Design and Development of Adjustable Side View Mirror System

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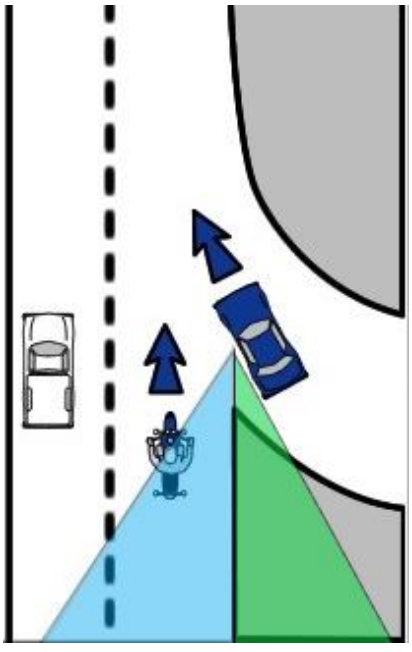
Abstract- *Mirrors are smooth surfaced features of the car that provide additional visibility for the driver. In fact, an automobile cannot be easily guided without mirrors. There are two types of mirrors in cars, side-view mirrors and rear-view mirrors. Rear-view mirrors are installed to see rearward and side-view mirrors help drivers to see area behind and to the sides of vehicles. Although, these mirrors help for better vision, still there are regions called blind spots that a driver must be informed about them. Lots of accidents may happen as a result of no sight for these areas. A Common type of disruption in traffic, which leads sometimes to car crashing, is when the driver intends to leave the car park. As the car is being turned, the blind spot is growing larger and probability of accident is increasing. So, in this paper, we design a controller, based on ARDUINO, MSP430 and L293D controller helps us to increase the viewing angle of side mirror. This system alters angels of side-view mirrors to compensate turning angle of the automobile, which results in changing blind spot into visible area.*

Keywords- ARDUINO, MSP430, L293D,Blind spot

I. INTRODUCTION

Mirrors are important parts of a car's guiding system. For the first time, a looking glass was used in a car as rear-view mirror by Marmon Motor Car Company's engineer, RayHarroun, in 1911[1]. He installed this mirror in order to see back. After that, from 1912 car manufacturers began to install this kind of mirror as a usual piece. Another type of mirror was used on the exterior part of motor vehicle to create better vision of behind and sides of the car. It was called side-view mirrors. Although mirrors help drivers to have a better look at the areas behind them, there are still some areas away from sight that are called blind spots [2]. This area increases the probability of accident. As a result, there have been many efforts to change blind spot into visible area, such as using special kinds of mirrors instead of the old one, and also using rear-view camera and sensors. For instance, "Fisheye mirrors", "Aspheric mirrors" and "Panoramic rear-view mirrors"[3] are mirrors that can be replaced for regular mirrors to reduce size of blind spot. With all these utilities, we can reduce the possibility of car crashing. Another way for eliminating blind region is mounting a system on side-view mirrors to make it auto-adjust. In high speed situations, altering the angle of mirror is not good, but in low speed conditions, this alteration can provide good visibility for drivers. As an example of these conditions, consider the situation in which a car is parked between two other cars in the side of street, and the driver wants to leave this state. An angle is made between the car and direction of road as a result of turning the steer, and then it results in creating a blind spot that increases disturbing in driving which it results in increasing possibility of accident. By designing a system that can adjust the angle of side-view mirror, the blind region can be visible for driver. Fig:1 shows the condition before and after applying the system.



Green – Before Applying System; Blue – After Applying System

Fig:1 The schematic of visibility in side-view mirror before and after applying system.

ARDUINO is most popular microcontroller platform. It is open source electronics prototyping platform based on flexible, easy to use hardware and software. It is used by designers, artists and students for various tasks; it is used to sense by receiving input and controlling lights, motors and controlling other actuators. The microcontroller is programmed by Arduino programming language which is well known for its ease of use. [4]

The MSP430 is a mixed-signal microcontroller family from Texas Instruments. They are used as MCUs for sensory units, robots. MSP430 processors are widely used for various applications including in automotive sector. They are less costly also it is well known for its very low power consumption i.e. battery lifetime (>10yrs) [6]. MSP430 microcontrollers have their own automotive qualified variants to ensure uninterrupted working through harsh environmental conditions it may face. Some variants are even water resistance. This makes them suitable for working in an automobile.

II. DESCRIPTION OF SYSTEM

The aim of this paper is designing a system in which side mirrors adjust their angle to have better vision while merging to another road and in leaving parking mode.

This system enables the driver to adjust the side view mirror while taking turn or changing lane from side road to main road with help of simply operated press button. The button can be mounted on steering wheel in order to have quick response from driver and to perform function within fraction of second. This system comes with function of auto home positioning which allows setting back original position of mirror automatically. When driver press the button, mirror rotates about vertical axis and allows driver to see all back side region. Once driver sees back region then mirror will automatically set to home position.

Taken into consideration that while the driver moves his/her car to merge to another road, there are several characteristics that are needed to be determine. Such as steering angle, speed, distance travelled by car, etc. These can be used as parameters in designing our system. Thus, we define our system based on these properties and experimental observations and then express membership functions for these parameters.

III. EXPLANATION

The flow of system is shown in Fig:2. When a button is pressed (for right hand side mirror) it gives signal to micro-controller (ARDUINO or MSP430) through which the whole system is controlled. After receive the signal micro-controller is reads the input which is from the push button. Then micro-controller is gives the supply to the input terminals A1 and A2 of the IC L293D which is works as a driver in this circuit. Then after the receive the signal from the micro-controller, IC L293D is implement on its specification and gives output signal from terminals A1 and A2. The output terminal from Driver is gives supply to the X-axis motor which is controls the X+ position of the Right hand side mirror. Same working conditions for the left hand side mirror only the difference in the input and output terminals. For left hand side view mirror input terminal are Input B1 and B2 and output terminals Output B1 and B2. When push button is released again the signal is send to Microcontroller and then this signal reads by the controller. Then Microcontroller is sends the signal to the driver and then again driver reads the signal. Then the output from Driver is gives supply to the X-axis motor which is controls the X- position of the mirror and mirror will be back to its initial position. From the all above working conditions, when we pressed the button we can adjust mirrors while merging a lane or to see the blind spot while parking and when button is released the mirror will be back to its initial position.

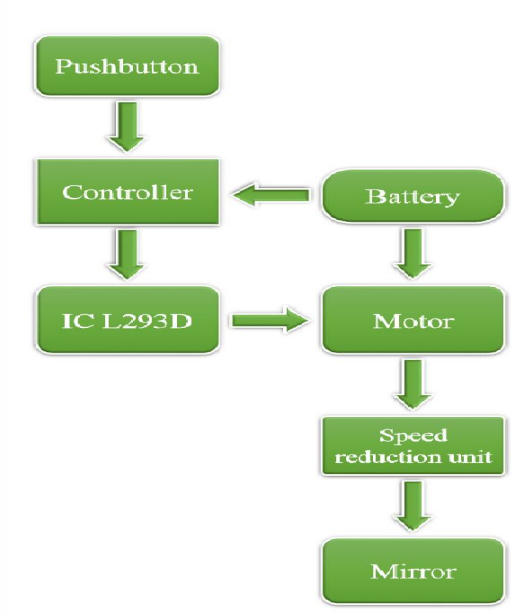


Fig:2 Block Diagram of Flow of Designed System

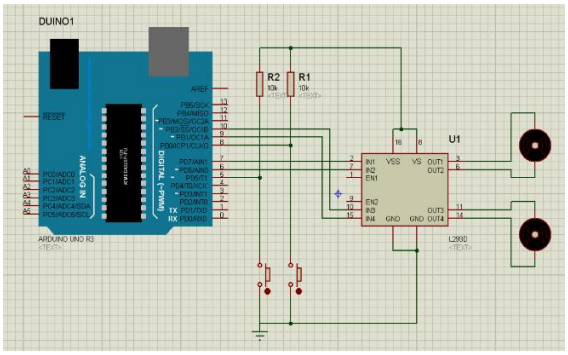


Fig:3Schematic diagram using ARDUINO controller

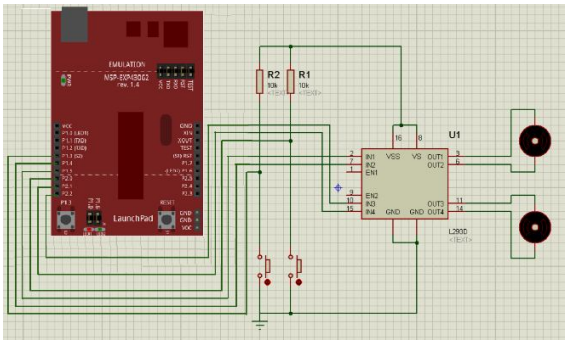


Fig:4 Schematic diagram using ARDUINO controller

IV. ALGORITHM

- Input by pushbutton is low at start; processor does not give any signal.
- If pushbutton input is high, processor gives control signal to rotate the motor from designated port.
- Processor counts the time duration & stores it in form of variable (say Z).
- As pushbutton is released, processor stops giving control signal.
- It checks the value of Z; it is now greater than 0.
- New loop starts where a control signal is given and value of Z is reduced according to time passed unless it reaches zero.
- This time control signal is given from another port, which in turn decides direction of turning of motor.

V. ADVANTAGES

The system we designed has advantages beside its simplicity which can be listed as follow.

1- Altering the angle of side-mirrors to compensate turning angle of the car which results in enhancing visibility and removing the blind spot while the car is leaving the side park.

2- As a result of designation of system based on parameters which are available in any automobiles, the system can easily be installed on any cars without any restrictions.

3- Installation of the system has low executive costs thus; mass production of the system is economical.

4- In comparison with sensors, our system has two advantages. First, the system is less expensive; second, it is more reliable than using sensors. So, installation of the system instead of sensors reduces costs and increases safety of vehicle.

VI. CONCLUSION

Side mirrors are very important instrument which are installed in a car. However, these mirrors help to better vision, yet areas that are called blind spots are places which drivers should be aware of them. Also it is known that, these kinds of areas increase the disturbing in traffic which results in enhancing probability of accidents. For instance, a usual type of car crashing is happening when driver wants to get out of side car parking. In this article, we designed a system using ARDUINO, MSP430 and L2930D controller and test on mirrors. We achieve reduction in blind spot by 30°. Hence increase viewing angle of side mirror.

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