

Automotive Glare Suppression and Night Vision Assistance

<https://www.youtube.com/watch?v=CgmJRnBSPHQ>

The project “Automotive Glare Suppression and Night Vision Assistance” aims to enhance driver visibility, comfort, and safety during nighttime driving by integrating image processing, embedded vision, and intelligent vehicle control systems. A Raspberry Pi 3 B+ acts as the central processing unit and is interfaced with a Pi Camera to continuously capture real-time video of the vehicle’s front view. The captured images are processed to detect high-intensity glare from oncoming vehicle headlights and automatically suppress it using adaptive filtering techniques. Additionally, night-vision enhancement algorithms improve image brightness and clarity in low-light conditions, and the processed video is displayed on a 7-inch HDMI LCD screen for real-time monitoring.

The system also incorporates automatic headlight beam control, which switches between high beam and low beam based on detected glare conditions to prevent discomfort to other drivers. Automatic indicator control is achieved using tilting switches that activate turn indicators when the steering direction changes, improving signaling accuracy during turns. Furthermore, an automatic accident alert system is implemented using an accident detection switch; upon detecting a collision, the system sends an emergency alert message with vehicle information to the nearest police station and hospital through a GSM module (SMS service).

An SD card is used for data storage, and a regulated power supply ensures reliable operation of all components. This cost-effective and intelligent driver assistance system significantly improves situational awareness, reduces accidents caused by temporary blindness due to glare, and enhances overall road safety during night driving.

OBJECTIVES:

- To design and develop an automotive glare suppression system for safe night-time driving.
- To implement night vision assistance using image processing techniques for improved visibility in low-light conditions.
- To achieve automatic headlight beam control by detecting oncoming vehicle glare.
- To enable automatic indicator ON/OFF operation based on steering direction using tilting switches.
- To detect accidents and automatically send emergency alert messages to the nearest police station and hospital using a GSM module.
- To display real-time processed video on a 7-inch HDMI LCD screen for driver assistance.
- To develop a cost-effective and reliable embedded system using Raspberry Pi 3 B+.

The major building blocks of this project are:

- Power Supply.
- Raspberry Pi3.
- Pi Camera.
- SD card.
- 7INCH HDMI Cable.
- Two tilting switches.
- Accident switch.
- Two indicators.

- Two Headlights.
- GSM.

Software's used:

- Raspbian OS.
- Python language.

Block Diagram Of The Project

