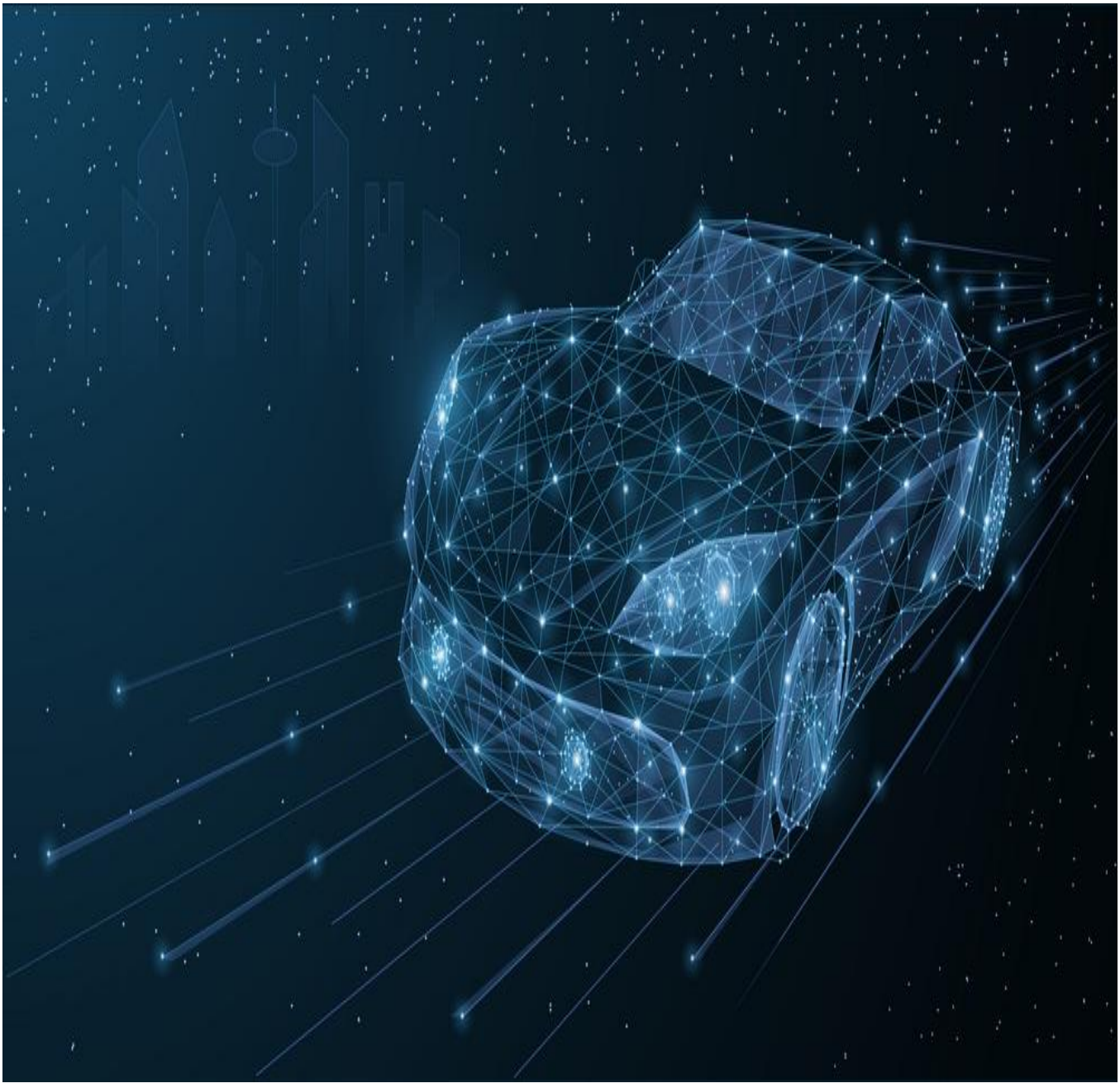
**Information Technology Institute (ITI)**
**New Administrative Capital Branch**
**Embedded Systems Track**

# *Control Lighting using GUI*

# *(Part of ADAS system)*



# *Control Lighting using GUI*

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***Deliver Date: March 4, 2023***

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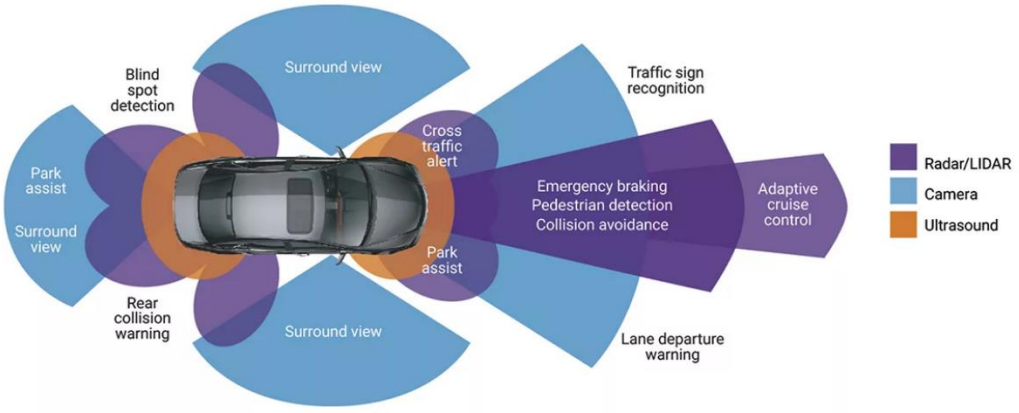
# INTRODUCTION

Almost all vehicle accidents are caused by human error, which can be avoided with Advanced Driver Assistance Systems (ADAS). The role of ADAS is to prevent deaths and injuries by reducing the number of car accidents and the serious impact of those that cannot be avoided.




## The previous figure shows some application of ADAS

Like:

- Pedestrian detection/avoidance
- Lane departure warning/correction
- Traffic sign recognition
- Automatic emergency braking
- Blind spot detection

# Other features and applications which our Project worked on:

- Glare-Free High Beam and Pixel Light: automatically uses sensors to adjust to brightness and the vehicle's surroundings without disturbing oncoming traffic. This new headlight application detects the lights of other vehicles and redirects the vehicle's lights away to prevent other road users from being temporarily blinded.
- Unseen area detection systems: use sensors to provide drivers with a level of brightness that makes the road possible to obtain without causing harm to oncoming vehicles.

# Main Features

## Automatic Mode

1- Automatic control of Car Lighting scanning area without any adjustment needed from the driver, using LDR sensors detect the lights from other vehicles, whether it's the taillights of the other vehicle or the headlights.
2- Automatic control of Car Light Beams Intensity & Direction without any adjustment needed from the driver, using IR sensors detect the vehicles nearby.

# Extra Features

## Manual Mode

1- RGB light source technology is added. As the LED light source itself contains RGB technology, through the control software, it can generate different light color signals, lighting becomes more intelligent.

Using GUI to control different colors of the RGB.

2- Using GUI to control different directions (Angles) of Headlights' motors.

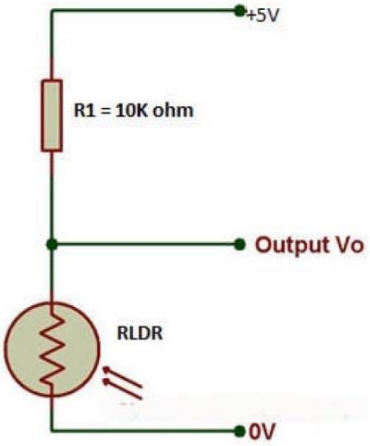
# Hardware Components

1- 3D mechanical part
2- LDR sensor
3- IR sensor
4- DC servo motors
5- SMD LED chip
6- ATMEGA32
7- Raspberry pi 3B+
8- RGB LED

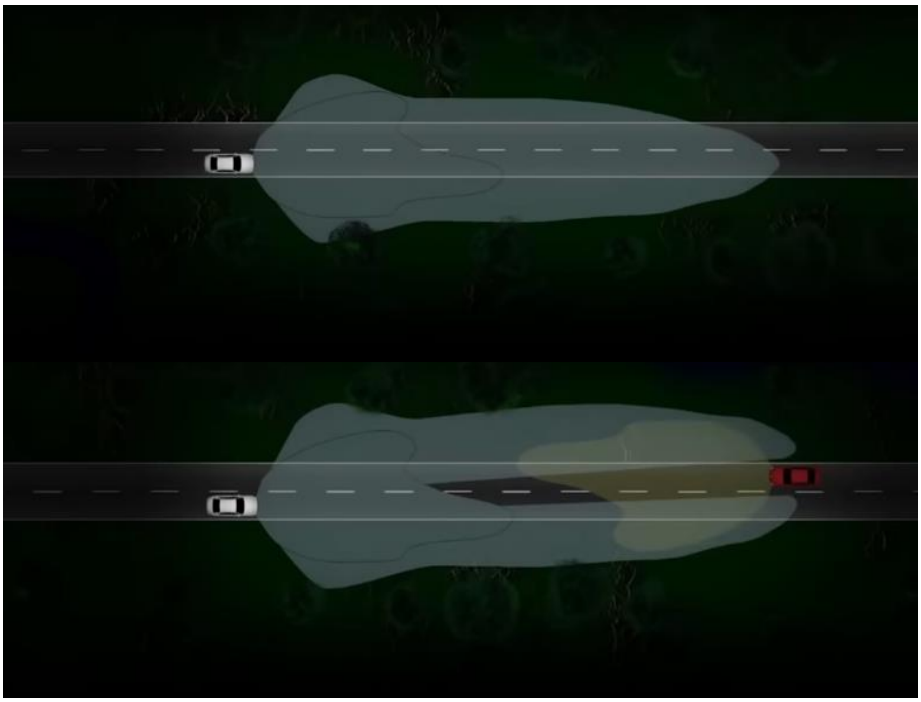
## 1- 3D mechanical part:

The Packaging of the Lighting System.

## 2-LDR sensor




**It converts the analog signal coming from the oncoming vehicle headlights to digital signal through ADC then use it to control the driver headlight brightness level through Timer.**



When the LDR detects light, they dim the brightness by

1- Changing 1st light beam intensity.
2- Changing 2nd light beam by rotating one Servo motor attached to a cover to that source like an eye closing.
3- Keeping the third light beam in its original direction.

As shown in previous figures

This will lead to:

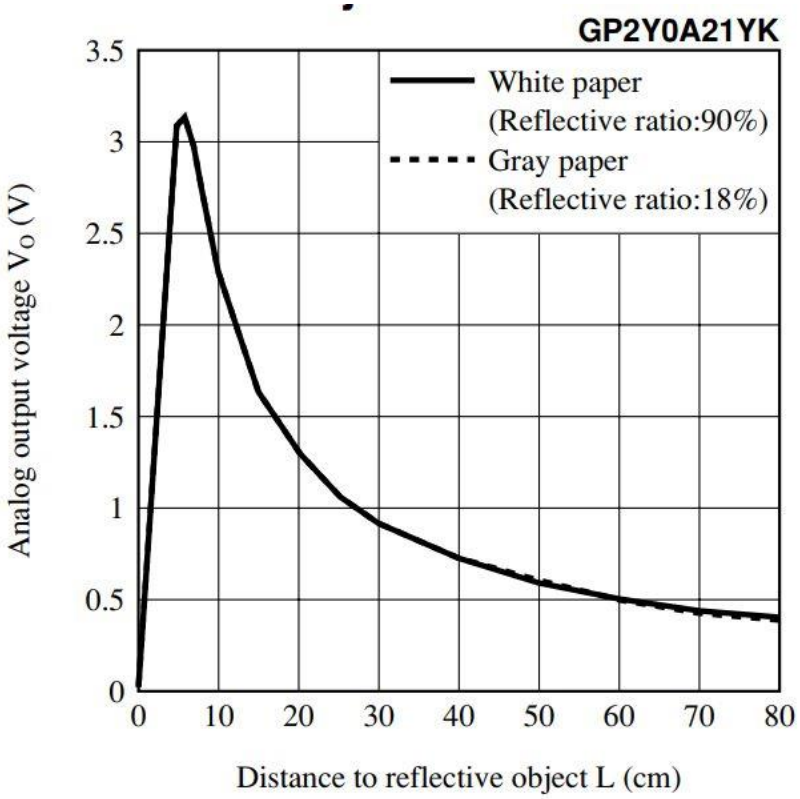
1- Clarify the coming driver's vision & protect their sight from the coming car Light Brightness.
2- Keep the driver's way & vision clear.

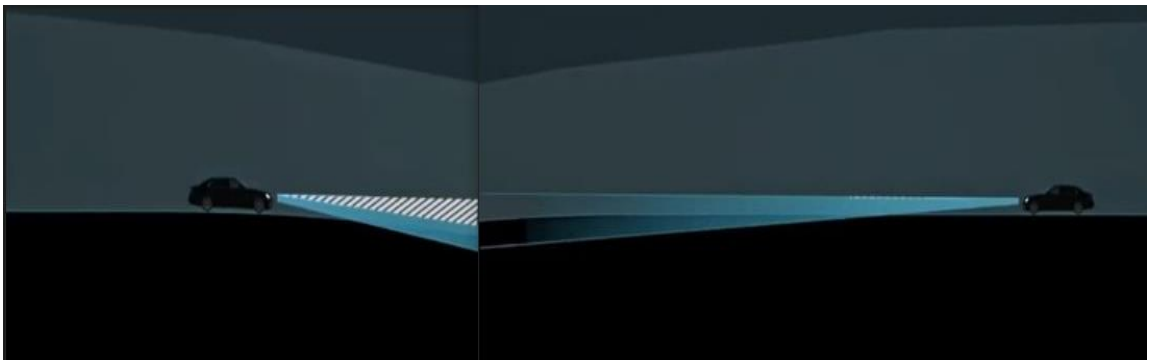
## 3-IR sensor

It converts the analog distance between the driver and the oncoming vehicle to digital signal through ADC then use it to control the driver headlight mechanism through Timer.

Through the following equation:

Distance (cm) = 29.988 X POW(Volt , -1.173)





When the IR detects nearby vehicles, they change the Light Beams Direction by

1- Lowering the bar carrying the LEDs.

This will lead to:

1- Make the Light Brightness less for the front vehicles, so make it comfortable for them to drive.

## 4-DC servo motors

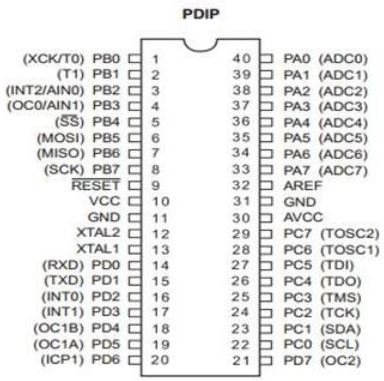
DC servo motors are used to control the LEDs Position so the Light Beams Direction.

**How it works**

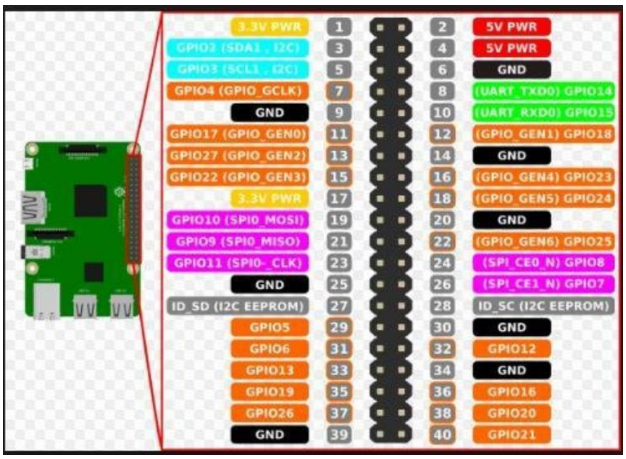
## 5-SMD LED chip

They're used as a source of Light Beam.

## 6- ATMEGA32



## 7- Raspberry pi 3B+




## 8-RGB LED

It’s used for Interior Design.