IIDS
(IMPLEMENTATION OF INTELLIGENT DRIVING SYSTEM)

Heroshy Varghese [1] ,Hareena U[2],Jesna Jacob[2],Jisha K Jayan [2],Neema Alex[2]

[1]Asst. Prof. E.C.E Dept. BTC CET Koothattukulam, Kerala, India
[2] B. tech students, E.C.E Dept. BTC CET Koothattukulam, Kerala, India

Abstract - *An intelligent driving system, for making our urban life safe, is presented in this paper. The technologies implemented are multi-beam LED lighting technology, inter-vehicle communication and obstacles detection. For providing efficient lighting for curved roads, multi-beam LED headlamps, that uses steering controlled headlamps which is highly directional is implemented. In inter-vehicle communication, a vehicle will be able to communicate with a set of vehicles in the immediate neighborhood by using ZigBee. A keypad is set to send messages to other vehicles in case of technical faults, health issues, traffic information etc. Obstacle detection helps in detecting any obstacles in front and back of the vehicle. It is achieved by using ultrasonic sensors. All this technology would makes travelling on roads more efficient.*

Keywords: Obstacle Detection, Inter-Vehicle Communication, Multi-beam LED Technology

1. INTRODUCTION

Road accidents are increasing rapidly in recent decades. Recent statistics shows that road accident causes an average of 1.2 million deaths and 50 million injuries around the world every year. A Road accident leads to human tragedy. Road safety is a major issue of national concern. Accidents can produce negative impact on economy, public health and public safety. Therefore, when operating a motor vehicle the main concern is safety, aside from functionality. In order to reduce the accidents we are adding intelligence to our existing driving system. Conventional headlamps provide illumination at the side of the road while taking a curve or shine off the road entirely, that causes a unsafe condition. Multi-beam headlamps differ from conventional lamps in such a way that they rotate according to the rotation of steering wheel, so that the driver can get a clear view of bend ahead. The concept of "rotating headlamps" were on cars in early 1920's,but not much popular. In multi-beam LED lighting technology, LEDs are used as the lighting source. Since LEDs have some advantages like low power consumption, low cost, light from LED is closer to daylight and it is attuned to the human eye perfectly. In our prototype a potentiometer of 10 k is used instead of steering. so this multi-beam LED headlamp provide safe driving both at urban and hilly areas.

In inter-vehicle communication which focuses on generating the alert messages in case of collision warning, speed limit, lane change, technical faults, health issues of the driver. Communication is done by using ZigBee. A vehicle will be able to communicate with a set of vehicles in the immediate neighborhood like a few meters. A keypad will be set to send a message to other vehicle in case of technical faults of the vehicle or health issues of the driver. Its range up to 30m. For inter-vehicle communication, we are using keypad, MAX232, XBEE and an LCD display. XBEE is a radio module. This is designed for point-to-point and star communications.

Obstacle detection helps in detecting any obstacles in front or back of the vehicle. Incase of any potential danger, the ultrasonic and warning system will alert the driver. After detecting any obstacle, the vehicle gets stopped , minimizing both collision with cyclists, pedestrians and objects and vehicle damage. Ultrasonic sensors and a buzzer is used for obstacle detection.

2. LITERATURE SURVEY

Based on the background data we have collected, Development of an Adaptive Headlamp system, an AFS system that improves the reliability and safety of conventional headlamp is introduced. To sense the steering angle and vehicle speed a real time sensor is used. Only horizontal movement of the headlamp is described. Therefore only 50% of the actual adaptive headlamp working is achieved. To move the headlamp horizontally a servo motor is used and also Pic microcontroller and potentiometer is used.[1]

Application of Real Time Lighting Simulation for Intelligent Front Lighting Studies, adaptive headlamp strategies used in Renault Automobile is described. The system called Valeo lighting system ,according to the road conditions and environment a dynamically directing headlamp is introduced. A halogen bulb that comparing with previous generation produces light 30% more is used as light source here.[2]

Inter-Vehicle Collision Avoidance Using Zigbee Sensor, Communication between vehicles increases the safety and efficiency. Inter-vehicle communication helps a lot in the safety and ease in the traffic flow. Several studies that considers the exchange of information related to safety of the vehicles. According to this paper, we studied that the communication requirements for the safety of the vehicles.

By the use of DSRC , it is very helpful in collision avoidance of 1km and allows the exchange of information between vehicles moving up to the speed of 160 km/hour.

Embedded controller for vehicle in-front obstacle detection and cabin safety alert system, to detect a front-side obstacle of about 3 ft an IR sensor is used and in-case of emergency information in SMS form is send to authorised person.AT89S52 micro-controller, GSM module, gas sensing and alarm is used.[4]

Detection of Car Pre-crash with Human, Avoidance System &Localizing through GSM", to differentiate between human and other obstacle and accidental situation a new approach is presented. To detect human or animal presence Passive Infrared Sensor is used .[5]

3. PROPOSED MODEL

This system describes the block diagram of the proposed system consists of PIC microcontroller. It also includes the ultrasonic sensor, ZigBEE, stepper motor and LED. These different modules are controlled by PIC.
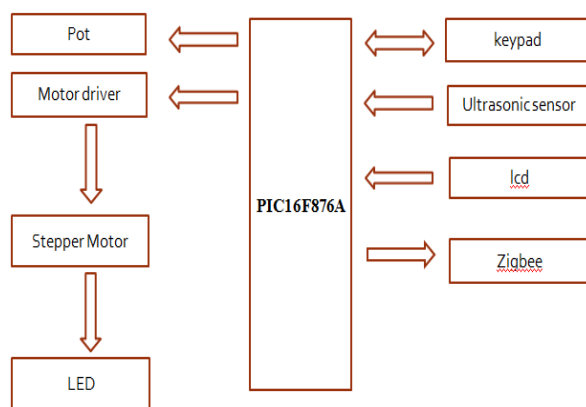

Fig -1: Block diagram of IIDS

4. WORKING DESCRIPTION

Multi-beam LED technology works based on the position of steering. Here 10k potentiometer is used instead of steering. As the resistance value of the potentiometer changes, the logic input to the motor driver IC changes. As a result LED which is connected to the stepper motor will rotate clockwise or anti-clockwise direction.

In inter-vehicle communication, a keypad is set to send a message to other vehicle with the aid of ZigBee in case if we have to inform any information like technical faults, health problems etc to neighboring vehicles. The range of the XBEE is 90m in case of outdoor. Since ZigBee works on TTL voltage. MAX232 IC used to maintain the TTL voltage.

Obstacle detection done by using two ultrasonic sensor, one is in front and other is in back. An external supply of 5V is applied to both the ultrasonic sensor. A 10uS pulse is given as trigger input. Then a 40kHz ultrasound is send for ranging. When it strikes on a obstacle an echo is received at the sensor. Thus our obstacle is detected and the vehicle gets stopped and a buzzer will produce an alarm the driver

3.1 Hardware Description

a) PIC16F876A

It is the heart of our project. It is an 8-bit controller. The important activities of the intelligent driving system are controlled by the microcontroller. It has 256 bytes EEPROM data memory. It is self-programming and has 37 instructions. It is a RISC (Reduced Instruction Set Computer) design. Its code is extremely efficient. It is low cost and high clock speed.

b)10 K POT: The user interfaces can be opened with the help of an adjustable potentiometer. By Turning the pot resistance changes. Depending on the rotation of the pot the voltage of the centre pin will varies from 0 to VCC .VCC is connected to outer pin, GND to the other. The centre pin connected to an ADC on PIC and a and a variable input is given.

c)ULTRASONIC SENSOR (HCSR04): To detect the presence of an object Ultrasonic ranging and detecting devices use high frequency sound waves called ultrasonic waves . It works at 5V supply. A 10uS pulse is given as trigger input. A 40kHz ultrasound is send for ranging. For conversion of one form of energy to other it consist of a transducer and a housing enclosing the ultrasonic transducer and an electrical connection.

d)L293D: It is a motor driver integrated circuit. It is used to drive stepper motors rotating in either direction. It is a 16 pin IC. It uses 5V for its own power and external power is needed to drive the motors. It works on the concept of typical H Bridge. There are two H-bridge circuits, which can rotate 2 stepper motors independently.

e)STEPPER MOTOR: A brushless DC electric motor is called a stepper motor or step motor or stepping motor   that divides a full rotation into a number of equal steps. It works at 12V supply. The stepper motor can generate a precisely defined increment in the shaft position by converting a train of input pulses. The shaft moves through a fixed angle for each pulses.
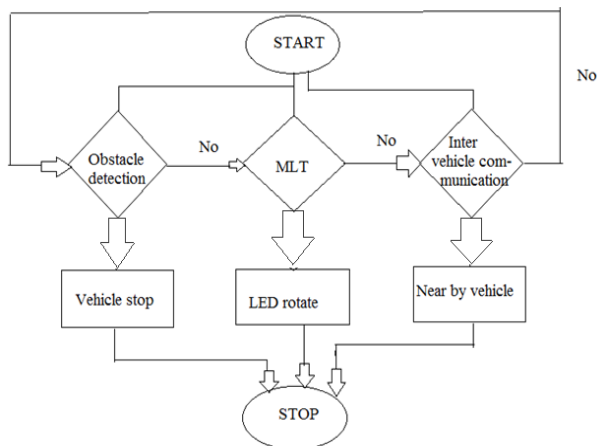
Fig. 4 FLOW CHART OF IIDS

f)ZIGBEE: ZigBee Module is a mesh networking standard that used to connect devices wireless. It is for low-power wireless local area networks that cover a large area and also it is a low power, low cost, device. It have a long life with smaller batteries because of low power usage. It operates in unlicensed radio frequency bands ,including 868MHz, 900MHz, 2.4GHz. The data transfer rate is about 250kbit/. It uses variety of security mechanisms such as frame counters, device and network keys and AES-128 encryption. To eliminate single points of failure and expand the reach of network uses multi-hop mesh networking and it is reliable and robust. This ZigBee module is in line with the Industry Standard applications of wireless data communication module.

f) LED: One of today's rapidly developing and highly energy efficient lighting technology is light emitting diode. LEDs comparing with other lighting sources have better light quality and also more durable, last longer and emit less heat. To make white LEDs a mix red, green and blue LEDs are used. LEDs requires a LED driver circuit to maintain controlled electric power. LED driver circuit convert the alternating current to direct current used by the LEDs. LEDs comparing with other lighting sources have 50 times more life span.

6. FUTURE SCOPE

The proposed system can be improved by adding non-dazzling to the adaptive headlamp and it can be add to heavy vehicles like trucks, buses etc. Computer vision based image processing algorithm can be used for locating the area. Sound generating devices(SGD) can be add to alert the driver in obstacle detection.

7. CONCLUSION

In recent decades road accidents are rapidly increasing. Road safety is an issue of national concern. Accidents have negative impacts on economy, public health and public safety.The accidents can be avoided by

incorporating IIDS mechanism.The technologies used in the IIDS mechanism consists of Multi-beam LED technology, Obstacle detection and Inter vehicle communication. The design and build of multi-beam LED headlights from conventional static headlamps has been achieved. Moving the headlights from left to right or vice versa continuously corresponding to a sensor is achieved. An advantage of the developed headlight system is in its high adaptability. Furthermore, the system is , simple, inexpensive and dependable assembly.

In obstacle detection, the ultrasonic sensors can detect any kind of obstacle, this system can also prevent collision with pedestrians, or at least reduce the injuries that can happen.. Our ZigBee-based driver assistance system provides a very cost-effective alternative to more expensive commercially adopted systems like GPS, which provide navigation but do not have any warning capabilities. Here a vehicle will be able to communicate with a set of vehicles in the immediate neighborhood, like a few kilometers. A keypad will be set to send a message to other vehicles in case of technical faults of the vehicle or health issues of the driver. All these technologies will help us to reduce accidents upto a limit that likely to be happened

8. REFERENCE

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