

# Adaptive Head Light System using Image Processing



Medha B.Patil, S.V.Phakade

**Abstract** – The project introduce a prototype of an adaptive head light system using image processing. This system is focused on the lighting angle of low beam in the headlights with its light moved horizontally. The controller in head light is based on image processing from a camera mounted front side of the car. This system decrease the 'glare' effect of the headlights and increase the drivers visibility based on survey.

**Index Terms** –Adaptive head light system, headlights.

## I. INTRODUCTION

In day, todays life we can observe that there are more number of vehicles increased. Fortunately or unfortunately some accidents are occurred. As per the survey more number of accidents takes place during the night time. Their for we decide to design a vehicle with adaptive headlight system. As per its name the headlight will be automatic and illuminate the light in the correct region and direction when vehicle takes turn from sharp corner. By this adaptive system we can minimize the accidents occurred due to the light. This system not only help during vehicle taking turns at curves but also when another vehicle coming in front side of the vehicle with brighter lights. The adaptive system will adjust the brightness of the light.

As shown below figure 1.1 car A uses the non-adaptive head light system and car B uses adaptive head light system. The diagram shows that the when car A is taking a turn then the light is more illuminated on the corners than on the road which may lead to accidents. While car B uses the adaptive light system which will get more focus on roads than on the corner which in return result in more clear visibility to driver.

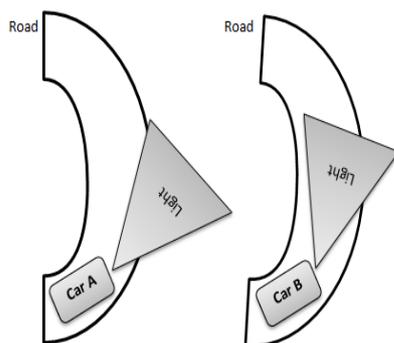


Figure 1.

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## II. LITERATURE REVIEW

Adhirajkadam, Jubainsharma, Naitik Mehta, Arpanpatel, Prof.HansrajKhande, this paper proposed that the headlight will move according to the movement of steering wheel.In this paper objectives are achieved by designing the horizontal and vertical movement of headlights. For this paper, he used ultrasonic sensor and accelerometer for horizontal and vertical movement of light beam respectively. Arduinouno is used as microcontroller of this system. And stepper motor is used for vertical and horizontal movement of the headlight. FengqunGuo, Hui Xiao, Shouzhi Tang This paper analysed photometric characteristics of vehicle headlamps when turning according to corner, and developed a new kind of adaptive front-lighting system based on charge-coupled device which was better than traditional AFS. This AFS used CCD image sensor to detect information about the corner and then sent curvature radius to electronic control units in advance. Meanwhile, electronic control units would calculate accurate turning angle of headlamps and send it to motor to adjust headlamps to get the lighting beam which is suitable for the corner. Through this way, when away from the corner it could ignore "blind spot" because of the fixed area which is covered by headlights of the vehicle, for improving safety of driving. This paper gave a modelling for horizontal rotation angle of vehicle headlamps, and simulated it with MATLAB.

## III. EXPERIMENTAL DETAILS AND METHODOLOGY

### 1. Hardware:

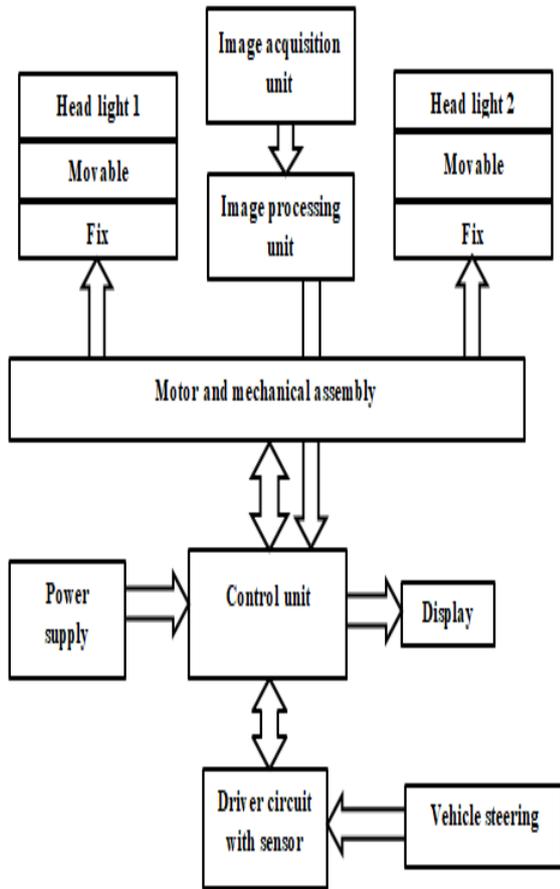
Control Unit is a heart of the system that controls all the peripherals we interface to it. It mainly consists of microcontroller PIC16F877A.This microcontroller can easily interface with peripherals. PIC have read-only memory or field-programmable EPROM for program storage. All current models use flash memory for program storage Image processing unit is matlab enabled and detects oncoming vehicle. As vehicle gets detected by the system it triggers control unit so that it controls glare of the vehicle. In display Unit, LCD displays are used. This is one of the most sophisticated display devices. It is the easiest and very reliable output device, for micro controller based project, not every time any debugger can be used to simulate the output. So LCD display used to test the outputs. Most important advantage of the liquid-crystal display have low power consumption than LED. In every electronics projects we need a power supply for converting mains AC voltage to a regulated DC voltage or to provide constant DC voltage to circuit if battery operated.



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For making a power supply designing, Each and every component is essential to get exact power from the source. This project demands 5v supply to operate. Driver circuit with steering sensor gives changes in the angle of steering as driver rotates handle of a car. Output of steering sensor can give exact digital values of steering angle after processing. Steering rotations can be analysed by the system to turn headlights accordingly.

The servo motor is most commonly used for high technology devices in the industrial applications. It is a self contained electrical device that rotates parts of machine with high efficiency. The shaft of this motor can be rotate to a particular angle. In this system servo motor used for the rotating head lights.



**Figure 2. Block diagram of adaptive head light system.**

The servo motor is most commonly used for high technology devices in the industrial applications like automation. It is a self contained electrical device, that rotates parts of machine with high efficiency and great precision. The output shaft of this motor can be moved to a particular angle. In this system servo motor used for the rotating head lights. In this system relay are used for switching. When oncoming vehicle are detected then relay switches to micro-controller for controlling glare of the headlights.

In this system we need to calculate steering angle for rotating headlights. For this purpose the potentiometer are used. This potentiometer are connected to steering. Potentiometer gives the value in voltage that is 0v-5v as according to the movement of steering.

When potentiometer gives the voltage level then these voltage converted into digital value in between 0-1023 by using analog to digital converter in ATmega328 then this digital value gives to the micro-controller then micro-controller converts this value in angle and then rotate the head lights. In this system also used USB connector. This USB connector is serial converter cable that provides connectivity between USB and PC.

Below table shows the calculation of the angle in this system.

Voltage	ADC Value	Angle in degrees
0	0	0
0.5	102	17.94
1	204	35.89
1.5	306	53.84
2	408	71.78
2.5	511	89.72
3	613	107.66
3.5	715	125.60
4	817	143.54
4.5	919	161.48
5	1023	180

2. Software:

**MATLAB:**

MATLAB Stands for Matrix laboratory. This is the general purpose programming language. In this project we will use this software for image processing. Image processing is a method of performing some operations on an image, in order to get enhanced image or it extract some useful information from it. In this project camera is mounted front side of the vehicle. Then this camera capture the images of vehicles on the road continuously with the help of image processing. When any object or vehicle is coming towards the vehicle then matlab detected this object or vehicle and trigged to the system. Based on these information system, it controls the glare of the headlights of the vehicle.

**MPLAB IDE:**

MPLAB IDE is a software program that runs on PC which provides a development environment for embedded system design. MPLAB IDE is a software program that runs on development environment for embedded microcontroller design.

**Proteus:**

Protues will combine advanced schematic capture, mixed mode SPICE simulation, PCB layout and auto routing for making a complete electronic design system. VSM technology is also included into the PROTUES, which allow simulating micro-controller based design that completes with all the surrounding electronic.

The Proteus Design Suite is a branded software tool suite which is used especially for electronic design automation. It is used mainly by electronic design engineers and technicians in order to create schematics and electronic prints for manufacturing printed circuit boards.

The Proteus Design Suite is a Windows application which is used for schematic capture, simulation, and PCB layout design. It can be obtained in many configurations, depending on the size of designs being produced and the requirements for microcontroller simulation.

PCB Design products include an auto router and basic mixed mode SPICE simulation abilities.

#### IV. RESULTS

In this project MATLAB tool used to capture the images of the road for detecting head lights of the oncoming vehicles. The below figure shows the detected headlights of the oncoming vehicle and count of the head lights.

Input Image



Output Image

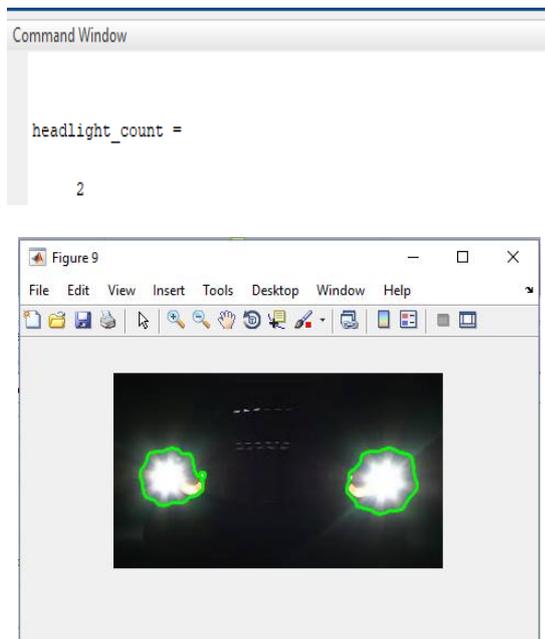


Figure 3.

The database consists of different types of the car images. Total 14 car images are used to experiment the technique. This images are taken from the internet. Experiment shows that the system has good performance on counting and detecting headlights of the car.

#### V. CONCLUSION

This paper present Adaptive Head Light system for vehicles. This system helps to remove “blind spot” of the curve road and improve the driver’s visibility at night time. And moving the headlights horizontally according to steering movement or angle.

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