‘‘Car Anti Collision System’’

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Abstract :-In India, the rate of increase in population is high. This rate of increase in population affects traffic system a lot. There are many needs and stuffs which are added in our day-to-day life and vehicle is major part of our life. As we all heard about the tag line of a tyre manufacturing company that roads are ‘full of idiots’ and that is somewhat true also. Now-a-days we consistently come across the news of road accidents and poor traffic system. We can contribute on reducing the road accidents which occurs due to the poor traffic system by making “car anti-collision system” using ‘fuzzy logic’. This car anti-collision system is based on ‘obstacle avoidance and obstacle detection” by IR sensor application. System packed with component microcontroller, D.C. motor, Capacitor, I.R. sensor & Relay etc. Also, these system indicates obstacles in the form of LED, when detecting the obstacles. Collision avoidance is one of the most difficult and challenging automatic driving operations in the domain of intelligent vehicles. In emergency situations, human drivers are more likely to brake than to steer, although the optimal maneuver would, more frequently, be steering alone. This statement suggests the use of automatic steering as a promising solution to avoid accidents in the future. The objective of this paper is to provide a collision avoidance system (CAS) for autonomous vehicles,

Keywords*: Collision avoidance, Control System, Vehicle Automation, Anti-Collision, Electronic Circuit Design*

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I. INTRODUCTION

Safety is a necessary part of man’s life. Due to the accident cases reported daily on the major roads in all parts of the developed and developing countries, more attention is needed for research in the designing an efficient car driving aiding system. It is expected that if such a device is designed and incorporated into our cars as a road safety device, it will reduce the incidence of accidents on our roads and various premises, with subsequent reduction in loss of life and property. However, a major area of concern of an engineer should be safety, as it concerns the use of his/her inventions and the accompanying dangers due to human limitations. When it comes to the use of a motor vehicle, accidents that have occurred over the years tell us that something needs to be done about them from an engineering point of view. According to the 2007 edition of the Small-M report on the road accident statistic in Malaysia [1], a total of 6,035 people were killed in 2000 and the fatality spring up to 6,287 in 2006 from accident cases reported in 250,429 and 341,252 cases of accident for 2000 and 2006 respectively. These road accidents were mainly at Kelang and KL area of Malaysia.

The obtained results show that, high rate of accident is reported each year. Suffice to say that the implementation of certain highway safety means such as speed restrictions, among others, has done a lot in reducing the rates of these accidents. The issue here is that policies of safe driving alone would not eradicate this, the engineer has a role to play, after all the main issue is an engineering product (the motor vehicle). Many motorists have had to travel through areas with little light under much fatigue, yet compelled to undertake the journey out of necessity. It is not always irresponsible to do this. A lot of cases reported is as a result of drivers sleeping off while driving, and when he/she eventually woke up, a head-on collision might have taken place. Not many have had the fortune to quickly avert this. It is therefore imperative to consider the advantages of an early warning system where the driver is alerted of a possible collision with some considerable amount of time before it occurs. The idea of incorporating radar systems into vehicles to improve road traffic safety dates back to the 1970s. Such systems are now reaching the market as recent advances in technology have allowed the signal processing requirements and the high angular resolution requirements from physically small antennas to be realized. Automotive radar systems have the potential for a number of different applications including adaptive cruise control (ACC) and anti-collision devices. The problem with this brand of cars is that they are expensive. This becomes an even bigger challenge when you consider a developing country like Malaysia. The Infrared Anti-Collision Device are expected to be made of relatively inexpensive components for easy purchase and incorporation. This research aims at the design of a prototype showing how this could function. The main objective is to find a way to implement a minimum spacing for cars in traffic in an affordable way, alongside to achieve safety for passengers of a moving car. The anti-collision device, when wired into the circuitry of a vehicle would help in the reduction of road mishaps. Though not every kind of collision can be helped by this, and it must be stated here that no allusion is being made that technology is the best line of action to take. It should be further noted that some already existing laws made use of technologies like the street lights and traffic lights. This would be a supplementation and not a replacement.

II. PREVIOUS WORK

Sensor systems onboard the vehicles are required to predict the car-to-pedestrian distance and the TTC. Cameras are the most commonly used sensors for that purpose. Over the last decade, a considerable number of vision-based pedestrian detection systems have been proposed. Several remarkable survey shave been presented, some of which have recently been published. Most of the work with regard to human motion have been summarized, focusing on the pedestrian protection application in the intelligent vehicle domain, covering both passive and active safety techniques. An overview of the state of the art from both methodological and experimental perspectives is presented, where a novel benchmark set has been made publicly available. Autonomous collision avoidance was first proposed for unmanned aerial vehicles (UAVs), and it has been in place onboard domestic transport aircraft since the early 1990s. Although autonomous aerial navigation considerably differs from autonomous navigation in the intelligent vehicle domain, several aspects can fruitfully be extended. For instance, an overtaking control method is proposed using the conflict probability, which has widely been used in the aviation community. Other concepts, e.g., TTC, time-to-escape, and risk assessment, which have deeply been studied for UAVs, are also suitable for intelligent vehicles. The next step carried out by the research community took place for autonomous-mobile-robot applications. In robotics, collision avoidance consists of modifying the trajectory of the mobile robot in real time such that the robot car avoid collisions with obstacles found on its path. This approach comprises the following two main layers: 1) obstacle avoidance and 2) path planning. Due to the idiosyncrasy of this field, a sizeable number of works have been developed during the past few decades. Were ferto there view in for a general background with regard to obstacle avoidance for autonomous mobile robots. With regard to autonomous collision avoidance for intelligent vehicles, in particular, collision avoidance by steering, we can define, at least, the following four stages of development. 1) Guidance or lane keeping. Autonomous guidance or lane keeping refers to the technology that tries to prevent lane departure, usually by monitoring the lane markers using a vision-based system and controlling the steering wheel. The first work on lane guidance was built in Japanin1977. Subsequently, works started to appear in the late 1980s.The Carnegie Mellon University(CMU) Navlab gained much experience in developing steering controllers for autonomous navigation for the Navlab vehicle series, which are equipped with artificial vision systems. The steering of the early versions was controlled by the template-based rapidly adapting lateral position handler (RALPH). Several lateral controllers and autonomous guidance systems have also been developed through the Partners for Advanced Transit and Highways (PATH) Program . As part of the well-known ARGO Project, an automatic guidance system was developed with an onboard computer that manages the steering wheel of a mass-produced car. The guidance system was based on a classical proportional controller whose inputs signals were directly supplied by the lane recognition vision system. Otherreal-vehicle applications have been developed, which can perform autonomous.

III. SYSTEM DESCRIPTION

1. Experimental Vehicle The experimental vehicle used in this paper is a Citröen C3 Pluriel, which has been automated by the Spanish National Research Council (CSIC; see Fig. 1). It is a dual-mode vehicle that offers an automatic mode in specific situations (e.g., platooning) and specific locations (e.g., automated parking lots) and a manual-assisted mode in regular situations. It has an onboard computer that houses the control system. The GPS is connected through an RS232 serial port, the cameras provide the images through the FireWire port, and the speed signal is read through the controller area network (CAN) bus interface. Finally, a wireless networking infrastructure is used to transmit the differential correction from a GPS base station to the vehicle.

2. Collision Avoidance Overview Pedestrian collision avoidance is defined as a three-stage process. As soon as the stereo vision sensor detects a potential pedestrian collision that can be avoided, a lane change to the adjacent left lane is performed. Path tracking is then applied until the pedestrian has been passed. Finally, a second lane change is carried out to go back to the right lane. We do not consider oncoming traffic along the left lane, because it would require a vehicle detection system and complex decision making, which are out of the scope of this paper. According to this scheme, two controllers have to be designed: one controller for the speed and another controller for the steering wheel.

IV.FEATURES AND WORKING OF COMPONENTS

1. D.C. motor

A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor. Most types produce rotary motion; a linear motor directly produces force and motion in a straight line.

Fig 3.3.1:D.C. motor

2. Battery

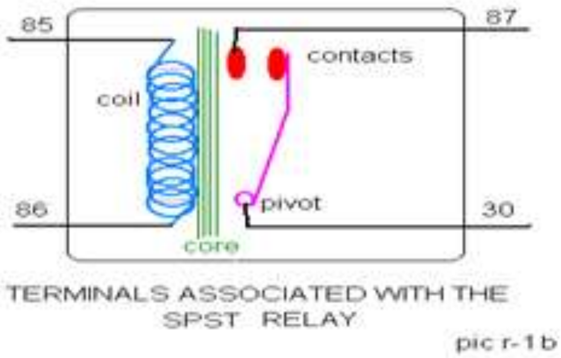
An electric battery is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices. A battery has a positive terminal, or cathode, and a negative terminal, or anode. The terminal marked positive is at a higher electrical potential energy than is the terminal marked negative. The terminal marked negative is the source of electrons that when connected to an external circuit will flow and deliver energy to an external device. When a battery is connected to an external circuit, electrolytes are able to move as ions within, allowing the chemical reactions to be completed at the separate terminals and so deliver energy to the external circuit. It is the movement of those ions within the battery which allows current to flow out of the battery to perform work.

Historically the term "battery" specifically referred to a device composed of multiple cells, however the usage has evolved to additionally include devices composed of a single cell.

Fig 3.3.2: Battery

3. Relay

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operation.



A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called "protective relays".

Fig 3.3.3: Relay

4. Infrared (I.R.) Sensor

IR Sensors work by using a specific light sensor to detect a select light wavelength in the Infra-Red (IR) spectrum. By using an LED which produces light at the same wavelength as what the sensor is looking for, you can look at the intensity of the received light. When an object is close to the sensor, the light from the LED bounces off the object and into the light sensor. This results in a large jump in the intensity, which we already know can be detected using a threshold.

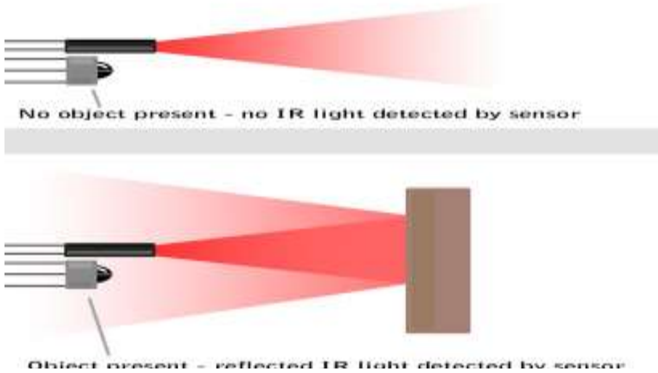


Fig 3.3.4: Infrared (I.R.)

5. Capacitor

A capacitor (originally known as a condenser) is a passive two-terminal electrical component used to store electrical energy temporarily in an electric field. The forms of practical capacitors vary widely, but all contain at least two electrical conductors (plates) separated by a dielectric (i.e. an insulator that can store energy by becoming polarized). The conductors can be thin films, foils or sintered beads of metal or conductive electrolyte, etc. The nonconducting dielectric acts to increase the capacitor's charge capacity. Materials commonly used as dielectrics include glass, ceramic, plastic film, air, vacuum, paper, mica, and oxide layers. Capacitors are widely used as parts of electrical circuits in many common electrical devices. Unlike a resistor, an ideal capacitor does not dissipate energy. Instead, a capacitor stores energy in the form of an electrostatic field between its plates.

Fig 3.3.5: Capacitor

6. Transistor

A transistor is a semiconductor device used to amplify or switch electronic signals and electrical power. It is composed of semiconductor material with at least three terminals for connection to an external circuit. A voltage or current applied to one pair of the transistor's terminals changes the current through another pair of terminals. Because the controlled (output) power can be higher than the controlling (input) power, a transistor can amplify a signal. Today, some transistors are packaged individually, but many more are found embedded in integrated circuits.

Fig 3.3.6: Transistor

7. Voltage regular I.C.7805

7805 is a **voltage regulator** integrated circuit. It is a member of 78xx series of fixed

linear voltage regulator ICs. The voltage source in a circuit may have fluctuations and would not give the fixed voltage output. The **voltage regulator IC** maintains the output voltage at a constant value. The xx in 78xx indicates the fixed output voltage it is designed to provide. 7805 provides +5V regulated power supply. Capacitors of suitable values can be connected at input and output pins depending upon the respective voltage levels.

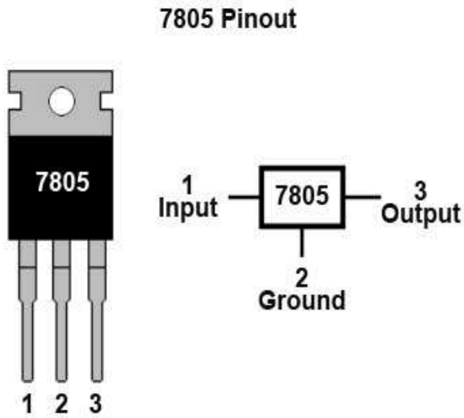


Fig 3.3.7: I.C. 7805

8. Microcontroller 89S52

The 89S52 has 4 different ports, each one having 8 Input/output lines providing a total of 32 I/O lines. Those ports can be used to output DATA and orders do other devices, or to read the state of a sensor, or a switch. Most of the ports of the 89S52 have 'dual function' meaning that they can be used for two different functions. The first one is to perform input/output operations and the second one is used to implement special features of the microcontroller like counting external pulses, interrupting the execution of the program according to external events, performing serial data transfer or connecting the chip to a computer to update the software. Each port has 8 pins, and will be treated from the software point of view as an 8-bit variable called 'register', each bit being connected to a different Input/output pin.There are two different memory types **RAM** and **EEPROM**. Shortly, RAM is used to store variable during program execution, while the EEPROM memory is used to store the program itself, that's why it is often referred to as the 'program memory'. It is clear that the CPU (Central Processing Unit) is the heart of the micro controllers. It is the CPU that will Read the program from the FLASH memory and execute it by interacting with the different peripherals Diagram below shows the pin configuration of the 89S52, where the function of each pin is written next to it, and, if it exists, the dual function is written between brackets. Note that the pins that have dual functions can still be used normally as an input/output pin. Unless the program uses their dual functions, all the 32 I/O pins of the microcontroller are configured as input/output pins.

Fig 3.3.8.1: Actual diagram of Microcontroller 89S52

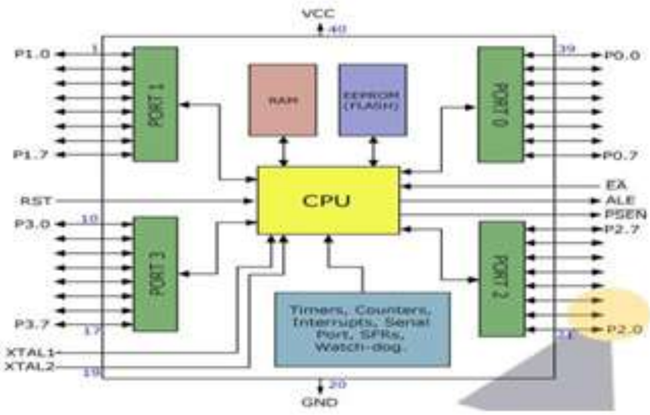
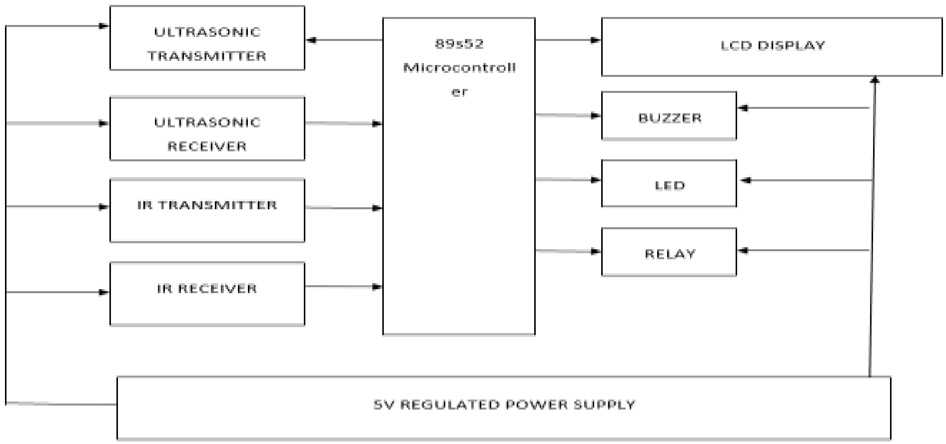


Fig 3.3.8.2: Port diagram of Microcontroller 89S52

V. BLOCK DIAGRAM



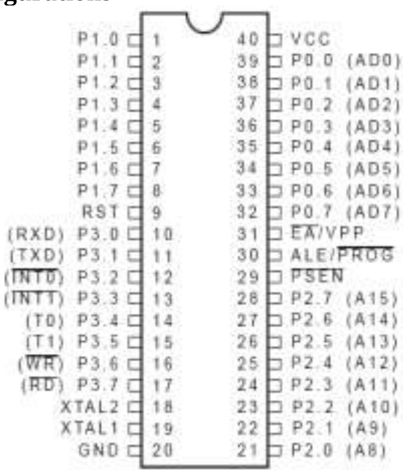
VI. AT89S52 MICROCONTROLLER FEATURES

• Compatible with MCS-51™ Products
• 4K Bytes of In-System Reprogrammable Flash Memory
– Endurance: 1,000 Write/Erase Cycles
• Fully Static Operation: 0 Hz to 24 MHz
• Three-Level Program Memory Lock
• 128 x 8-Bit Internal RAM
• 32 Programmable I/O Lines
• Two 16-Bit Timer/Counters
• Six Interrupt Sources
• Programmable Serial Channel
• Low Power Idle and Power Down Modes

VII. DESCRIPTION

The AT89C51 is a low-power, high-performance CMOS 8-bit microcomputer with 4K bytes of Flash Programmable and Erasable Read Only Memory (PEROM). The device is manufactured using Atmel's high density nonvolatile memory technology and is compatible with the industry standard MCS-51™ instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C51 is a powerful microcomputer which provides a highly flexible and cost effective solution to many embedded control applications.

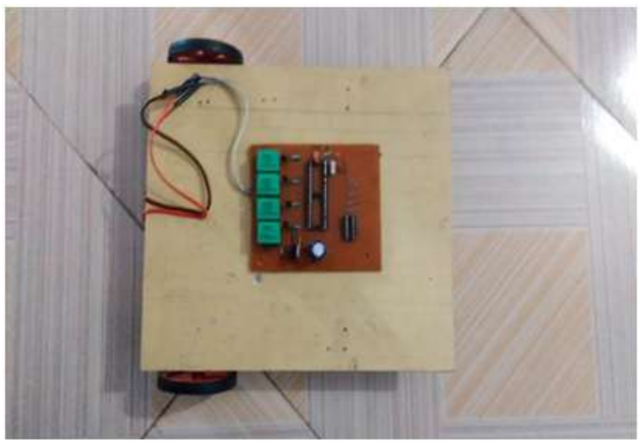
1. Pin Configurations



2. Fuzzy logic

Here microcontroller used fuzzy logic so importance of fuzzy logic is increased. Fuzzy logic is a form of many-valued logic in which the truth values of variables may be any real number between 0 and 1, considered to be "fuzzy". By contrast, in Boolean logic, the truth values of variables may only be 0 or 1, often called "crisp" values. Fuzzy logic has been extended to handle the concept of partial truth, where the truth value may range between completely true and completely false. Furthermore, when linguistic variables are used, these degrees may be managed by specific (membership) functions. The term *fuzzy logic* was introduced with the 1965 proposal of fuzzy set theory by Lotfi Zadeh. Fuzzy logic has been applied to many fields, from control theory to artificial intelligence. Fuzzy logic had however been studied since the 1920s, as infinite-valued logic-notably by Łukasiewicz and Tarski.

3. Model Diagram



VIII. CONCLUSIONS

The system which is the design and construction of an anti-collision system for vehicles was designed considering some factors such as economy, availability of components and research materials, efficiency, compatibility, portability and also durability. The performance of the system after test met design specifications. The general operation of the system and performance is dependent on the presence of two moving cars as they get closer to each other. However, it should be stated here that the system was aimed at fabricating prototype, a replica of the actual thing. It is economically viable to undertake certain system this way since testing would not cost so much. Any desire to implement this design into a vehicle would require a laser detector. The problem of power supply would not arise due to the amount of battery power from the car battery. Also the operation of the system is dependent on how well the soldering is done, and the positioning of the components on the Vero board. The IC's were soldered away from the power supply stage to prevent heat radiation which, might occur and affect the performance of the entire system. The construction was done in such a way that it makes maintenance and repairs an easy task and affordable for the user should there be any system breakdown. All components were soldered on one Vero-board which makes troubleshooting easier. In general, the system was designed, and the real time implementation done with a photo-type of the model.

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