COLLISION CONTROL AND SPEED REDUCTION IN DIFFERENT SPEED ZONES

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ABSTRACT

In almost all the countries accident occurs often and claims many lives. All those countries are not able to prevent such accidents. Even though all drivers know that rash driving will lead to death, some are still careless. All these accidents are due to rash driving and violating traffic rules. We can't monitor each vehicle whether they are violating the rules or not. Even though vehicles like car have various protection circuits, accident occurs often. Those protection circuits in such cars contain many components and moving system. This project is an idea to prevent such calamities and from these outlaws. The device contains less number of components and no moving system. The device will be activated when the speed is greater than the preset speed (Above which driver can't stop suddenly). And it is deactivated when it is below the preset speed or when the vehicle is in traffic; hence the control is given to driver. When the device is activated and in case of accident the vehicle stops automatically with respect to the speed and distance between the vehicles or vehicle and object. The brake is applied linearly according to the distance between the vehicles. In different zones like school and speed limit zone, when the vehicle is moving at a speed greater than the limited, then the device get activated. It will control the speed increase and bring it to the required speed and it gets deactivated, so that the driver can maintain the speed.

Keyword: - *Infrared Sensor1, Fuzzy Logic 2,Deffuzification 3, Embedded Circuit 4, Deceleration 5*

1. INTRODUCTION:

In the modern society, owing a vehicle is not a difficult task because the retail price of vehicles is going down and consumer's spending power is going up. As a result, the number of vehicles on the road is rapidly increasing. Since more vehicles are on the road, more accidents are bound to happen. In the past, the driver judges the distance between his/her vehicle and the vehicle in front by human vision and accordingly brakes or performs some recovery manoeuvres for preventing danger caused by vehicle collision. However vehicle collisions continue to happen because human cannot accurately determine distance or human sometimes make careless mistakes. Therefore, the method of monitoring by the driver cannot effectively avoid danger. Thus our vehicle aims at overcoming this human inability. In this context we intend to develop a mechanism of fuzzy logic which reduces the accidents and also assists physically/visually challenged individuals.

2. LITERATURE REVIEW:

The survey of various papers helps us to get a clear view on the sensors and their working. It also helps us in understanding the process of the embedded circuit.

- [1] The paper proposes an intelligent collision avoidance system as a prototype, which avoids vehicle accidents and to provide a greatest security to the user in adverse or bad weather condition
- [2] The device is intended to find a way to implement a minimum spacing for cars in traffic in an affordable way. It would also achieve safety for the passengers of a moving car.
- [3] Vehicle navigation is carried out using Radio Frequency Identification technology. It is used to navigate the vehicle from source to destination. The obstacle detection is carried out using ultrasonic sensor

3. OBJECTIVE:

When the speed is above preset, To prevent collision,

- Enable the brake
- Disable the acceleration

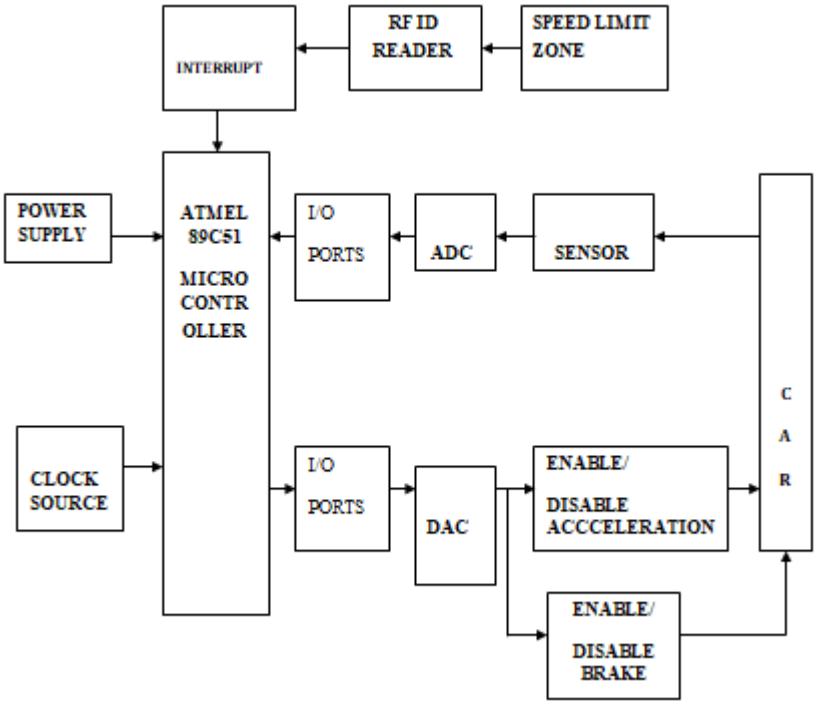
When the speed is below the preset or vehicle is in traffic, the control is given to driver to limit the speed in different zone,

- Disable the acceleration
- Enable the brake

- This project is an idea to prevent such calamities and from these outlaws.
- The device contains less number of components and no moving system.

The main objective of our project is to reduce the collisions due to negligence of the driver and to reduce or prevent mishaps due sudden changes in the surroundings such as sudden over-taking of vehicles especially in the high-ways. Our aim is to introduce automatic systems to enhance the braking of the vehicle without the intervention of the driver as well as maintaining the safety of the driver. We propose a system maintain the speed of the vehicle at a safer range without the addition of any mechanical or moving parts which may compromise the build of the car and increase the weight.

4. BLOCK DIAGRAM:



5. COMPONENTS USED:

5.1 Infrared Sensor:

There are two types of infrared (IR) detectors, active and passive. Active infrared sensors operate by transmitting energy from either a light emitting diode (LED) or a laser diode. An LED is used for a non-imaging active IR detector, and a laser diode is used for an imaging active IR detector. In both types of detectors the LED or laser diode illuminates the target, and the reflected energy is focused onto a detector consisting of a pixel or an array of pixels. The measured data is then processed using various signal-processing algorithms to extract the desired information. Active IR detectors provide count, presence, speed, and occupancy data in both night and day operation. The laser diode type can also be used for vehicle classification because it provides vehicle profile and shape data.

5.2 Embedded System:

An embedded system is a computer system with a dedicated function within a larger mechanical or electrical system, often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. Embedded systems control many devices in common use today. Ninety-eight percent of all microprocessors are manufactured as components of embedded systems. Modern embedded systems are often based on microcontrollers but ordinary microprocessors (using external chips) are also common, especially in more-complex systems. Since the embedded system is dedicated to specific tasks, design engineers can optimize it to reduce the size and cost of the product and increase the reliability and performance.

5.3 PIC Micro controller:

The PIC Micro controllers are supported with a full range of hardware and software development tools. The used PIC16F877A device comes in 40-pin package. To communicate with the PIC we are using RS232 port of the computer. So we have to initialize the port before using it. To initialize and to communicate with the PIC, the file COM.C defines and uses several functions.

5.4 RS 232:

The most common communication interface for short distance is RS-232. RS-232 defines a serial communication for one device to one computer communication port, with speeds up to 19,200 baud. Typically 7 or 8 bit (on/off) signal is transmitted to represent a character or digit. The 9-pin connector is used.

5.5 Personal Computer:

In personal computer, data transfer takes place serially. RS-232standard is used for serial communication .PIC Micro controller is linked to PC through the RS-232 port. The PC displays the menu for selecting the calibrating equipment and all the calibration results graphically and in tabular form. The user can access the calibration data to get calibration reports, comparison graphs etc at any time using the menu offered in the PC.

6. PROCESS INVOLVED:

The automatic motion is carried out by microcontroller and the accidents with neighboring vehicles are controlled by using FUZZY LOGIC. The basic steps in designing FUZZY LOGIC CONTROL are as follows:

- Identifying the input and output variables.
- Partitioning the interval of each input and output into number of fuzzy subsets, assigning each a linguistic label.
- Determining a membership function for each fuzzy subset.
- Assigning the fuzzy relationship between the “input fuzzy subsets” on one hand and the “output fuzzy subsets” on the other hand, thus forming the Rule-Base.
- Interpreting the rules using fuzzy “AND” and “OR”, operators. In fuzzy systems, more than one rule may fire at the same time, but with varied strengths.
- Translating the processed fuzzy data into the crisp data suitable for real world applications.

7. WORKING:

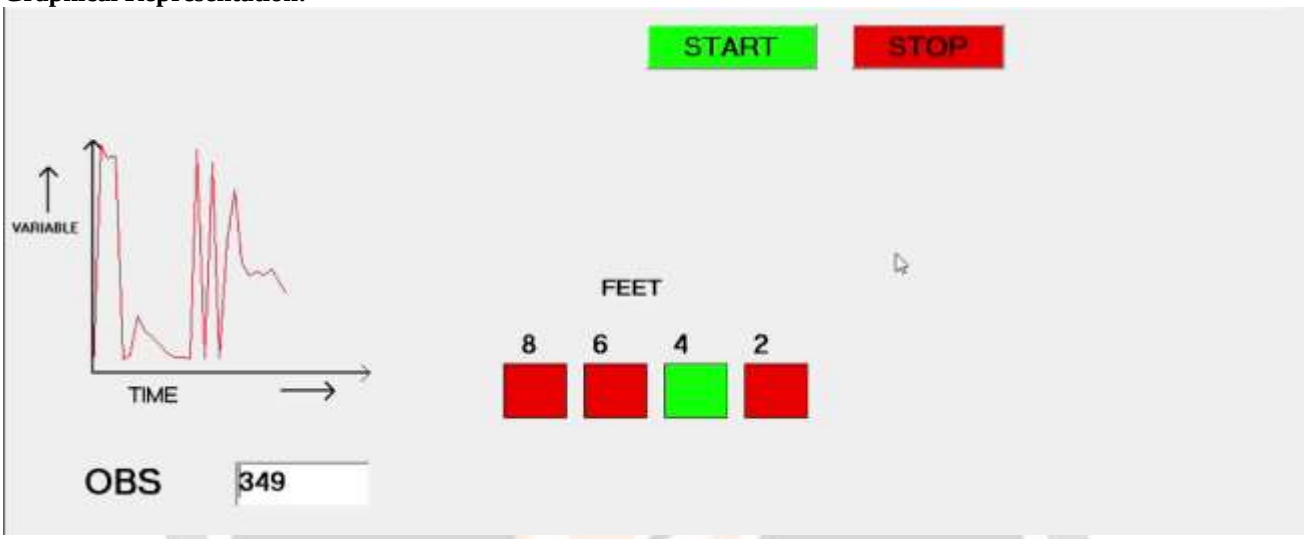
Initially, the power is supplied to the motors with the help of two 12V batteries. Then with the help of RS232 Microcontroller 12V is distributed individually to each relays. The threshold voltage of each relay can be changed with the help of the program in PIC Microcontroller. The IR Sensor senses the distance between the obstacle and the vehicle. The data obtained from the sensors are fed into the relay with the help of ATMEL 89C51 microcontroller which controls the gear motor. The IR Sensor transmits and receives the signal and the crystal oscillator is used to alter the frequency as voltage difference. This voltage difference is used to control the speed of the motor which helps to control the speed of the vehicle with respect to the position of the obstacle. The speed of the motor is controlled with the help of 4 relays which are programmed to supply preset voltage. The first relay provides 12V to the motor since it represents full speed of the vehicle and absence of obstacle before the vehicle. The second relay provides 9-10V to the motors which represents the presence of obstacle at a distance of 8 feet. The third relay provides 7-8V which significantly reduces the speed of the motor since the obstacle will be at 6-4 feet. The last relay provides very less or no voltage because it means that the obstacle is very nearer to the vehicle so that collision could be avoided

8. EXPERIMENTAL RESULTS:

When the vehicle moves forward, the sensor transmits and receives infrared waves in order to detect any obstacles that may be in front of the vehicle. The embedded circuit calculates the relative velocity between the vehicle and the obstacle present before and sends the command to the embedded circuit, which reduces the voltage sent to the wheels to decelerate the vehicle.

8.1 Output from the program:

Graphical Representation:



9. CONCLUSIONS:

The proposed system is designed into a small car model as a prototype to control the distance between the car and the preceding car and also distance between the front obstacles and initiates automatic braking. System detects the lane line and automatic lane control is done to avoid accidents in a significant manner. Lane detection will ensure that car follows proper lane discipline for safety purpose. ARM 7 microcontroller is used which eliminates the rounding problems and resulting in near perfect distance reading. The alert mechanism used in system will facilitate the vehicle driver at any unusual movement of the vehicle.so, if this system is used in fully automate cars with adaptive cruise control the overall safety will be further enhanced

10. FABRICATION IMAGES:

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