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DEVELOPMENT OF ADVANCED PARKING SYSTEM WITH WARNING CONTROL

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Abstract: This paper is about a system for assisting a car driver while parking in reverse direction. This system is used in vehicles, and continuously detects the obstacle so as to avoid accidental situation while reversing the vehicle. It makes easy for a driver to park the car in reverse direction. Driver gets immediate warning on LCD display about the obstacle. This system also gives warning to the pedestrians using buzzer while reversing the car. It not only gives warning but also apply automatic brakes when distance between an obstacle and car is below some threshold value. This is a microcontroller based system which is useful in automobiles as an intelligent vehicle assistant for safe driving. Most of the car drivers used the reverse radar orareverse camera to detect the road situation behind the vehicle when it is engaged in reverse gear. As a matter of fact, the pedestrians can virtually know if the vehicle is backing up or not only by seeing the permanent bright reverse lamps. And as there is not much change with the reverse lamp to be seen, therefore their warning function for pedestrians seems to be still insufficient eventually. Not only the warning feature of the reverse lamps is virtually not sufficient but their function will be influenced owing to the different installation positions. Hence we propose the new technology to overcome this issue.

Keywords: ***vehicle, parking, reverse, intelligent, microcontroller.***

I.INTRODUCTION

The growth in automobile technology is now attracting electronics engineers. The reason is, now automobile is not a mechanical system but becomes intelligent automobile with an electromechanical system. In recent years vehicles are fully equipped with electronic systems and electronic sensors. One of them is Intelligent Vehicle Assistance System. The aim of this system is to prevent accident with other vehicle or any object while moving in reverse direction.

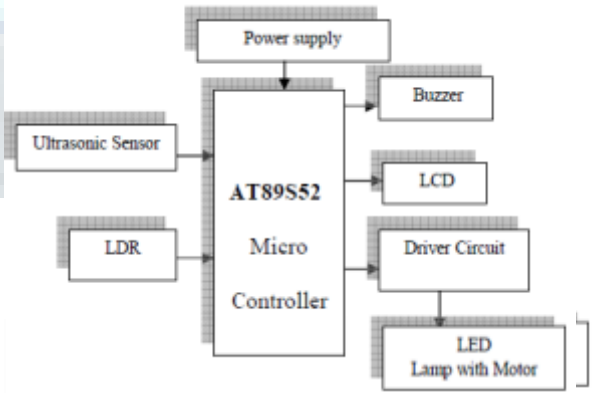
This system has been designed to help driver to prevent accident while parking in reverse direction. Distance sensors are used to sense the objects and used to detect the obstacle. The system uses distance sensor as range finder, microcontroller to process calculations. It displays result on LCD screen and alert pedestrians by buzzer and flashing LED lights.

The system is activated when the reverse gear is applied. Then it continuously displays the distance of the obstacle on LCD display while reversing. It warns the pedestrian with flashing light and buzzer. When the obstacle is very close i.e. the distance between vehicle and obstacle is below threshold value the system automatically applies brakes.

There are several car back-up warning systems which are currently used in the market at present such as reverse radar, reverse camera, and reverse alarm audio system, etc. and the function of the reverse radar is used to remind the driver of the distance behind the driving vehicle and the obstacle while the reverse camera is used to let the driver see the situation behind the driving vehicle without needing to turn around driver's head. Apparently, either of them is used for driver's purpose only. There is nothing to do with the pedestrians. As the pedestrians can only know if the vehicle is in reverse gear or not only by seeing the permanent bright reverse lamps. And it is very difficult for them to know the actual situation well. This research tries to design a set of embedded intelligent car backup warning system so as to promote the safety of the walkers or the other drivers on the road. By using microcontroller to transform the signal from the ultrasonic sensor and LDR sensors. And the angle of the LED reverse lamp bracket is adjusted and driven automatically according to the results of this logic deduction eventually.

This research tries to do the test by using a mobile frame in the same height as a real automobile. Installation angle will be changed correspondently with the distance between test mobile frame and obstacle and being declined automatically from 90 degree to 0 degree. Apparently, from the test results, it has been proven that this system can reach the goal of automatically controlled car back-up warning function truly.

Block Diagram:



Working

In this circuit we are using the LDR for time sensing purpose, whether the time is day or night. So the LDR will sense the time, if it is night when the car is get reversed the ultrasonic sensor will sense the obstacles which are the behind the vehicle and it will rotate the LED lamp with motor according to the distance. If it is low distance it will rotate the lamp with that much angle it will flash the light on humans and alert the pedestrients. so the pedestrian come to know that the vehicle is coming behind so he can get alert. so it can alert the driver by using the buzzer and the obstacle information also displayed on LCD display. If the obstacle is very nearer to the car then Break will be applied, so that the speed of the car is decreases and automatic break also performed.

II. RELETED WORK

Tsung-hua Hsu et al [1] has implemented automatic parking system using ultrasonic sensors. It first searches for available parking area. The microprocessor makes a calculation about car length and available space and produces a map for parking, in processor memory.

R. Rani & M. Sudhakara Reddy [2] has implemented the embedded control warning system for vehicle reversing. In this system ultrasonic sensors will sense the obstacles which are behind the vehicle. It flashes light on pedestrians. Display and buzzer is used to alert driver.

Hsi-Chuan Huang et al [3] designed a system which uses Microsoft Win CE operating system and matches with the Mini2440 developing board. It also uses the Visual Studio 2005 for developing the intelligent touch panel operating mode. This research tries to do the simulated test by using a mobile frame in the same height as a real automobile.

Lelono D, Muldani, F.[4] designed a device that uses ultrasound sensor as range finder, microcontroller AT89S52 processes calculation and displays result in LCD screen. These calculations are also used for managing buzzer and relay as the actuator. The device has been simulated by toy car which run reversely to object behind. On any ranges, buzzer sound would sign actively, and it continued to break the electric current of the vehicle if it is still running.

Sidek S.N, Salami, M.J.E.[5] implemented the system to use an intelligent controller to achieve the objective of automatic braking system. To ensure high speed of system response, a DSP controller TMS320C24x with an embedded fuzzy algorithm is used in the implementation of this new device. The results are simulation and studies using MATLAB. That has demonstrated the feasibility of this new system under investigation.

III. SYSTEM IMPLEMENTATION

System implementation is divided in two parts. First part is hardware part, which includes description of microcontroller, sensors, DC motor, LCD display, buzzer and LEDs. Second part is software part, which is a program in embedded C.

A. Hardware Description:

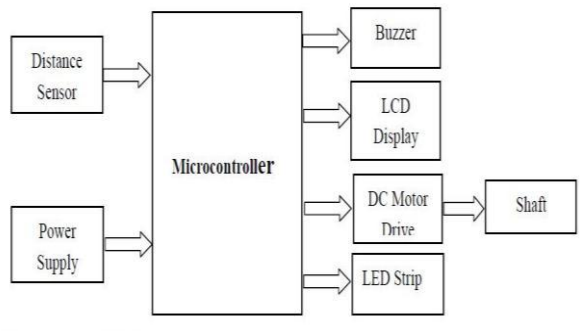


Figure shows block diagram of the system. Description of the hardware is given below. Microcontroller is performing all calculations and controlling all output devices such as buzzer, LCD display, DC motor and LED strip. Distance sensor is an input device.

1) Microcontroller: Microcontroller is heart of this system. AT89S52 microcontroller is used in the system. The microcontroller is always in the active mode, it provokes the buzzer and LCD display to warn pedestrians and driver.

2) *Distance sensor:* Distance sensor is used to sense obstacle. Ultrasonic sensor is used in the system which senses the obstacle behind the vehicle by emitting ultrasonic waves and receiving reflected waves. Number of sensors can varied according to width of the vehicle and requirement of precise measurement.

3) Buzzer: A buzzer or beeper is an audio signalling device. The buzzer is used in the system to make a sound when the obstacle is very near. It is used to alert driver as well as pedestrians.

4) *LCD Display:* Liquid crystal display is used to display messages about the distance between vehicle and obstacle. The display is interfaced with microcontroller and the messages are programmable.

5) DC Motor with Motor Driver: DC gear motor is used to move a shaft. This shaft is used to stop the vehicle while reversing. The microcontroller is programmed such that the DC motor will run and apply brakes when the distance between obstacle and vehicle is below the threshold value. The threshold value can be changed using microcontroller program.

6) LED Strip: Flashing LED strip is used to alert pedestrian when vehicle is moving in reverse direction. The speed of flashing increases when distance between obstacle and vehicle decreases.

B. Software Description:

An embedded system is used to perform a specific task using embedded software. This software can be developed using various embedded programming languages. But embedded C is well-known because of its flexibility, simplicity, reliability and scalability. After developing the software it is cross compiled using Keil compiler before downloading.Then the software is downloaded to microcontroller through a downloading tool such as universal programmer.

Distance sensor is activated when vehicle is in reverse gear. Distance sensor continuously sensing the distance between vehicle and obstacle. The distance is displayed on LCD display. When the distance is below 200 cm LED starts flashing and the frequency of flashing go on increasing when the distance go on decreasing. When the distance is below 100 cm buzzer is on. The DC motor is activated when the distance is below 50 cm. Then automatic brakes are applied using shaft. That will stop the car. When car is not in reverse gear all the sensors are then deactivated.

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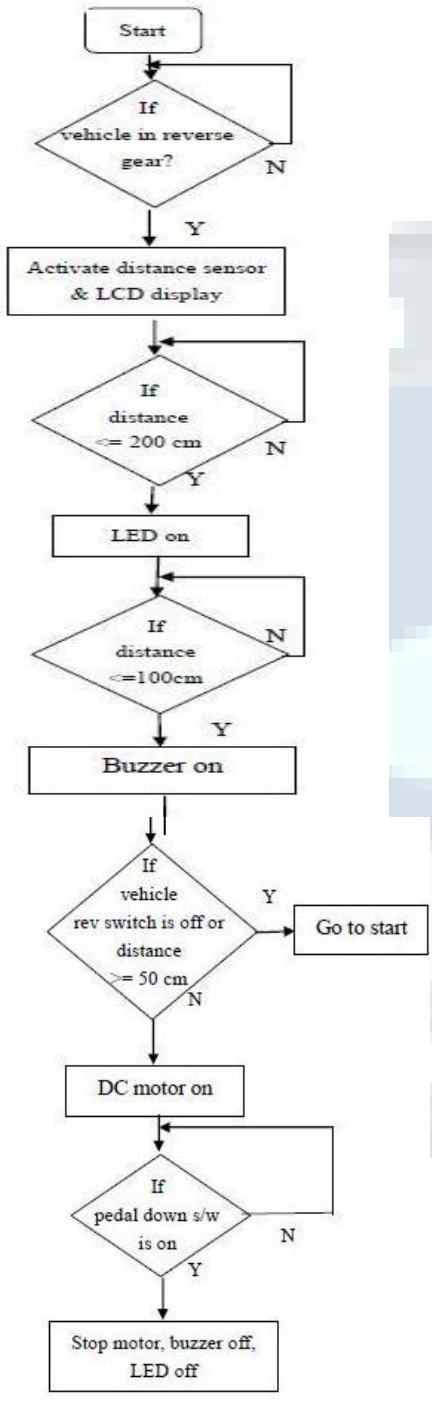
The system flow chart is shown in figure



System flow chart

IV. RESULTS

Table I shows the status of devices when the distance between vehicle and obstacles changes. It shows the results of changing the distance between vehicle and obstacles.

Table I Results

REVERSE GEAR APPLIED	DISTANCE	LED	BUZZER	DC MOTOR & SHAFT
NO	-	OFF	OFF	OFF
YES	≤ 200 cm	ON	OFF	OFF
YES	≤ 100 cm	ON	ON	OFF
YES	≤ 50 cm	ON	ON	ON

V.CONCLUSION

This system is easy to implement along with the current systems in vehicles. The system can be considered as a part of autonomous vehicle system. It is low cost and durable, ensures maximum safety to passengers and pedestrians. It also increases roadside parking capacity by reducing the safety gaps between the vehicles. There are multiple alert devices such as buzzer, LCD display and LED strip so the system is more secure to prevent any accidental situation**.** In future the extension of our project is an autonomous car which is in research.

An autonomous car, also known as robotic or informally as driverless, is an autonomous vehicle capable of fulfilling the human transportation capabilities of a traditional car. As an autonomous vehicle, it is capable of sensing its environment and navigating on its own. A human may choose a destination, but is not required to perform any mechanical operation of the vehicle.

Indirect advantages are anticipated as well. Adoption of robotic cars could reduce the number of vehicles worldwide, reduce the amount of space required for vehicle parking, and reduce the need for traffic police and vehicle insurance.

Autonomous vehicles sense the world with such techniques as laser, radar, lidar, GPS and computer vision. Advanced control systems interpret the information to identify appropriate navigation paths, as well as obstacles and relevant signage. Autonomous vehicles typically update their maps based on sensory input, such that they can navigate through uncharted environments.

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