

Hand Brake Security System

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Abstract: The aim of the project is to implement a new technology in the field of 'automobile security system. Currently there are many anti-theft alarm available in market. Those alarms are fitted on the vehicle and incase of theft the alarm starts ringing on the vehicle. The disadvantage of such a system is we may not hear the alarm sound. Think we are inside the room and has put some music, else we were sleeping inside and the alarm was alarming outside. In such cases there are chances that we may miss to hear the alarm and there can be vehicle theft. We have designed a new security system named "Handbrake Security System" which will overcome this problem.

Keywords: New Technology, Handbrake Security System.

1. INTRODUCTION

Although car theft has dropped 73% in India over the past decade, it remains a common and costly property crime. Fortunately, there are a number of affordable and effective automobile theft-prevention options currently on the market. These silent alternatives truly make audible alarms obsolete. Steering wheel locks (such as The Club) and brake pedal locks are the least expensive solutions, and both work to deter joyriders. Brake locks are particularly difficult to defeat. For those attracted to alarms, personal car alarm pagers buzz a vehicle's owner when a car is disturbed rather than annoying an entire neighborhood. Ten of the fourteen India car alarm installers we called sell and install these pagers, for about Rs400/-. (By comparison, conventional aftermarket alarms range from Rs200/- to Rs1,000/-.) With a silent pager, an owner knows when his car is being threatened, and can take appropriate action. This marks a great improvement over audible alarms, and eliminates the problems of noise pollution and false alarms. The best theft prevention device on the market is the passive immobilizer, now standard equipment on 98% of General Motors' light duty vehicles and nearly all of the new Fords. These immobilizers use a key that contains a computer chip which communicates with the car's engine. Without the proper key, the only way to steal the car is to tow it away. "Obviously, an immobilizer is more effective than an alarm," says GM spokesman Andrew Schreck. "An audible system is really just a noisemaker, but we can tie an immobilizer directly to the ignition system, to make sure it really is a deterrent. And it doesn't cost us any more than putting in an alarm."

The main objective of this project is to provide assistance for automobile users. Keeping the above objective for the new technology is implemented in the field of automobile security system operates at very low cost. This intelligent security system adopts self-monitoring which uses smart embedded system technology. Vibration sensors, remote alarm and RF range finders enhance the security of this project.

2. WORKING PRINCIPLE

Currently there are many anti-theft alarm available in market. Those alarms are fitted on the vehicle and incase of theft the alarm starts ringing on the vehicle. The disadvantage of such a system is we may not hear the alarm sound. Think we are inside the room and has put some music, else we were sleeping inside and the alarm was alarming outside. In such cases there are chances that we may miss to hear the alarm and there can be vehicle theft. We have designed a new product which will overcome this problem. Such a product is not available in market today. Keeping this in mind we have developed a new vehicle theft alarm and wheel locking system. This alarm locking system has 2 units. One needs to be fitted on the vehicle and the second unit is like a mobile, need to be kept with the user.

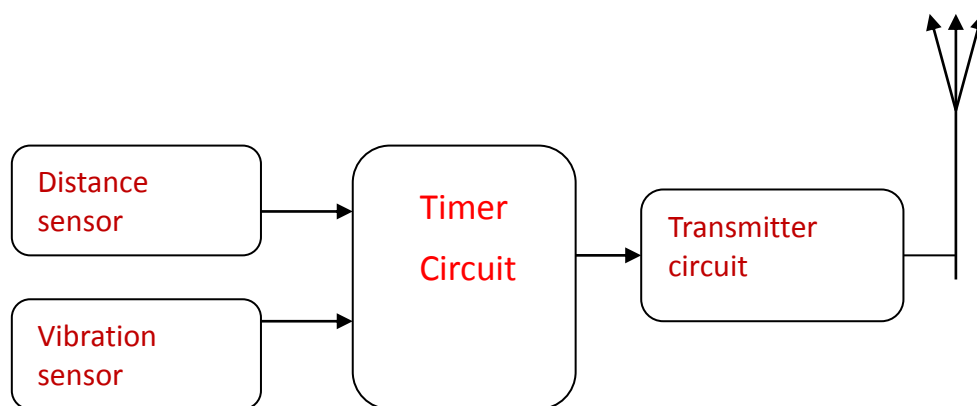
In any one of the conditions mentioned below this alarm gets activated Conditions where alarm is activated are;

1. When there is any shake in the vehicle- alarm activated.
2. When someone tries to remove the handle lock of the vehicle- wheel lock activated.
3. When someone tries to cut the battery connection- no additional battery needed for wheel lock and security function.
4. When someone pushes the vehicle and the vehicle goes out of the range of the unit. Remote alarm activated.

In all the above condition this we will be having alarm and we will get to know someone is trying to do something with our vehicle. Currently such a product is not available in market. Hence, we would like to design this as a product. We expect this idea will be accepted by the people.

This project has two parts;

- i. Wheel Locking Mechanism.
- ii. Electronic Security System.



Basic block diagram for sensor system

DISTANCE SENSOR:

Using the distance sensor the maximum distance between remote and vehicle is fixed. So even when the vehicle is pushed and moved without starting engine it can be sensed in remote.

VIBRATION SENSOR:

Timer circuit is activated when the vibration sensor works. When the timer circuit is activated for three seconds the transmission signal is disconnected. Whenever the transmission signal is absent the remote alarm is enabled.

WHEEL LOCK:

Hand Lock activation.

❖ This system can be activated just like the ordinary vehicle hand brake lever. Remote should be switched on after activating the system.

Wheel locking system:

- ❖ Even if the vehicle engine is switched on, it cannot move as the wheel axel is locked, it is an advantage of this system.
- ❖ Single key operation.
- ❖ It is the timer control switch which is used to unlock the system. We should calculate the time of LED indication and after that on the proper time the key must be pressed properly.
- ❖ It has electric unlocking.
- ❖ It has Fault key alarm.
- ❖ It has Time sensing unlocking system.

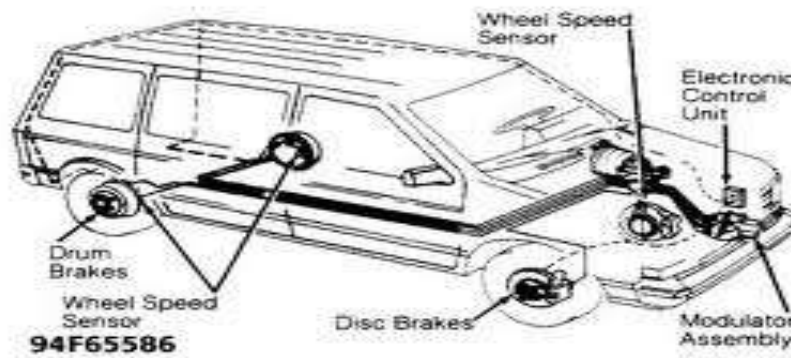


Fig 2.1 Vehicle setup

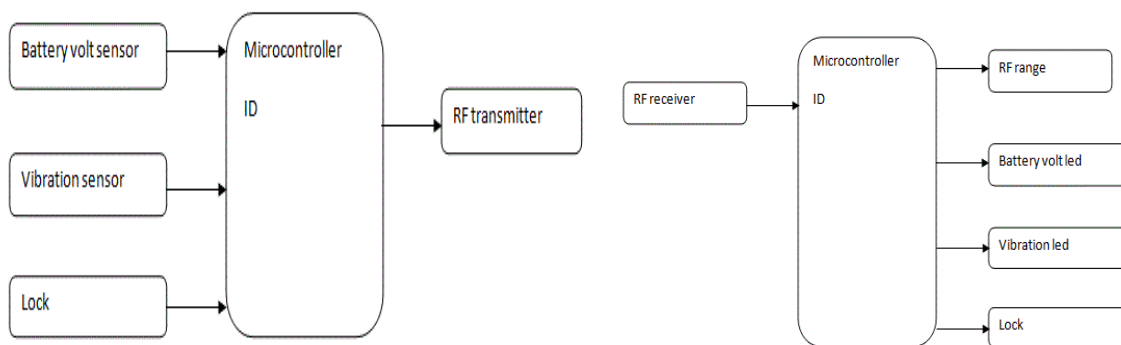


Fig 2.2 Flow diagram of HBSS transmitter

Fig 2.3 Flow diagram of HBSS receiver

3. WORKING OF WHEEL LOCKING MECHANISM

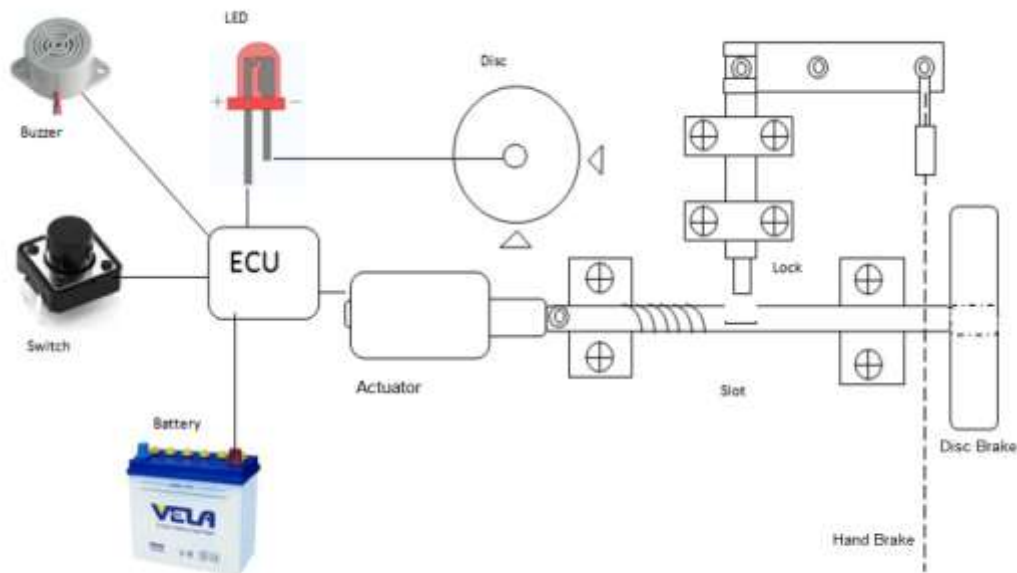


Fig. 3.1 Mechanical Wheel Lock System

In this system a hand brake is used to activate the wheel lock. Once the wheel lock is activated it is possible to open only with the help of a security disc key. Wheel lock is released when the handle lock disc is activated. At this time lock shaft is pushed to the brake disc slot. When the disc brake hole and lock shaft are the same direction the disc drum is locked. It is not possible to release from the outside. Because the system is in an enclosure or casing. To unlock this system, first

switch ON the disc motor key and then a indicator LED is blinked when the disc reaches the indicator sensor, after sometimes it reaches the time security switch which is aligned by the user. At the same time of switching time when we press the unlock key then only the wheel lock system will unlocked. If the sensor switch is switched ON at this time actuator, relay and alarm circuit are short circuited. Moreover through the relay circuit the actuator is activated. At this time disc lock is opened and vehicle wheel will be free. This disc lock is open till the hand brake is activated.

The lock is not pressed in proper time the relay is activated. Relay is permanently switched with the help of relay circuit. Buzzer is connected parallel to the relay. So the alarm will be switched ON or the alarm will be sounded. This is an antitheft system which cannot be opened by a thief, because the user get information signal through the vibration detector.

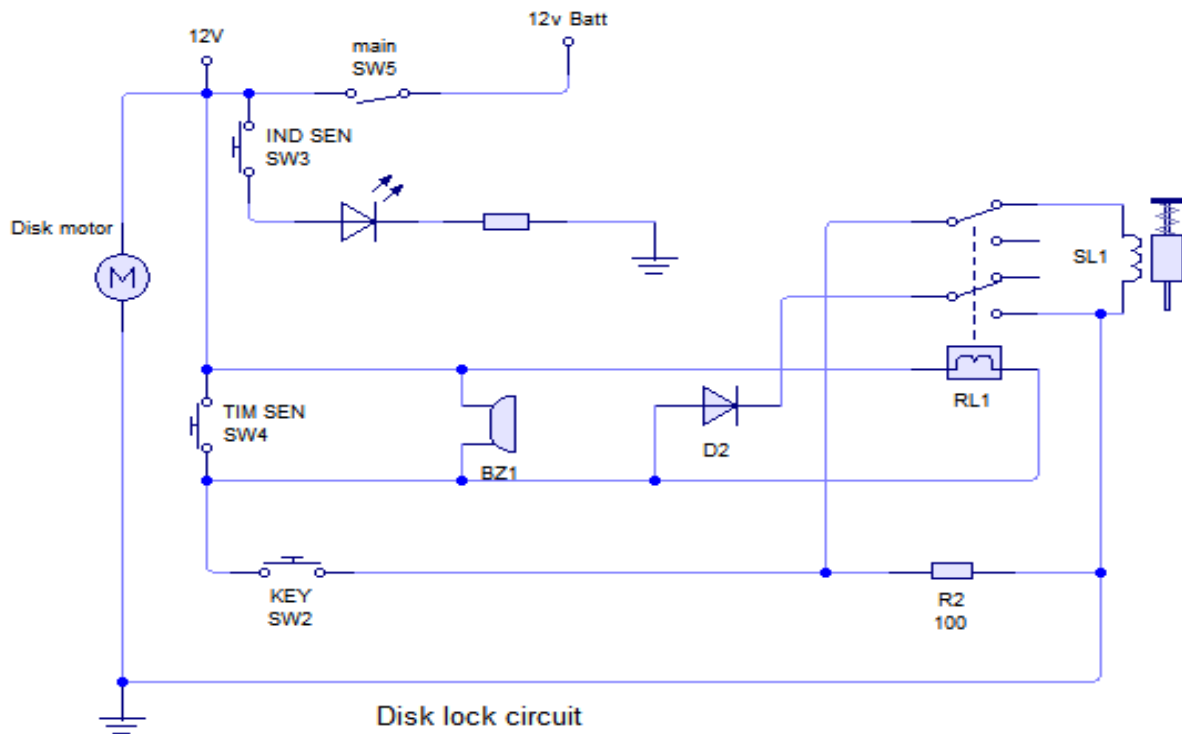


Fig. 3.2 Detailed Diagram showing working of Wheel Lock System

Step 1: Locking the wheel:

After parking the vehicle, the owner can lock the wheels by just pulling the lever provided for engaging the lock, which is located next to the hand brake lever. In this prototype, when the lever is pulled, a spring loaded rod moves into the slots provided in the disc and thus the wheel is locked.

In actual case, the spring may be replaced by a plunger mechanism driven by hydraulic system or by an electric motor, which pushes the locking rods into the slots on the disc. Four wheels of a car can be locked simultaneously.

Step 2: Unlocking the wheel:

This is the most important part of the project.

The wheels cannot be unlocked by simply releasing the lever. The lever is useless after engaging the lock. That is, the lever has only the function of locking the wheels. To unlock the wheels the owner of this vehicle has to use a special technique and this special technique is only known to the owner of the vehicle and manufacturers.

The technique is - after switching off the other security systems (vibration and distance sensing and alert systems) the vehicle owners enters the car and presses the switch to start the unlocking procedure, and after few seconds the person gets an indication through an LED to start counting the time which he had preset to unlock the wheels, and at the particular time the person pushes the unlocking switch and the wheel is unlocked.

If a person pushes the unlocking switch on or before the preset unlocking time, a buzzer will be activated and starts beeping. The time duration for unlocking the wheels after the LED indication can be rested by the user.

The detailed working of this unlocking system can be explained with the help of circuit diagram Fig. 4.2

When the owner of the vehicle presses the switch SW5 to start the unlocking procedure, the timing disk attached to the motor starts to rotate and while rotating the projection provided on the disc triggers the indication switch IND SEN SW3 and gives the user an indication by glowing a LED. Now the user can start counting. Here the unlocking time is set to 5 seconds so, after the LED indication the user has to count for 5 seconds and press the KEY SW2. At the same time (after 5 seconds) the projection on the timing disc triggers the timing switch TIM SEN SW4. If the unlocking switch KEY SW2 and timing switch TIM SEN SW4 are activated at the correct instant, the actuator gets activated and pulls the locking rod out of the slots on the disc and thus the wheels are unlocked. On the other hand if both the switches are not activated at the same time, then another path will be opened in the circuit and the buzzer gets activated and at the same time, the relay becomes short circuited and this cuts the supply to the actuator so, the wheel remain in the locked position. The buzzer can be stopped by switching of the power supply.

In this prototype, during the unlocking process, the wheel locking rods are pulled out of the slots which are provided on the disc with the help of an actuator but, in actual case this actuator can be replaced by the plunger mechanism driven by an electric motor or by hydraulic system.



Fig.3.3 Actual Disc Brake System

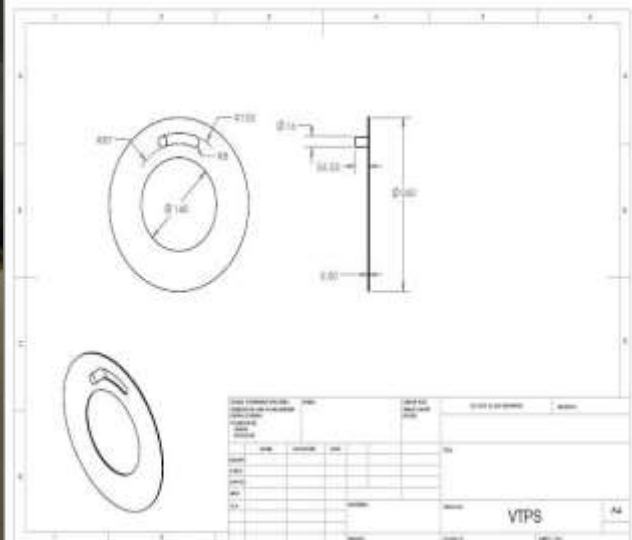


Fig. 3.4 Modifications required in disc brake's disc.



Fig 3.5 Assembled parts of HBSS prototype

4. CONCLUSION

With the industry going hi-tech, we expect the need of low cost *Hand brake security system (HBSS)* unit will be of great help. With lock replacing in all automobiles with a good labor and growing production units in India, there will be growing requirement for *Hand brake security system (HBSS)*. This *Hand brake security system (HBSS)* should the advantage of being user friendly and cost effective comparing to existing system. This project was done with utmost sincerity and we would take this chance to thank all of them who had lent their helping hand in the entire project span. Special thanks to our college and teachers without their hand holding this project would not have been a success.

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