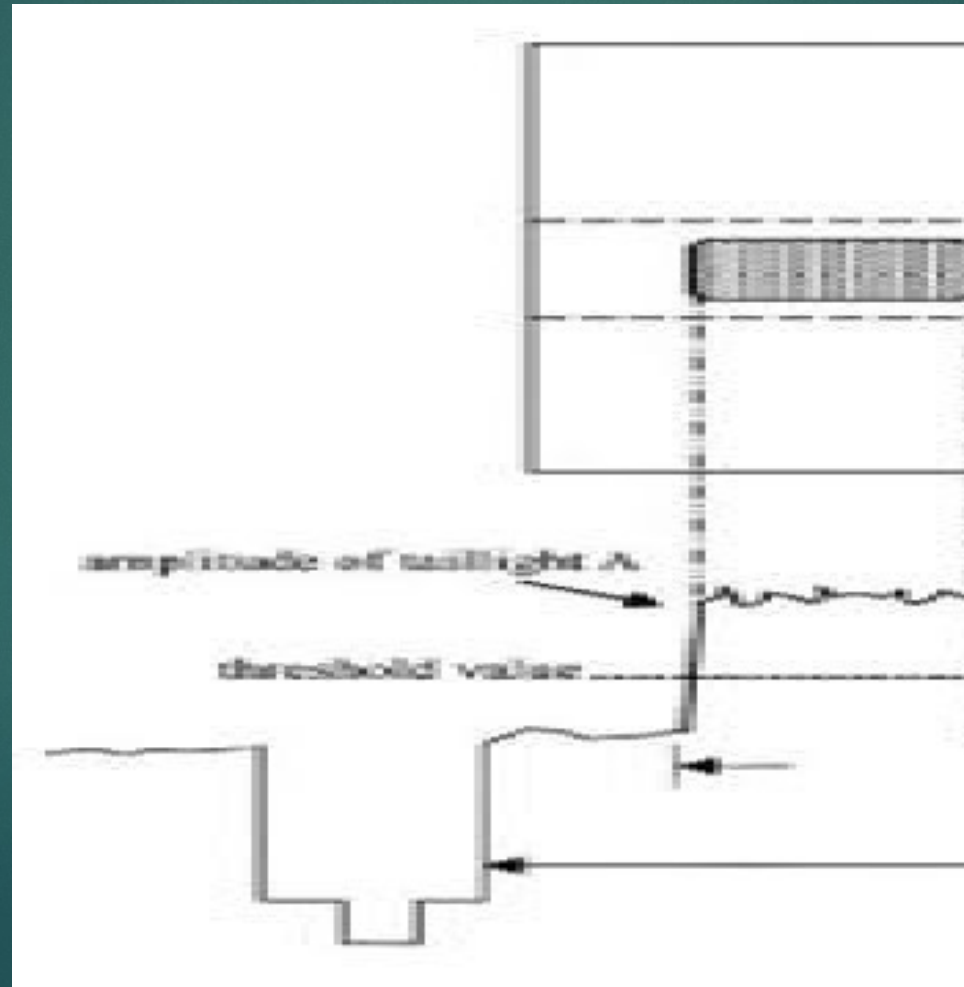


# METHODOLOGY

- ▶ **In Lamp Edge Detection**
- ▶ **The noise free input frame are subjected into the edge detection .**
- ▶ **The Edge Detection block finds the edges in an input image by approximating the gradient magnitude of the image.**

# Circuit

- Red output from a CCD camera :



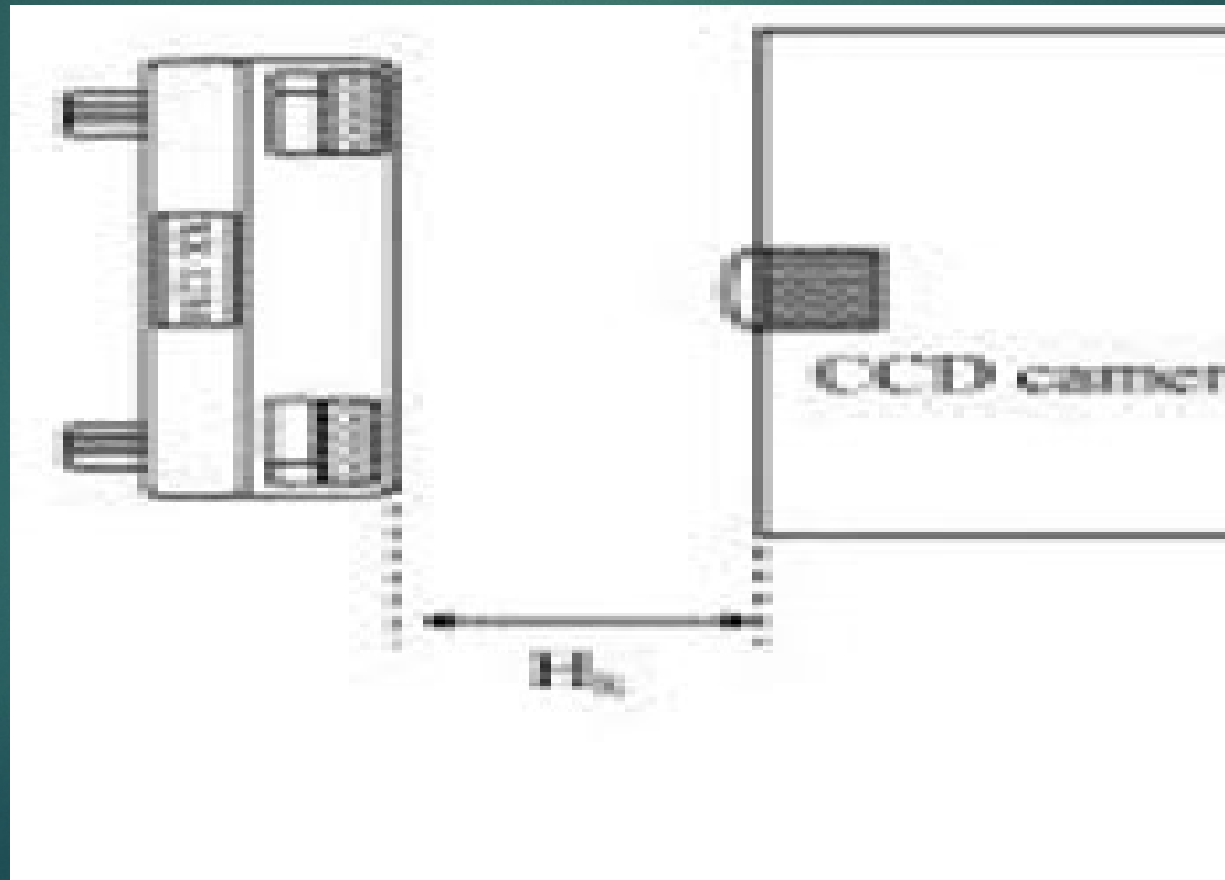
# Circuit

- ▶ **Images captured by a CCD camera are easily obtained.**
- ▶ **The red output signals of the taillights A and B in relevant scan lines would appear**



# Circuit

- ▶ **Circuit structure for identifying bright signals :**

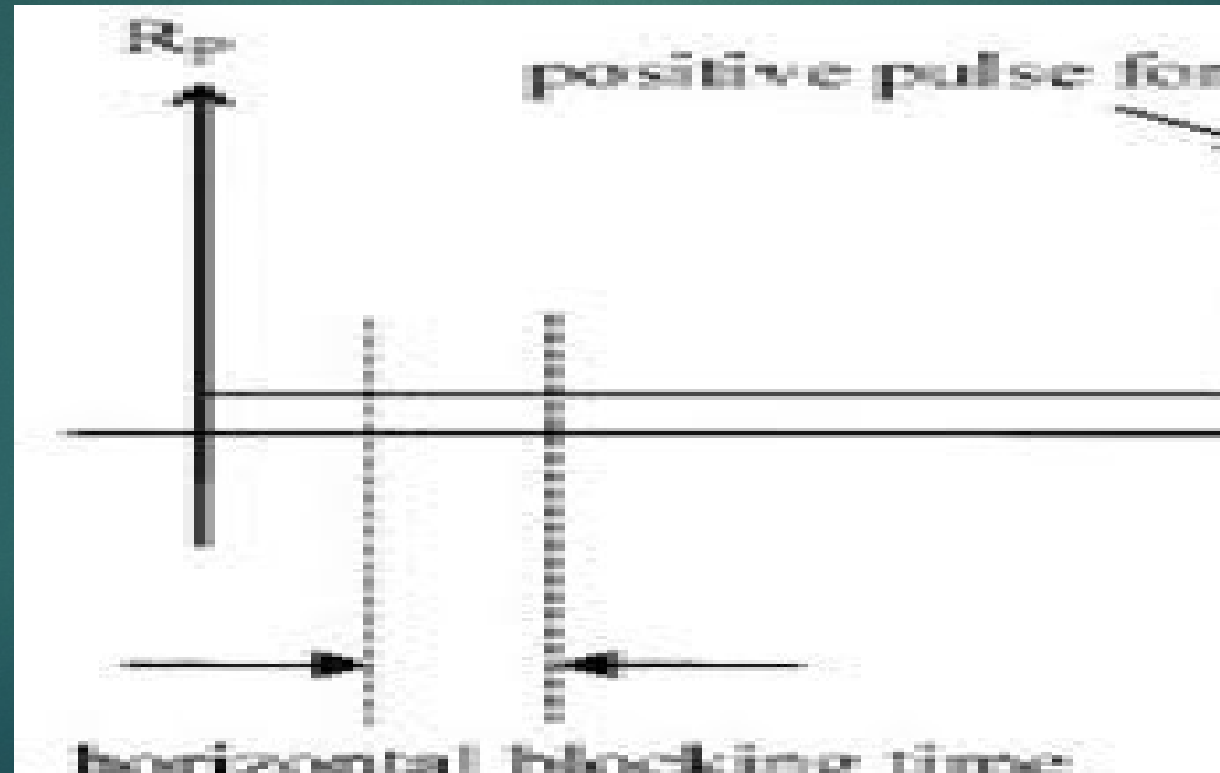


# Circuit

- ▶ **The circuit structure for identifying the red output signal is a simple and practical circuit**
- ▶ **The low-pass filter is used to smooth the signals from the CCD,**
- ▶ **We can define different supplemental quantities for different backgrounds.**

# Circuit

- ▶ **Comparator output  $R_p$  for identifying the positions of spots A and B :**

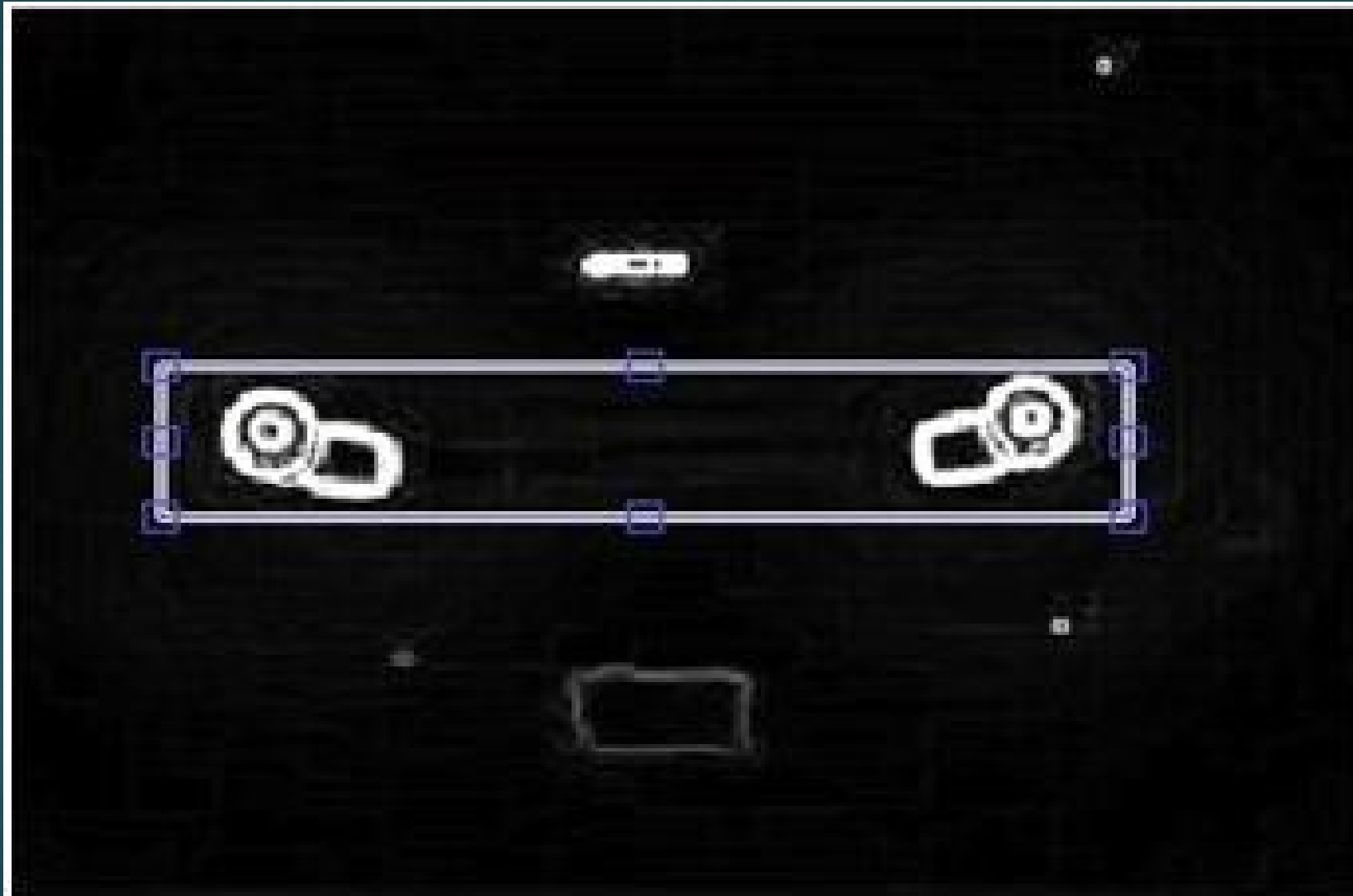




# Circuit

- ▶ **In this brief ,we propose a technique for transforming the time value scale into a distance scale that uses a clock counter instead of a pixel counter for measuring the distance between the taillights.**
- ▶ **This method can enhance measurement speed.**

# RESULTS



# RESULTS

- ▶ **This entire process essentially amounts to a symmetry check .**
- ▶ **If a bounding Box above a certain size is detected then the driver is alerted that a vehicle is close.**
- ▶ **The algorithm has demonstrated that it works well in both well lit urban areas and dark rural areas. It also works effectively in wet conditions**



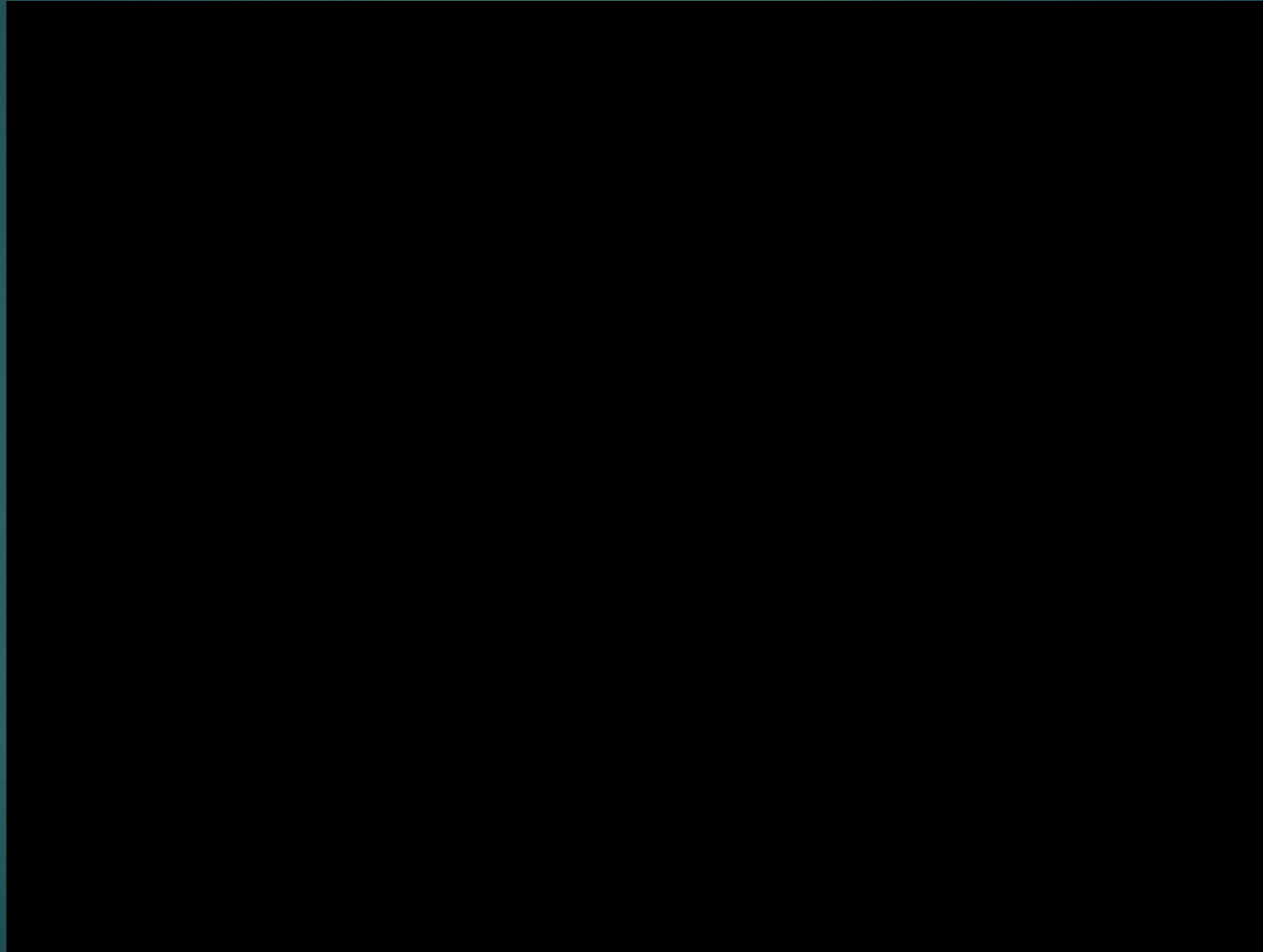
# CONCLUSION

- ▶ **In this paper, we have discussed the need for a system to avoid or mitigate forward collisions during darkness.**
- ▶ **A background to the relevant automotive rear light legislation, showing characteristics that can be recognized by image processing**

# CONCLUSION

- ▶ **We have presented an algorithm for forward collision detection at night using a visual camera.**
- ▶ **Our technique filters red and white colours in the HSV colour space.**
- ▶ **White regions adjacent to red regions are searched for symmetrical pairs, and aspect ratio constraints are applied to resulting bounding boxes.**

# Result





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