

# Fabrication of Integrated Braking Assistance

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**Abstract-** One of the most operated part of an automobile vehicle is a hand brake, it is generally used in vehicles in order to park the vehicle on level road, hill area and during emergency so as to keep the vehicle motionless. The conventional hand brake mainly consists of a ratchet lever locking operated by hand lever which is connected to brake mechanism through cable which will keep them engaged until the release button is pressed by the driver. While vehicle is parked the hand brakes are engaged but sometimes the driver forgets to release the hand brake when he starts moving the vehicle. This may cause damage to the brake liners and also results in poor performance. Our main objective of this project is to design automatic hand brake release mechanism in order to prevent the chances of damage of vehicle parts and to get better efficiency. The mechanism facilitates the release of the brake without any manual effort and during all the necessary conditions inherent in actual movement of vehicle is present.

**Index Terms-** hand brake, Ratchet, Sensors, Microcontroller

## 1. INTRODUCTION

In cars the hand brake is used to keep the vehicle motionless, automobile hand brake mainly consists of a cable directly connected to a mechanism on one end and to some type of mechanism that can be actuated by the driver on the other end, the mechanism is often called as hand operated lever which is located on the side of the driver. This invention relates to an automatic hand brake release system and more particularly to such a system in which the automatic means are actuated only after all the conditions inherently necessary prior to actual operation of the vehicle are present. Our main objective of this project is to design automatic hand brake release mechanism in order to prevent the chances of damage of vehicle parts and to get better efficiency. The mechanism

facilitates the release of the brake without any manual effort.

Our project comprises an electric circuit which consists of microcontroller, stepper motor, actuator and sensors. Sensors used to sense the vehicle operating conditions which are required to release the hand brake. Introducing the PLC Microcontroller along with the stepper motor which can lead to efficient as well as flexible in design and manipulate the power actuator which converts rotating motion into linear motion needed to move the lock. Automobile hand brake release mechanism will be useful to reduce the chances of accident thereby increasing the safety as well as reducing effort of the operator or driver

## 2 OBJECTIVE

The main objective of our project is to eliminate the most of the mechanical components from the hand brake system and to increase the space inside the cabin. One more thing is the safety requirement which is most efficiently needed in all the cars that is intelligent braking assistance which helps the vehicle to identify the obstacle in front and apply sufficient brake pressure in a required time.

## 3 PROBLEM DEFINITION

Generally while driving an automobile the driver forgets to disengage the hand brake when he starts moving his vehicle. This may cause the damage to the brake liner and results in poor performance of the vehicle. Most commonly the brake shoes are over heated and burned out. The automatic hand brake release mechanism is one of the most effective system over the conventional braking system which saves the effort of the operator, reduces the chances of accident and damage to the vehicle. And the space consumption by the unit inside the cockpit or cabin is

quite an issue. Hence by installing electronically operated system and actuating the mechanism can actually reduce space used and can be optimally used for further ergonomics.

#### 4 METHODOLOGY

- Selection of the micro controller.
- Selecting of the electronic components for the controller board.
- Giving the simple rotation in the main controller.
- Selection of frame material.
- Fabrication process to get required dimensions on the frame.
- Assembly and mounting of all the electronic components.

#### 5 CONSTRUCTION AND ELECTRONICS INSTALLED

As the construction of this integrated assistance include the major electronics components and the braking assembly. The braking setup will be handled by the two motors installed on the frame and is connected to the controller. The microcontroller board with the programmed operation is attached with the independent relay and the ultrasonic sensor which will be mounted on the front part of the vehicle. The controller is setup fixed inside the frame. And the ignition switch which is turned on by the key operation will be installed freely. The electronic components which are used in are explained below

5.1 ULTRASONIC RANGING MODULE HC-SR04: Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit. The basic principle of work:

1. Using IO trigger for at least 10us high level signal,
2. The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.
3. IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic to returning.

4. Test distance = (high level time×velocity of sound (340M/S) / 2
  5. HC-SR04 ultrasonic module distance measuring transducer sensor, uses sonar to determine distance to an object.
  6. Use method: Supply module with 5V, the output will be 5V while obstacle in range, or 0V if not. The out pin of this module is used as a switching output when anti-theft module, and without the feet when ranging modules.
- Note: the module should be inserted in the circuit before been power, which avoid producing high level of misoperation; if not, then power again.

#### 5.2 ELECTRIC PARAMETER

Working Voltage	DC 5 V
Working Current	15mA
Working Frequency	40Hz
Max Range	4m
Min Range	2cm
Measuring Angle	15 degree
Trigger Input Signal	10uS TTL pulse
Echo Output Signal	Input TTL lever signal and the range in Proportion
Dimension	45*20*15mm

#### 5.3 WIRE CONNECTING DIRECT AS FOLLOWING

- 5V Supply
- Trigger Pulse Input
- Echo Pulse Output
- 0V Ground

5.4 RELAYS: A relay is a simple electromechanical switch made up of an electromagnet and a set of contacts. Relays are found hidden in all sorts of devices. In fact, some of the first computers ever built used relays to implement Boolean gates.

5.6 RESSISTORS: A resistor is a two-terminal electronic component designed to oppose an electric current by producing a voltage drop between its terminals in proportion to the current. Resistors are used as part of electrical networks and electronic circuits. They are extremely commonplace in most electronic equipment. They can be integrated into hybrid and printed circuits, as well as integrated circuits. Size, and position of leads (or terminals) are

relevant to equipment designers; resistors must be physically large enough not to overheat when power dissipating.

#### 6 WORKING AND RESULT

when all the setup has been made and the frame is installed with the micro controller which is programmed to release the hand brakes and the ultrasonic sensor to avoid the obstacle. While the vehicle is in the parking, the hand brakes are engaged and later on when the key is inserted to the slot and put it in to the ignition there the controller receives the signal and send it to the independent relay which release the hand brakes. The ultrasonic sensor which is installed will emit the desired frequency, if any obstacle came into it the reciver receives the change in the emitted frequency and the the electronic signals converted into analog signals which is sent to the stepper motors by the independent relay so the brakes engages swiftly.

#### 7.ADVANTAGES

1. Reduction of major mechanical components from the handbrake setup.
2. Increase in the cabin space.
3. Increased safety feature by intelligence braking.
4. Cost effective and simple operation.

#### 6. CONCLUSION

There's no doubt the modern era technologies are highly top end and advanced meeting the needs of global market and every individual. But still there's always room for improvement hence the new way of finding a way to improvise the present technologies for betterment is a major concern. Hence the braking system is one of the needed system in an automobile the improvisation of the unit or the system is also a concern. The optimum utilisation of space, cost of production and reducing components and its weight is the key element therefore working on these areas can gradually improvise the system. By eliminating the major components such as hydraulic unit's cylinders, compressors and other storage units can be reduced by option for electrical compact modules. Therefore the idea behind the whole project is to optimally use the space and components giving way for smarter operation. As the generation is directed

towards the electronic and smart technologies this is the better scope for utilising them.

#### REFERENCE

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