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Smart Headlight System

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***Abstract*—In adaptive headlight system, this paper will illuminate the curve roads which will make the blind side of curved road visible to the driver. Our design includes, an extra LED which will be placed between the main front light and indicator of the vehicle. The added headlights will turn on automatically by sensing the surrounding luminosity to improve visibility for driver to make the objects visible in those darkened locations and thereby prevent accidents.**

***Index Terms*— Adaptive headlight, blind side of curved roads, front light, LED.**

I. INTRODUCTION

In the known technology of the prior art, the angle of illumination of headlights is fixed in a particular direction. Survey shows that there is one death after every four minutes due to road accidents in India. But still in some situations where in this advanced technology does not meet the real-time situations and this can lead to fatal accidents which is a loss to life and economy too. Many accidents occur on roads having steep turns and curved roads in hilly areas, due to presence of blind spots, these areas cannot be seen directly by looking forward or by looking through either of side mirrors. Many reasons cause these blind spots like steep curves in roads, weather conditions, poor infrastructure, improper street lights etc. which creates problems if they are out of the area covered by light; and such lack of visibility poses danger in driving at night or in darkness. Although the effects of high beam or low beam can be achieved by adjusting the angle of elevation of the headlamp, the direction of emission is not adjustable as to the left or right Therefore, it is highly desirable to invent a device to solve this problem and such device is of high utility.

II. METHODOLOGY

The figure shows the interfacing of LDR, stepper motor, ultrasonic sensor and temperature sensor with microcontroller PIC 18F4520. The inputs obtained from these sensors will be processed for the adaptive controlling of the headlight. The basic design principle is controlling the intensity of the LED added between headlight and the indicator. LDR stands for light dependent resistor, when the light level decreases, the resistance of the LDR increases. As this resistance increases in relation to the other Resistor, which has a fixed resistance, it causes the voltage dropped across the LDR to also increase. The change in resistance changes corresponding current and input is fetched to the microcontroller. Stepper motor is brushless DC motor that divides a full rotation into number of equal steps. It is used at input to detect the angular displacement of the steering. Temperature-humidity sensor used is DHT11. It uses capacitive humidity sensor and a thermistor to measure the surrounding air. It gives out a digital signal to the microcontroller. Ultrasonic sensor is used to measure the distance by using ultrasonic waves. It measures the distance to the target by measuring the time between the emitted wave and reception.

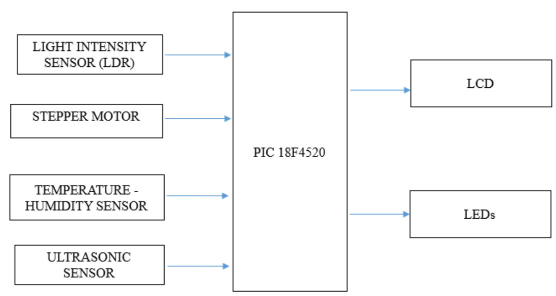

Fig. 1. Block diagram of system

III. DEMONSTRATION ON THE ROAD

We implemented this at a prototype level. In this design, we are developing a prototype in which we are controlling a supporting headlight. The control is decided by accepting the inputs from the four attached sensors: LDR, stepper motor, ultrasonic sensor and temperature-humidity sensor. The microcontroller we have used is PIC18F4520 because it accepts analog inputs and provides digital outputs. There are multiple situations where our system will drive the output. First, microcontroller will check the angle subtended by the stepper motor if it is beyond the threshold value then the light condition through LDR will be checked. If both the conditions are satisfied then, the LED will glow and illuminate the hidden spots. Second, there will be conditions when the surroundings will be foggy. Since, the normal light is reflected back because of the fog, the LED added has a larger wavelength. If the humidity and temperature conditions match to that of foggy conditions, the LED will be driven. Third, ultrasonic sensor will continuously check if any vehicle is incoming from the front. If this condition is satisfied as well, then the LED will be illuminated notifying the presence of the incoming vehicle. The rotation angle of the stepper motor will be calculated and

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displayed on the LCD along with the temperature and humidity of the surroundings. Also, the relative intensity of the LED corresponding to the angle of rotation and light intensity.

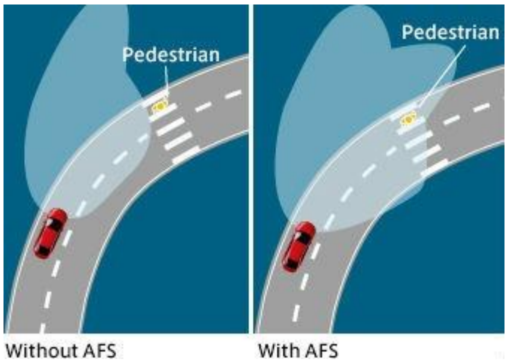

Fig. 2. Before and after using our system

The Fig. 2. Shows the distinction between two conditions with and without using Adaptive front-lighting system (AFS). In the first condition, the pedestrian is hidden to the driver, which is an undesirable condition and might lead to fatal accidents. The second condition is implemented using our system. The extra middle bump of light illuminates the pedestrian. Hence, making it visible to the driver and further reducing the number of accidents. Fig. 3. Shows the practical realization of our system.

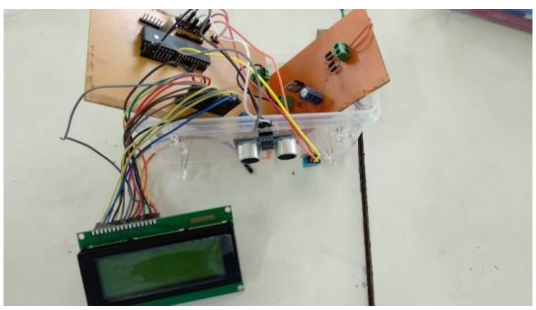
Fig. 3. Practical realization

IV. Conclusion and Future Scope

This paper intends to automate the headlight system in vehicles. The system is inexpensive, simple and dependable assembly. This system provides the ability to illuminate the road at sharp turns or foggy weather conditions. And most importantly whole work is focused towards low-end vehicles hence a low budget and reliable system. Also, with some further research more features can be added to this system like Automatic temperature control according to outer weather conditions and smart automotive lighting. Thus, implementation of this system in all the vehicles in future will not only avoid accidents but also provide safe and comfortable driving.

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