Automatic Vehicle Accident Control System

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31 st May, 2019

Declaration

This dissertation is my original work and has not been submitted previously for a degree at this or any other university/institute. To the best of my knowledge it does not contain any material published or written by another person, except as acknowledged in the text.

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ABSTRACT

Automated Vehicle accident control system is aim to provide solution to minimize present heavy road accidents. Because of these accidents around 50 persons were died per day according to the repots. There has been a significant increase in such accidents since the beginning of the year. On average, 600 medico-legal examinations are conducted each month, of which around 350 cases are caused by road traffic injuries.

This project is aim to provide a solution to minimize road accidents with the automated vehicle braking system. Most of the time automated vehicle accident control system is only limited to luxury vehicles for the prevention of traffic accidents. This system introduces a more lucrative and successful way to identify the dangerous situations on the road while driving the vehicles. And if some situations identified, suddenly it will take necessary actions automatically to ignore the risk and dangerous situation (Stop Vehicle, light Brake lights etc), providing easy driving facilities with more vehicle safely.

The system has been developed with the very low cost using the Arduino technology and implemented by using ultrasonic sensor, LCD display, relay module, Arduino board and jump wire. The system which can be fitted to all type of vehicles (Electronic, Auto Gear, Manual Gear), because of its simple mechanism. It does not require major changes of the vehicles while its installation.

ACKNOWLEDGEMENT

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Finally, I thank almighty my parents, brother, sister for their constant love and encouragement given me every time throughout the 2 years of the MIT Master Degree program.

LIST OF ACRONYMS

GUI-Graphical User Interface

UML - Unified Modeling Language

ER - Entity Relationship

EV-Electronic Vehicles

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CHAPTER 01 – INTRODUCTION

1.1 INTRODUCTION

Automated Vehicle accident control system is aim to provide solution to minimize present heavy road accidents. Because of these accidents around 50 persons were died per day according to the repots. There has been a significant increase in such accidents since the beginning of the year. On average, 600 medico-legal examinations are conducted each month, of which around 350 cases are caused by road traffic injuries.

This project is aim to provide a solution to minimize road accidents with the automated vehicle braking system. Most of the time automated vehicle accident control system is only limited to luxury vehicles for the prevention of traffic accidents. This system introduces a more lucrative and successful way to identify the dangerous situations on the road while driving the vehicles. And if some situations identified, suddenly it will take necessary actions automatically to ignore the risk and dangerous situation (Stop Vehicle, light Brake lights etc), providing easy driving facilities with more vehicle safely

1.2 Problem Domain

The transportation is essential for day today lives and lot of road accidents are happened on the road because of careless driving, drivers has got sleeping and drunk alcohol and drive the vehicles are the main reasons .If there are some method for detecting dangerous road situations and identify road signals and react them automatically ,accidents can be minimized . Unavailability of automatic vehicle accident control system for the all kinds of vehicles such as manual gear vehicles, non-EV. Although some technology is available for luxury vehicle in the world but it only for the luxury vehicle. Air balloon and e-paddle are some of using technology but it cannot be used for all type of vehicles and implementing those type of solutions for normal old vehicles will be very expensive and risky.

1.3 Motivation

Our daily routine is started with the road vehicle traffic because of various reasons. but some of the major reason is road accidents which block the roads. Because of this heavy traffic we lost our time and our human lives Now a day’s luxury vehicle have some accident control and

prevent system. But lot of peoples haven’t luxury vehicles they have normal manual gear, non-electronically controlled vehicles.

In today's society, road accidents can be identified as the most commonly recognized problem which is the most common cause of human deaths. Major reasons are unprotected driving, drunk driving, pedestrians' negligence, driver negligence, etc.

Because of the above reasons it was decided to implement automatic vehicle accident control system which may suitable for all kind of vehicle to detect and control the vehicle accident.

1.4 Objectives

This security system is mainly used to detect all risks that are external to the vehicle and mainly aims two parties.

Drivers

1. Display the distance between the front side vehicles and rear side vehicles. If a vehicle come to more close than it will give some notification to the drivers take necessary safety actions.
2. Notify risk situations of the moving things around the vehicle which can cause some accident (distance between vehicle and side vehicles).
3. Give the danger Signals such as law distance between vehicle and other vehicles etc. so that the drivers can control their vehicle.

System

1. Get the distance of both vehicle in the front and rear vehicle. if the rear vehicle is close alarm will fire for the rear vehicle driver and if the distance between front vehicle and target vehicle decrease vehicle will stop and brake lights will lamp. ,
2. Check the distance between side(left side or right side) vehicles and target vehicle if the distance is less ,vehicle will stop
3. The system will identify the road color lights. (vehicle will stop for red lights)
4. If there are any barrier in front of the vehicle, it will stop safely(with lighting brake lights)

If the vehicles, passengers are identified in front of the vehicle Cliff, and color lights, thereby stopping the vehicle. By realizing the accelerator, brakes and clutch, the electro magnet will automatically operate and stop vehicles in normal way. In this case, the vehicle stops only running on the road instead of stopping its engineering performance.

If there is vehicle in front of the vehicle the driver will display the distance between the vehicles .and also if there is a vehicle rear of the vehicle it also will be. If the vehicles arrive close to the prescribed distance. It automatically releases a signal to the driver before stopping the car. It will minimize accident which can be happened by suddenly stopping the vehicle and also if there are close distance between side vehicles (left side or right side) it also will be stopped the vehicle by indicating the alarm and displaying the distance to driver. Color lights will be separately identified by the system, it will safely stop the vehicle for red lights by displaying the all the details on the screen such as distance and firing alarm.. No protection system has been introduced for manual vehicles in this way.

1.5 Scope of the Project

Proposed system is automatic vehicle accident control system which first system detects the dangerous signals by using the ultrasonic sensors(such as distance between barrier in front of the vehicle when it is s moving, distance between the vehicle and rear side vehicle, distance between left and right barriers for the vehicle, color lights) with the Adriano technology. Color lights are identified by using color detecting sensors and image processing technology. Then after processing all the distance, colors system will show all the necessary details (distance, barriers, and color lights) on the LCD display and before taking every safe action by the system it will indicate to the drivers by alarming for the safety. The system is used electromagnetic technology for stop the vehicle .there are three electromagnets has fixed on under the accelerator, clutch and brake paddle. When the system tries to stop the vehicle, it will realize the accelerator paddle and drag the brake paddle, clutch paddle manually at the same time. This process is implemented for auto gear vehicle by pressing only the break paddles. Using this process this system aims to reduce the vehicle accident and control it.

1.6 Structure of Dissertation

1.6.1 Chapter 2 – Background

The chapter describes how the current systems works, the problems of the system in use and the requirements for the project. And Review of the similar systems works further.

1.6.2 Chapter 3 – Methodology

Mythology chapter explains about the tools and techniques employed for the system.

1.6.3 Chapter 5 – Evaluation

Evaluation chapter deals with testing methods used in system testing while project development and the results of those tests.

1.6.4 Chapter 6 – Conclusion

The final chapter of the dissertation, which includes problems, occurred in system development. This chapter also mentioned the problems can be occurred in the future, the way to overcome them and how to improve the system further.

CHAPTER 2-BACKGROUND

2.1 Background

This system, which is designed to prevent road traffic accidents, and help to pre detects accidents and indicating those for the drivers. Some required processing details are mentioned below.

1. The way to Identify of the distance of vehicles moving in front or ahead of the vehicle
2. The way to Identify the distance of vehicles from behind the vehicle.
3. Identification of the distance of the vehicle from both sides (left and right)of the vehicle
4. The way to Identify color signal lights on the roads.
5. The Way to properly notify the signals that vehicle braking system.

Followings diagrams has briefly described how to system will reads the distance and othe readings.

The system should focus on the distance of the vehicle which moving in front of or ahead of the vehicle. If the distance between two vehicles is less, system should take necessary action to prevent the accidents. Following figures is shows how the distance capturing process.

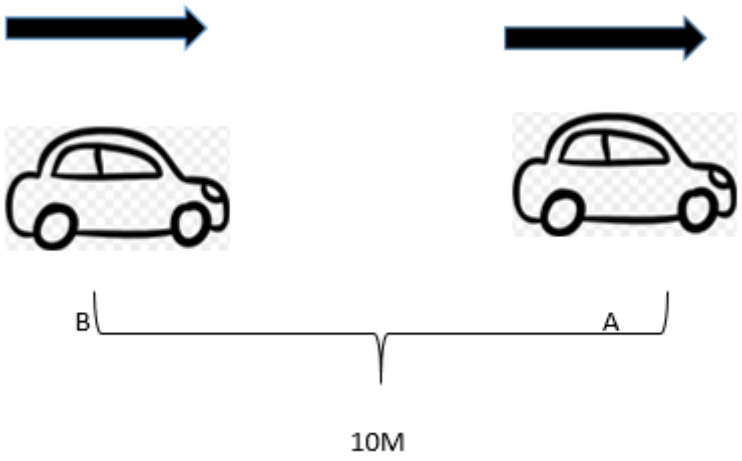

Figure 2.1 Vehicle moving within 10m

Figure 2.1 shows that a vehicle is moving and (B) vehicle is moving Rear side of the vehicle (A) .in this situation (B) vehicle speed can increase or (B) vehicle speed can decrease its may cause to have an accident .

It is very important to take consideration distance between the two vehicles or barrier in front of the moving vehicle.

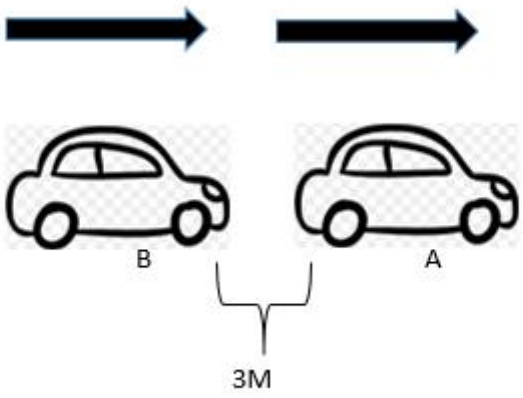

Figure 2.2 Vehicle moving within 3M

According to Figure 2.2, distance between (A) and (B) vehicle should be identify at least 3M distance by the sensors for the safe termination of (B) vehicle. Unless (B) vehicle is fail to stop, accident will happens so it is very important to pay attention to the distance between the vehicles.

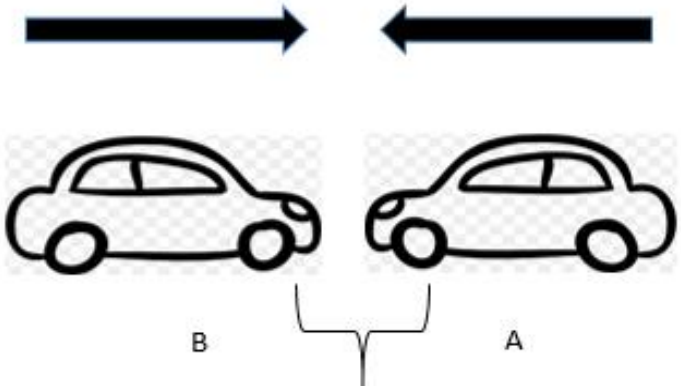

Figure 2.3 Vehicle moving within 3M

According to Figure 2.3 shows how to identify vehicle which is coming from in front of the vehicle (B).it is necessary to identify before 3M distance between vehicles for the safe termination.

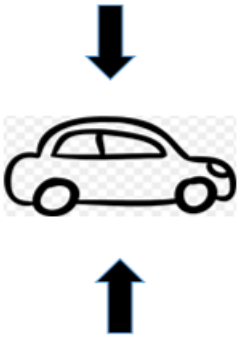

Figure 2.4 Vehicles left and right side

According to Figure 2.3 shows how to system should be react when vehicles or object comes left and right side .if the vehicle or object come close to vehicle from left or right side side it should be notify for the drivers .

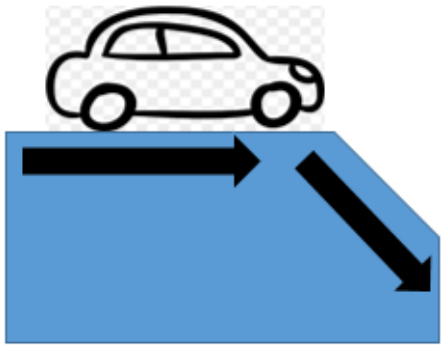

Figure 2.5 Vehicle with downhill

Vehicles accident can be happens as above mentioned ways as well as by going to the downhill so it is necessary to identify the downhill for the control the accidents. Figure 2.5 shows how to system identify downhill.

Similarly, Vehicle accidents can happens near to road signals lights on the road. Most of the accidents occur due to non-conformity with the road light signals. This also makes it very important to identify the color light and control the vehicle according to the signal.

In this way, the driver should be made aware of the accidents prior to stopping a vehicle on the road for various reasons. Because unless driver will not able to control the vehicle.so notification about vehicle termination are very important.

After the vehicle is confirmed to be in danger, the vehicle may be stopped or fire an alarm. And all the Signal lights must be operated (Such as Brake Lights). Otherwise, others on the road may be unaware of this.

Similarly, when implementing this system, it is also important to note that this should be able to fit this system for new, old and used vehicles. Further, heavy vehicles and light vehicles

should be used this system. Furthermore, the cost of installing this system in the vehicle should be minimal. All of the above facts are the main factors that contributed to this system

2.2 Internal system process

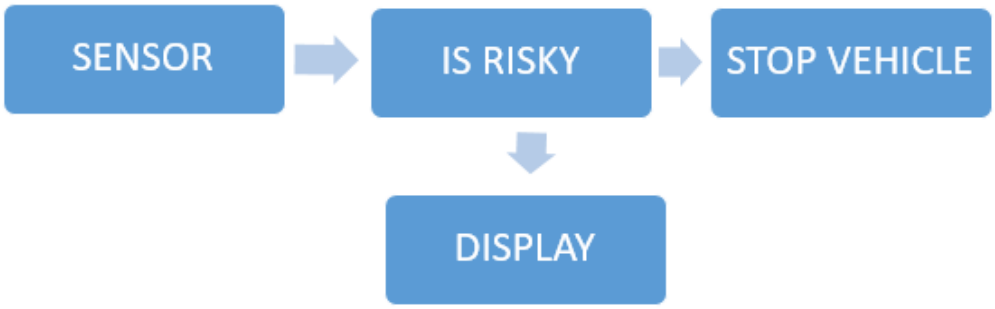

Figure 2.6.Internal system process

According to Figure 2.6 shows after taking data from the ultrasonic sensors. If the vehicle is in danger system should notify to the driver. If the driver is not response for the alert vehicle should be stopped automatically.

2.3 Functional hierarchy

According to the system's entire operating system, the driver or the system can be automatically prevented from accidentally causing a vehicle accident. Using the Functional hierarchy can be identified as follows:

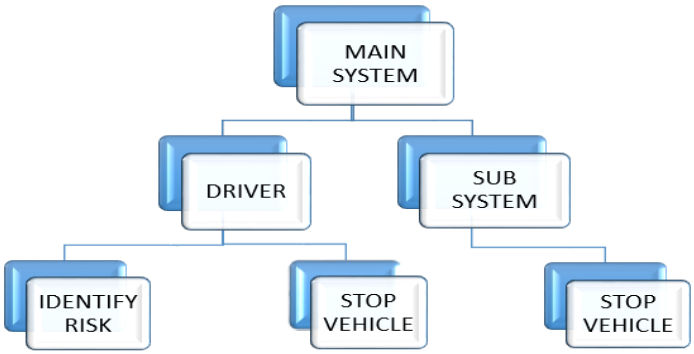

Figure 2.7 functional hierarchy

2.4 Reviews similar system

Many traffic rules have been pursued to prevent possible road traffic accidents. Many embedded vehicles have been fitted to various protection systems. Furthermore, these systems

will monitor the entire vehicle and monitor the vehicle. However, all these benefits are available only to luxury vehicles. This is not the case with other vehicles.

This system not based on any other project or work. But have some background study about the automatic braking system, automatic emergency brake system. However when considering the literature reviews of this systems it was able to find some similar systems has for this system. Always this systems used for the marketing and promotional functions.

Some luxury vehicle have some accident control system. It can be divided as three parts. Collisions avoidance, collisions avoidance and forward collisions warning. According to the parts sensor detect a potential collisions and take action to avoid in entirely taking control away from the driver it. Explain the collision, ask avoidance and also collision mitigation braking system it. That the sensor detect a potential collision but take no immediate action to avoid it. Some find this system doing a reduce the collision speed and hence injury severity of the collision. Such that system also trigger actions related to secondary safety such as the per-alarming or optimization restraints. The third part of that system is a forward collision warning that ask sensors detect a potential collision and take action to warn the driver. This type of system has been sold on some EV vehicle since 1999.

There were some automatic vehicle accident control system. It carry out based driver's behavior. When the drivers sleep or if driver's eyes were closed 30 seconds the alarm is activating. Then vehicle reduces the vehicle's speed. And also some researchers had found an automatic braking system which implement the automatic break for the four tire. Lot of system has implemented for marketing purposes.[1]

There were intelligence automatic vehicle accident detection and prevention system It detects the basically the driver's drunk alcohol percentage. If driver was drink alcohol vehicle is not start. If when the drivers take alcohol the vehicle automatically park in the left side using a GSM a GPS technology.[2]

Additionally students from the University of Bridgewater state have designed a system to prevent the vehicle from projecting a vehicle according to Color Light.[3]

However all of automatic accident control system used only for the automated vehicles. But manual system was not introduced for manual vehicles by any of others. Because of that it was decided to develop system for vehicle accident control system for all kind vehicles

2.5 Comparison of alternative design strategy

All of these systems are designed primarily for use with manual vehicles. This technology can be used for both manual vehicles and automatic vehicles,.

Consequently, all three components, Clutch, Break, Accelerator, should be considered mainly when braking the vehicles. In this case, the brake system cannot be confused with the developed brake system. and also take care about the speed of the vehicle. Only the brake on the wheel cannot be controlled the vehicle. Because stopping Speeded up vehicle suddenly can overturn the vehicle, which could lead to another accident. Therefore, it is necessary to consider the accelerator function to control the speed of the vehicle.

Similarly, there are many type of system has developed to find the drunk driver to minimize the road accidents. Vehicle accidents cannot be minimize only through the monitoring the drunkenness of the driver. There are many other reasons for the behind the road accidents. It can cause accidents caused by the driver's mistakes based on various factors. Sleepiness, negligence, misbehavior, and other thoughts can be factors but this system is not only affect for the drivers but also vehicle.

Also, it is not enough to detect color lights to prevent the roadside. It is only one step to take only the consequences of reducing the accident. All this is important to consider the impact on the external environment as long as it focuses on vehicle accidents.

CHAPTER 3-METHODOLOGY

3.1 Introduction

This chapter describes the methodology followed to develop proposed system, and Explaining design of the system, Hardware, software, Explanation of the major code segments and modules also describes here

3.2 Design of the system

Design of the system is described in details in this chapter and also basic plan regarding how the braking the system works, and hoe the notification system works.

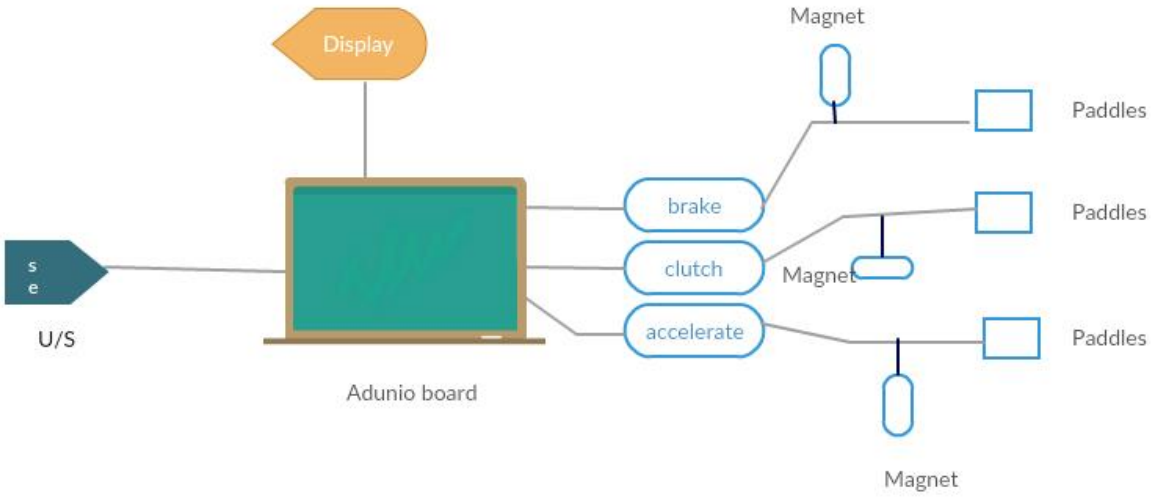

Figure 3.1 basic system plan

The system focuses primarily on minimizing potential damage from the outside environment. The overall system's performance can be as follows.

In this system all the data are collected by using the ultrasonic sensors which fixed on outside of the vehicles. The distance between the bodies that are external to the vehicle is obtained. The vehicle sensors positions are mention below.

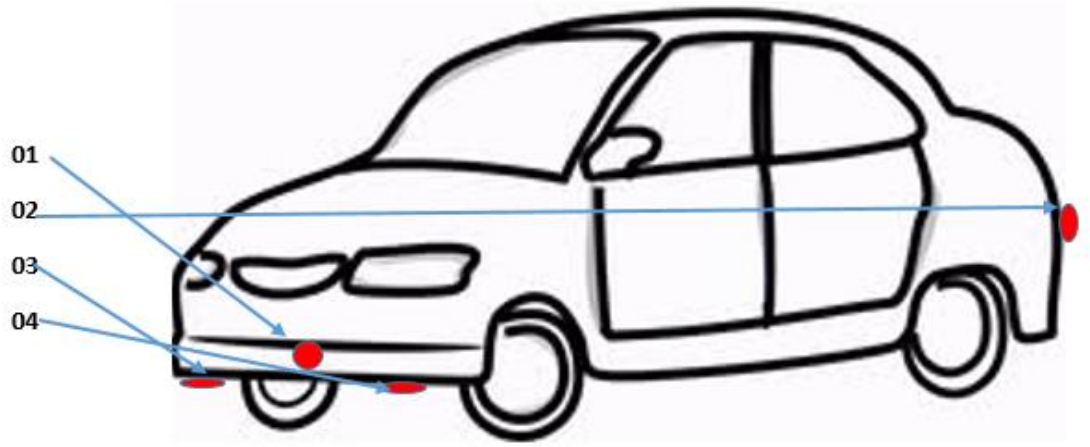

Figure 3.2 Ultrasonic Sensors on the vehicle

According to the Figure 3.1, (1) sensor receives the distance between the vehicle in front and the other object. The (02) Sensor offers the distance of the vehicle coming behind of the the vehicle. (03) and No. (04) Sensors obtained a height between vehicles and floor. All of these are directed to the main Adriano circuit.

Details of the distance given by the Ultrasonic Sensor is sent to the main Adriano circuit. It then takes care of that distance and commences security. All the distance from the sensor is primarily shown to the driver. For that this is used for a display. The driver shows his distance to in front of his vehicle and distance to the rear side vehicle. And his vehicle height between the roads.

The third stage takes the distance from the (01) first sensor. This distance is about 3 meters in average, and activates immediately and gives a defensive signal to the driver. If it is about 3 meters away, the speed of the car should be minimized. It alerts the unit to control the accelerator.

The fourth stage takes over the accelerator. In this case, the speed of the vehicle can be speeded up. Figure 3.3 and Figure 3.4 illustrate the way in which the accelerator is installed in different vehicles. The driver will then discard the accelerator when the driver is trampling. It creates a magnetic force created by the system that generates an electric current. With this magnetic energy, the accelerator accelerates down with the help of the compressed Spring. The magnet component as indicated in the picture is thus a magnet. Different types of vehicles will be in

the way that the Accelerometer is fixed. In this way, the use of magnetic energy reduces the speed of the vehicle without any major change in the vehicle.

Figure 3.3 Clutch connected type 1

Figure 3.4 Clutch and accelerator connected type

Fifth step occurs as same as the third step. The clutch is controlled by a magnet and a spring. When controlling the accelerator, the magnet was repelled by the magnet, but this is the attraction of the scissor. Figure 3.1. Shows how the clutch pedal works. The car is specifically designed to prevent the vehicle from completely stopping in the middle of the road. The brake is also used to prevent the vehicle from being stopped by brake operation. It is intended to prevent the inconvenience caused by carriage from the fetus.

Simultaneously, the brake pad is in parallel with the operation of the clutch. Both of these measures operate when a 3 meter is between the two vehicles. The brake pad operates in the form of a magnet using a spring. This helps the vehicle to stop during an emergency.

(3) and (4)sensors fixed under the vehicles are set at 45 degrees. When a height increases between the vehicle and the road, the signal is considered a rational state when the distance is not docked. That is, the increase in height means that there is a sharp slope and the absence of distance indicates that there is a patch. The Ultrasonic Sensor determines the distance according to the time it takes to re-receive the waveform, since there is no backwardness of the waves. The vehicle stops when the vehicle's height is over 2 feet.

The car should also be stopped after identifying stop signals lights (By using Image processing color signals light detects). Where the color identifies a sensor, indicating that there is a risk in the red light. the system stops the vehicle by following above mentioned electromagnetic method.

3.2 Hardware

3.2.1. HC-SR04 Sensor

Details of the hard drive components used to create the system are as follows:

Figure 3.5 Ultrasonic sensor HC SR04

3.2.1.1 Features

- Operating voltage: +5V
- Theoretical Measuring Distance: 2cm to 450cm
- Practical Measuring Distance: 2cm to 80cm
- Accuracy: 3mm
- Measuring angle covered: <15°
- Operating Current: <15mA
- Operating Frequency: 40Hz

Pin Number	Pin Name	Description
1	Vcc	The Vcc pin powers the sensor, typically with +5V
2	Trigger	Trigger pin is an Input pin. This pin has to be kept high for 10us to initialize measurement by sending US wave.
3	Echo	Echo pin is an Output pin. This pin goes high for a period of time which will be equal to the time taken for the US wave to return back to the sensor.
4	Ground	This pin is connected to the Ground of the system.

Table 3.1 Sensor Pin Configuration

3.2.1.2 HC-SR04 Ultrasonic Sensor - Working

As shown above the HC-SR04 Ultrasonic (US) sensor is a 4 pin module, whose pin names are Vcc, Trigger, Echo and Ground respectively. This sensor is a very popular sensor used in many applications where measuring distance or sensing objects are required. The module has two eyes like projects in the front which forms the Ultrasonic transmitter and Receiver. The sensor works with the simple high school formula that

Distance = Speed × Time

The Ultrasonic transmitter transmits an ultrasonic wave, this wave travels in air and when it gets objected by any material it gets reflected back toward the sensor this reflected wave is observed by the Ultrasonic receiver module as shown in the picture below

Figure 3.6 behavior of ultrasonic sensor

Now, to calculate the distance using the above formulae, we should know the Speed and time. Since we are using the Ultrasonic wave we know the universal speed of US wave at room conditions which is 330m/s. The circuitry inbuilt on the module will calculate the time taken for the US wave to come back and turns on the echo pin high for that same particular amount of time, this way we can also know the time taken. Now simply calculate the distance using a microcontroller or microprocessor.

3.2.1.3.How to use the HC-SR04 Ultrasonic Sensor

HC-SR04 distance sensor is commonly used with both microcontroller and microprocessor platforms like Arduino, ARM, PIC, Raspberry Pie etc. The following guide is universally since it has to be followed irrespective of the type of computational device used.

Power the Sensor using a regulated +5V through the Vcc ad Ground pins of the sensor. The current consumed by the sensor is less than 15mA and hence can be directly powered by the on board 5V pins (If available). The Trigger and the Echo pins are both I/O pins and hence they can be connected to I/O pins of the microcontroller. To start the measurement, the trigger pin has to be made high for 10uS and then turned off. This action will trigger an ultrasonic wave at frequency of 40Hz from the transmitter and the receiver will wait for the wave to return. Once the wave is returned after it getting reflected by any object the Echo pin goes high for a particular amount of time which will be equal to the time taken for the wave to return back to the sensor.

The amount of time during which the Echo pin stays high is measured by the MCU/MPU as it gives the information about the time taken for the wave to return back to the Sensor. Using this information the distance is measured as explained in the above heading. [4]

3.2.2. Arduno uno

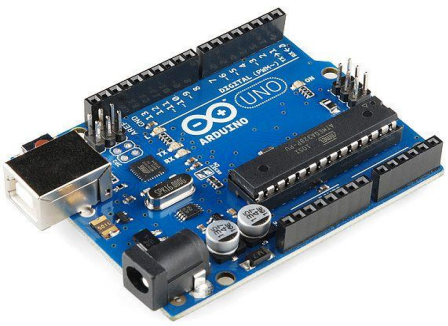

Figure 3.7 ardunio uno board

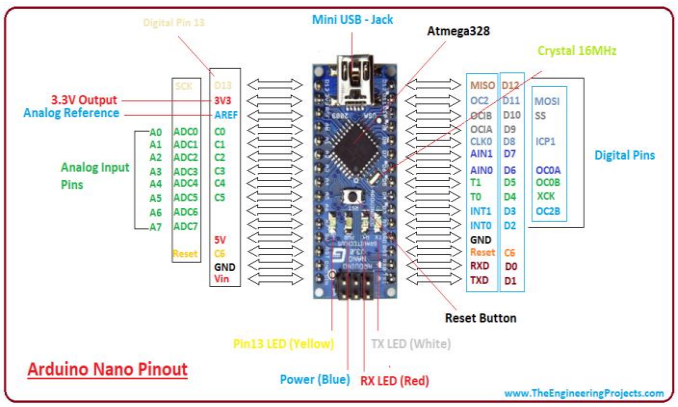

Figure 3.8 arduino uno board circuit side

Arduino Uno is a microcontroller board based on the ATmega328P (data sheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

This is the latest revision of the basic Arduino USB board. It connects to the computer with a standard USB cable and contains everything else you need to program and use the board. It can be extended with a variety of shields: custom daughter-boards with specific features. It is similar to the Due milanove, but has a different USB-to-serial chip the ATMega8U2, and newly designed labeling to make inputs and outputs easier to identify.

Microcontroller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
PWM Digital I/O Pins	6
Analog Input Pins	6
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328P) of which 0.5 KB used by boot loader
SRAM	2 KB (ATmega328P)
EEPROM	1 KB (ATmega328P)
Clock Speed	16 MHz
LED_BUILTIN	13

Table 3.2 Information of Arduino Uno board

3.2.2.1 Programming

The Arduino Uno can be programmed with the (Arduino_Software (IDE)). Select "Arduino/Genuino Uno from the Tools > Board menu (according to the microcontroller on your board). For details, see the reference and tutorials. The ATmega328 on the Arduino Uno comes preprogrammed with a boot loader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol (reference, C header_files). You can also bypass the boot loader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header using Arduino ISP or similar; see these instructions for details. The ATmega16U2 (or 8U2 in the rev1 and rev2 boards) firmware source code is available in the Arduino repository. The ATmega16U2/8U2 is loaded with a DFU boot loader, which can be activated by:

- On Rev1 boards: connecting the solder jumper on the back of the board (near the map of Italy) and then reseing the 8U2.

- On Rev2 or later boards: there is a resistor that pulling the 8U2/16U2 HWB line to ground, making it easier to put into DFU mode.

  You can then use Atmel's FLIP software (Windows) or the DFU programmer (Mac OS X and Linux) to load a new firmware. Or you can use the ISP header with an external programmer (overwriting the DFU boot loader). See this user-contributed tutorial for more information.

3.2.2.2 Warnings

The Arduino Uno has a resettable poly fuse that protects your computer's USB ports from shorts and overcurrent. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed.

3.2.2.3 Differences with other boards

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

3.2.2.4 Power

The Arduino Uno board can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the GND and VIN pin headers of the POWER connector. The board can operate on an external supply from 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may become unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

The power pins are as follows:

- VIN. The input voltage to the Arduino/Genuino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
- 5V.This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board. We don't advise it.
- 3V3. A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.
- GND. Ground pins.

- IOREF. This pin on the Arduino/Genuino board provides the voltage reference with which the microcontroller operates. A properly configured shield can read the IOREF pin voltage and select the appropriate power source or enable voltage translators on the outputs to work with the 5V or 3.3V.

3.2.9 Memory

The ATmega328 has 32 KB (with 0.5 KB occupied by the boot loader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library).

3.2.2.5 Input and Output

See the mapping between Arduino pins and ATmega328P ports. The mapping for the Atmega8, 168, and 328 is identical.

Each of the 14 digital pins on the Uno can be used as an input or output, using pinMode(),digitalWrite(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive 20 mA as recommended operating condition and has an internal pull-up resistor (disconnected by default) of 20-50k ohm. A maximum of 40mA is the value that must not be exceeded on any I/O pin to avoid permanent damage to the microcontroller.

In addition, some pins have specialized functions:

- Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.
- External Interrupts: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attachInterrupt() function for details.
- PWM: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the analogWrite() function.
- SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication using the SPI library.
- LED: 13. There is a built-in LED driven by digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.
- TWI: A4 or SDA pin and A5 or SCL pin. Support TWI communication using the Wire library.

The Uno has 6 analog inputs, labeled A0 through A5, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analogReference() function. There are a couple of other pins on the board:

- AREF. Reference voltage for the analog inputs. Used with analogReference().
- Reset. Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

3.2.2.6 Communication

Arduino/Genuino Uno has a number of facilities for communicating with a computer, another Arduino/Genuino board, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The 16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. The Arduino Software (IDE) includes a serial monitor which allows simple textual data to be sent to and from the board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1).

A Software Serial library allows serial communication on any of the Uno's digital pins.

The ATmega328 also supports I2C (TWI) and SPI communication. The Arduino Software (IDE) includes a Wire library to simplify use of the I2C bus; see the documentation for details. For SPI communication, use the SPI library.

Automatic (Software) Reset

Rather than requiring a physical press of the reset button before an upload, the Arduino/Genuino Uno board is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the ATmega8U2/16U2 is connected to the reset line of the ATmega328 via a 100 Nano farad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip. The Arduino Software (IDE) uses this capability to allow you to upload code by simply pressing the upload button in the interface toolbar. This means that the boot loader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload. This setup has other implications. When the Uno is connected to either a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half-second or so, the boot loader is running on the Uno. While it is programmed to ignore malformed data (i.e. anything besides an upload of new code), it will intercept the first few bytes of data sent to the board after a connection is opened. If a sketch running on the board receives one-time configuration or other data when it first starts, make sure that the software with which it communicates waits a second after opening the connection and before sending this data.

The Uno board contains a trace that can be cut to disable the auto-reset. The pads on either side of the trace can be soldered together to re-enable it. It's labeled "RESET-EN". You may also be able to disable the auto-reset by connecting a 110 ohm resistor from 5V to the reset line; see this forum thread for details.[5]

3.2.3 Lcd display

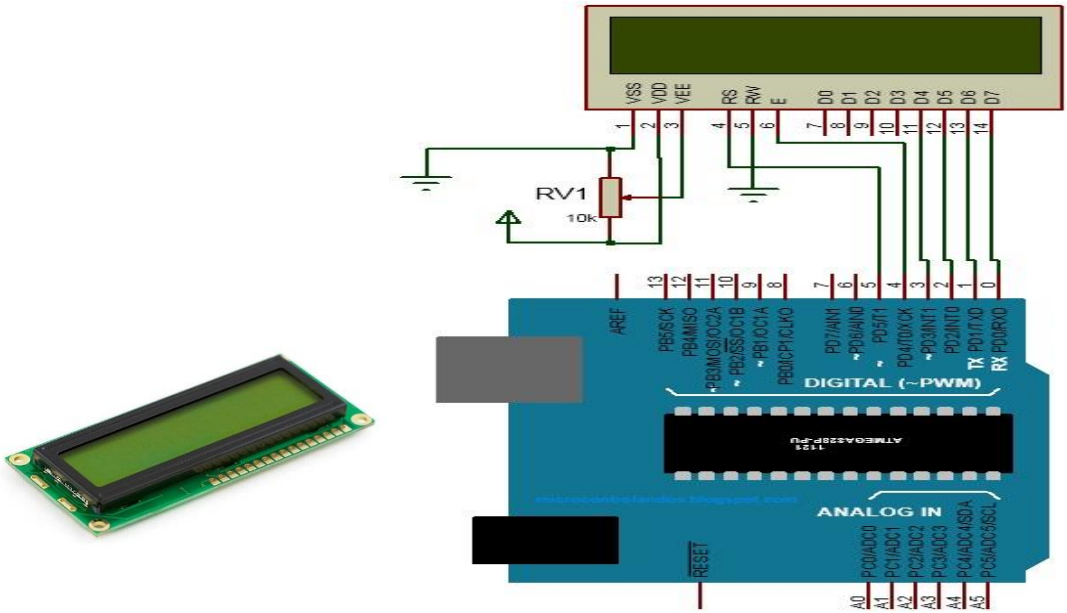

Figure 3.9 Lcd display circuit side

LCD (liquid crystal display) is the technology used for displays in notebook and other smaller computers. Like light-emitting diode (LED) and gas-plasma technologies, LCDs allow displays to be much thinner than cathode ray tube (CRT) technology. LCDs consume much less power than LED and gas-display displays because they work on the principle of blocking light rather than emitting it.

An LCD is made with either a passive matrix or an active matrix display display grid. The active matrix LCD is also known as a thin film transistor (TFT) display. The passive matrix LCD has a grid of conductors with pixels located at each intersection in the grid. A current is sent across two conductors on the grid to control the light for any pixel. An active matrix has a transistor located at each pixel intersection, requiring less current to control the luminance of a pixel. For this reason, the current in an active matrix display can be switched on and off more frequently, improving the screen refresh time (your mouse will appear to move more smoothly across the screen, for example).

Some passive matrix LCD's have dual scanning, meaning that they scan the grid twice with current in the same time that it took for one scan in the original technology. However, active matrix is still a superior technology.[6]

3.2.4 Jump wire

Figure 3.10 Jump wire

Jumper wires are used for making connections between items on your breadboard and Arduino's header pins. Use them to wire up all your circuits!Buy jumper wires from SparkFun, Adafruit, or Network.[7]

3.2.5 Relay module

Figure 3.11 Relay module

A relay is an electrically operated switch that can be turned on or off, letting the current go through or not, and can be controlled with low voltages, like the 5V provided by the Arduino pins.

This relay module has two channels (those blue cubes). There are other models with one, four and eight channels. This module should be powered with 5V, which is appropriate to use with an Arduino. There are other relay modules that are powered using 3.3V, which is ideal for ESP32, ESP8266, and other microcontrollers.

Get a relay module:

- 5V 2-channel relay module
- 5V 1-channel relay module
- 5V 8-channel relay module
- 3.3V 1-channel relay module

- The high-voltage side has two connectors, each with three sockets: common (COM), normally closed (NC), and normally open (NO).
- COM: common pin
- NC (Normally Closed): the normally closed configuration is used when you want the relay to be closed by default, meaning the current is flowing unless you send a signal from the Arduino to the relay module to open the circuit and stop the current.
- NO (Normally Open): the normally open configuration works the other way around: the relay is always open, so the circuit is broken unless you send a signal from the Arduino to close the circuit.
- The set at the right consists of **VCC** and **GND** to power up the module, and input 1 (**IN1**) and input 2 (**IN2**) to control the bottom and top relays, respectively.
- The second set of pins consists of **GND**, **VCC**, and **JD-VCC** pins. The JD-VCC pin powers the electromagnet of the relay.

The connections between the relay module and the Arduino are really simple:

- GND: goes to ground
- IN1: controls the first relay (it will be connected to an Arduino digital pin)
- IN2: controls the second relay (it should be connected to an Arduino digital pin if you are using this second relay. Otherwise, you don't need to connect it)
- VCC: goes to 5V[8]

3.2.6 Led bulbs

Figure 3.12 Led bulbs

3.3 Software

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board -- you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.[9]

3.4 Major code and module

```
void loop() {
    long duration, inches, cm;
    pinMode(red, OUTPUT);
   pinMode(green, OUTPUT);
   pinMode(moter, OUTPUT);

    pinMode(pingPin, OUTPUT);
    digitalWrite(pingPin, LOW);
    delayMicroseconds(2);
    digitalWrite(pingPin, HIGH);
    delayMicroseconds(10);
    digitalWrite(pingPin, LOW);
    pinMode(echoPin, INPUT);
    duration = pulseIn(echoPin, HIGH);
    inches = microsecondsToInches(duration);
    cm = microsecondsToCentimeters(duration);
    Serial.print(inches);
    Serial.print("in, ");
    Serial.print(cm);
    Serial.print("cm");
    Serial.println();
    delay(100);

    if( inches <=7){
   digitalWrite(red,HIGH);
   digitalWrite(green,LOW);
     digitalWrite(moter,HIGH);
       Serial.print("moter high");
```

Figure 3.13 Ultrasonic Sensor code

This diagram shows how far the distance obtained by the system's Ultrasonic Sensor is equal to what we expect. The distance between the vehicle and the outside is done in this section.

```
#define S0 4
#define S1 5
#define S2 6
#define S3 7
#define sensorOut 8
int frequency = 0;
void setup() {
  pinMode(S0, OUTPUT);
  pinMode(S1, OUTPUT);
  pinMode(S2, OUTPUT);
  pinMode(S3, OUTPUT);
  pinMode(sensorOut, INPUT);

  // Setting frequency-scaling to 20%
  digitalWrite(S0,HIGH);
  digitalWrite(S1,LOW);

  Serial.begin(9600);
}
void loop() {
  // Setting red filtered photodiodes to be read
  digitalWrite(S2,LOW);
  digitalWrite(S3,LOW);
  // Reading the output frequency
  frequency = pulseIn(sensorOut, LOW);
  // Printing the value on the serial monitor
  Serial.print("R= ");//printing name
  Serial.print(frequency);//printing RED color frequency
  Serial.print("  ");
```

Figure 3.14 LCD display code

This diagram shows the distance the system receives from the ELC's display shows the information displayed to the driver.

Chapter 4- Evaluation

4.1 Evaluation

As mentioned above, when the system is implementing. There are a few things to consider here. The system can be mounted on all roads as a rule. However, there are many different types of accelerators, clutch pedal and brake pads. For example, in contrast to a vans, these sections of the three-wheel has been combined. The vehicle will also vary from one direction to the other. That means that there is a three-wheeler and the road between the three-wheeler and the road. As a result, the changes should be changed according to each vehicle.

Further, there can be a suspicion that not only vehicles from vehicles coming from behind or behind them, but also vehicles coming from either side of the vehicle. But as a whole, this system can be used for all vehicles, since other vehicles also operate on the opposite side of the vehicle, as well as the vehicles at the opposite end as well as the distance of the vehicle. The other parts are controlled without a control unit for non-power driven vehicles the system can be set up.

A prototype can complete this system, but the overall result can be obtained after installing this concept in a real-time vehicle. However, since this system does not interfere with other components of the vehicle, it does not result in an outcome.

Furthermore, the system can be improved by allowing communication between vehicles. If there are several vehicles caught in traffic on the road, they can inform the other vehicles to inform other vehicles as well. The system can also be used to prevent accidents caused by road users who are hurrying suddenly through image process in.

As mentioned above, this system can minimize vehicle accidents. The driver will not be able to add new stocks because of the automatic awareness of the driver and also the automatic stop of the vehicle components if there is no response. And the design has been used with the least expensive components, since it makes it easy for any vehicle. Therefore, the vehicle does not need to install a heavy fitting system. Since the vehicle is in the same way, even Signal lighters work the same way. Therefore, there is no need to make any other changes.

Further, the development of this system can improve the way that GPS technology can be used to transport the vehicle without the use of a driver. However, the system which has been

developed thus far can take over the responsibility of the state or any other responsible institution and this can be fitted to all national vehicles. The system can change the system in order to upgrade the vehicle to fit all vehicles. As long as the vehicle is mandatory, it is imperative that the system be made compulsory if the system is made compulsory. It can reduce traffic accidents.

Chapter 5- Conclusion

In sum, this system has been able to prevent vehicle accidents in a very successful manner. This simple system, which can be used for very low cost for the vehicles, then it can reduce the number of accidents. It also reduces the risk of life injuries, as well as property, and can be very safe and secure for vehicles. It is very important that it does not need to make a big change in a vehicles .when it comes to caring for a single risk. Similarly, the completion of the system will not be a big threat to the poor countries due to the small amount of money.

This system, designed to minimize vehicle accidents, focuses on all the above issues, giving the expected results in much the same way as expected.

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