

# Digital Autolocking Handbrake Securitysystem

Gurpreet Singh, Mayank, Tejaswi, Nitish Malik, Mandeep Sharma



**Abstract:** With the emerging technology the auto region is likewise evolving. Since previous couple of years, it has been found that various advancements were made concerning the security of the car. To boom the safety degree and to combat the robbery instances this assignment has been proposed. The predominant concept at the back of this mission is to install a safety device for an automobile handbrake which can be operated digitally to guard motors from being stolen. Apart from introducing new techniques of engaging the handbrake there has been no predominant improvement on this place of automobiles. The operation will remain identical as the handbrake is operated; the exchange could be made inside the working mechanism i.e. The twine that transmits the force to the brake pads of the rear wheels. A safety module could be installed surrounding the wire in which the twine can be locked through a piston cylinder arrangement. When the fingerprint matches with the registered one it'll actuate the piston cylinder sensor giving it sign to lock or release the handbrake twine. Both the sensors could be monitored via the ECU. With the introduction of such kind of system the safety of the automobile will be progressed as much as higher degree.

**KEYWORDS:** Handbrake, Autolocking, Security module, Biometric, piston cylinder arrangement;

## I. INTRODUCTION

Brakes are one of the maximum essential safety systems in a motor vehicle. The important features of brakes system are to slow down the automobile, to preserve the vehicle's velocity for the duration of downhill operation and ultimately to park the vehicle desk bound both on a flat or slope road condition. The first two functions are related to the carrier brakes, while the final feature is cited as the secondary or parking brakes. Conventional parking brake actuation involves the human interference. Handbrake also known as the parking brake or emergency brake of an automobile is a mechanical device that is operated through a ratchet mechanism. Like the regular braking operation handbrake is likewise applied on the brake shoes inside the drum brake and on the brake pad in disc brake. The primary handbrake gadget consists of a lever that is connected to a ratchet and pawl mechanism, this mechanism is attached to a wire which transmits the force, this twine is then divided into distinct wires to transmit force in rear wheels.

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In the beyond few years, it's been seen that vehicle robbery cases has been growing regularly consequently, to cope with those situations the concept of autolocking handbrake security device has been proposed. The gadget will defend the car from getting stolen, furthermore it'll also reduce injuries which arise due to mistaken engagement of the handbrake. The idea of this security gadget is based totally on a piston cylinder arrangement. The security module could be positioned surrounding the handbrake twine. When the button on lever is pressed the fingerprint sensor will actuate and could ship the signal to the engine control unit (ECU). The ECU will then send indicators to the principle sensor which is likewise related with a piston-cylinder association. On getting the signals the sensor will command the piston to transport forward consequently locking the cord. On releasing the handbrake identical mechanism will be observed besides now the sensor will command the piston to release the wire. The system could be very clean to put in and screen.

## II. LITERATURE SURVEY

[1]S.THIVAGAR, C.NANTHA KUMAR, the study is focused in growing an automatic handbrake gadget for safety motive in which the handbrake engagement and disengagement can be executed by proximity sensor and rack & pinion. Sensors experience and offers sign to the circuit board which at once drives the motor. The rack and pinion get activated and lifts the handbrake and disengages with the help of push lock and spring anxiety.

[2]Akash D. Singh, Siddhesh P. Rahate, Amit V. Pawaskar, Ravindra K. Ambekar, Studied approximately how to reduce human attempt in making use of the handbrake at the same time as parking the vehicle and have concluded that developing automated hand brake device is the only answer for reducing human effort that's required for making use of guide hand brake. This device can provide quite parking protection and braking effect. It provides quick braking and additionally easy in operation. It can be evolved to use in case of failure of foremost braking system of the automobile.

[3]Dineshkumar C, Subramanian M, Have studied about the automobile braking gadget for passenger automobiles in which the sensors in vehicle can feel any object in front of the automobile. They'll come across its speed and follow the brakes robotically. On end they said that the recommended device should be useful for the centre-class peoples and low-end motors. The proposed gadget could be cost powerful and the stepper motor is used to perform the brake cable to govern the effect. The system is designed to lessen the speeds of the vehicle and to slow down the vehicle earlier than collision. The impact of the vehicle is decreased and the braking efficiency is multiplied at some point of crucial scenario. The existence of driver and co-passenger is stored and damage is decreased by the usage of this gadget.

[4]D. L. Shinde, Talandage Nikhil M, AttardeVarad R Mashalkar Akash S, Mahajan Rohit B, Has done their work in automatic engagement and disengagement of handbrake system by the usage of pneumatic process.

They've proposed such a gadget wherein the handbrake will engage or disengage relying upon the key role i.e. When the ignition is ON the handbrake will mechanically have interaction and when the ignition is OFF the handbrake might be disengaged. They have concluded that use of Pneumatic device lets in speedy engagement and disengagement of the handbrake and it makes the vehicles more secure.

[5]Jitendra B. Satpute,Rohan E. Dalvi, Ramesh G. Sutar, Prashant H. Karke, they've carried out their studies on EMPB (electro mechanical parking brakes) and proposed to replace traditional parking braking systems with a completely electrical element gadget. It's operated by means of a switch in the center console. The end from their research changed into that electromechanical tool hand brake presents the subsequent edges over the traditional handbrake: easy use-the hand brake is implemented completely no matter the power of the using force. The electrical hand brake applies mechanically as soon as the ignition is off.

[6]Gokul Gopan, Kishore Pradeep, Gokul K.R, Akhil.A, Amal Prasad, Have accomplished their paintings to growth the protection of the automobile handbrake with the assist of an antitheft alarm and a wheel locking device and have concluded that after the vehicle will stumble on any shake or vibration or any intrusion the alarm will start to ring and the wheels will lock automatically.

[7]Sanjay B S, Sunil M K, Akhilesh P,Nataraj G, Sunil Kumar B, they have done their research in automatic engagement and disengagement of the handbrake though gears and a D.C motor. When the ignition is turned off the D.C motors starts to rotate, the motor drives the pinion and pinion then drive the gear. The handbrake which is connected with the gear starts levelling up and engages itself. If the motor rotates in opposite direction the handbrake lever moves down. They've used an electronic actuator to prevent the handbrake lever not to move down by itself.

[8]Rohit Khubalkar, Saurav Kumar, Kishen Jadhav, Vaibhav Regundawar, Aniket Phatangare, Have given a concept of linking the handbrake engagement and disengagement with ignition and seat belt. When an automobile is started and the driver is wearing a seat belt but he forgets to lower down the handbrake and keeps driving the automobile then, at a particular pace the sensor will be actuated and will give signals to the solenoid valve. The solenoid valve will then routinely disengage the handbrake. Conclusion is found that the system is very useful as it will also remind the driver to wear a seat belt.

### III.COMPONENTS

#### A. Fingerprint Sensing Module

The image below is of a finger print sensor module with TTL UART interface. The individual can report the finger print records in the module and can configure it in 1:1 or 1: N mode for identifying the individual. R307 Fingerprint module consists of optical fingerprint sensor, high-pace DSP processor, immoderate-overall performance fingerprint alignment set of policies, robust ordinary overall

performance, clean shape, fingerprint matching, seek and template garage and one of a kind function.



Fig 1: Fingerprint sensing module [9]

#### B. Hydraulic Piston

This is a Type 6407 piston valve which is a servo-assisted piston valve. As a piston valve, the Type 6407 is specific appropriate for media together with gasoline and steam. As properly as liquids with low operating temperature underneath 0°C.The stopper and the middle guide pipe are welded collectively to enhance strain resistance and leak-tightness.

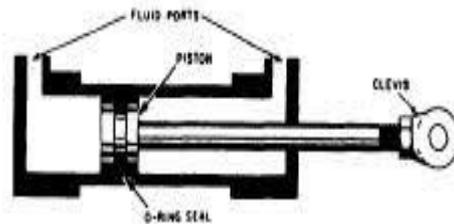


Fig 2: Hydraulic Piston [10]

#### C. D.C Battery

Battery used is to supply the power to the various electric components like microcontroller, sensors, relays etc. Specifications:

- Lead Acid
- 12 Volt



Fig 3: D.C Battery [11]

#### D. Microcontroller

The ATmega328 is an 8-bit and 28 Pins AVR Microcontroller, synthetic with the aid of Microchip, its operation ranges from three.3V to five.5V however typically we use 5V as a widespread. Its functions include the price performance, low energy dissipation, programming lock for safety purposes.



Fig 4: Microcontroller [12]

**E. Handbrake Lever**

Hand brake lever is used for moving up-down mechanism in which a button is there with the aid of the help of button the ratchet mechanism is launched. Hand-brake lever assemblies are used to apply or launch the parking brakes.



Fig 5: Handbrake Lever [13]

**F. Wheels**

The wheels will be used to show the locking of vehicle. Wheels to be used in the project will not be of an automobile. Smaller wheels will be used to depict the experiment.



Fig 6: Wheel [14]

**G. Electrical Relay (12V, DC)**

Relays are the electrically operated transfer. Relays are used in which it's far essential to control a circuit via low electricity. We have the usage of the relays for switching the motor ON or OFF. For making automated hand brake machine more efficient, these relays should be operated perfectly in all driving and climatic situations.



Fig 7: Electrical Relay [15]

**H. Solenoid Valve**

A solenoid valve is an electromechanical managed valve. The valve capabilities a solenoid, that is an electric powered coil with a movable ferromagnetic centre in its centre. Solenoid

valves are used to shut, dose, distribute or mix the float of fuel or liquid in a pipe.



Fig 8: Solenoid Valve [16]

**I.Brake Fluid**

Brake fluid, additionally referred to as hydraulic fluid, is chargeable for shifting the diverse components of your car's braking system. The non-compressible fluid operates under excessive temperatures and high stress and delivers very high force.

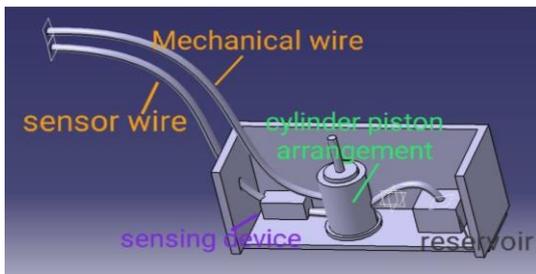


Fig 9: Brake Fluid

**IV.METHODOLOGY**

- The D.C battery will be powering the module.
- Wires are drawn from the battery to connect engine control unit (denoted as MCU), motor (which will actuate the piston), relay(which will distribute the current) and the solenoid valve (which will open or close the circuit), the fingerprint sensor is connected with the MCU, handbrake is connected with the solenoid valve and lines from the valve are further extended to the piston, the piston will lock the brake cable.
- When the handbrake button is pressed and lever is pulled upwards the sensor gets activated and verifies whether it is the registered fingerprint or not. If yes then the sensor will send activate the controller.
- The controller will send signal to relay to activate the circuit. When the circuit gets activated the sensor linked with the piston cylinder checks its position and sends the signals to engine control unit.
- The engine control unit sends commands to the sensor and the brake wire will get locked. When the button is released the solenoid valve cut-off the circuit and the piston come to rest.
- When the lever is lowered the system works in the same way and the engine control unit sends signals to the sensor and the piston moves outward releasing the tension in the brake cable.

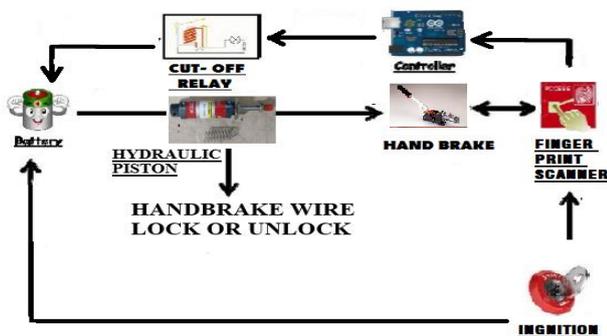
## V.CATIADESIGN



**Fig 10:Catia Design**

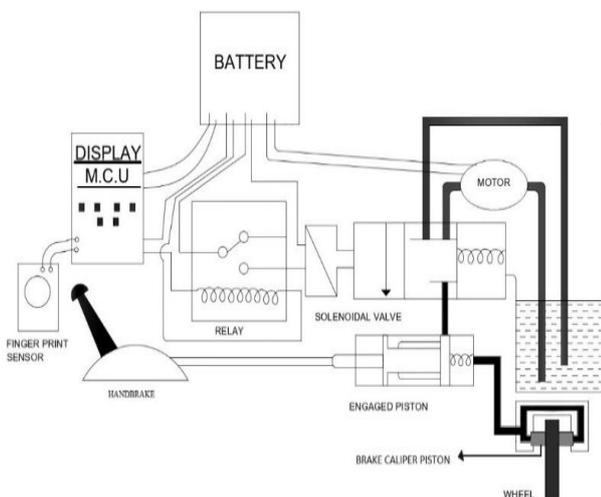
The above figure shows the security module. The virtual model is designed with the help of designing software. It comprises of a piston cylinder arrangement which will lock the wire, a reservoir which will contain the fluid. A sensor wire is also shown here which will be connecting the sensor attached to piston cylinder and engine control unit. The term mechanical wire here represents the brake cable which is connected with the handbrake lever. The sensing device is the sensor which will detect the position of the piston and will send the data to engine control unit.

## VI. BLOCK DIAGRAM



**Fig10:Block Diagram**

## VII.CIRCUIT DIAGRAM



**Fig 11: Circuit Diagram**

## VIII.CONCLUSION

With the above studies and improvement, it could be concluded that this security gadget is one of the exceptional strategies to save car from being stolen as it's far embedded with best components including the sensors and consequently it will be able to do its task smoothly for which it has been designed. However, with some enhancement and advancement in era every day, few adjustments may be executed within the destiny to enhance its affordability and its accuracy.

## IX.FUTURE SCOPE

- The security module will extend the car safety to a higher level since it will act as double security for the vehicle.
- The proposed idea can be further extended by combining its use in the clutch lock, gear lock and brake system which will allow the user to lock the operating system of car completely.
- The security system can also be linked with the connected car feature, which will make the user to easily access it from their cell phones.
- The system can also be used as a child lock mainly for handbrakes.
- The security module can also be linked with the vehicle anti-theft alarm system.

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