

# Hill Assist Control System

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**Abstract-** In this project work the design and construction of a model of automatic braking system for vehicles in hill stations is to be developed. The mechanism has been developed to stop the vehicle from rolling back ward when the vehicle is moving in the hill roads. This construction made of two phases in a first deigns of ratchet and pawl mechanism, frame, shaft, etc. is done and in second sensor selection and interference is done. Ratchet and pawl mechanism has been fabricated and assembled with sensor interface is tested. The proposed mechanism is to lock reverse break using ratchet gear. By reverse locking the differential is disengaged from the axle. Thus the power is directly transmitted to the axle and hence to the wheels.

This will considerably reduce the power loss in some occasions when unwanted loss is happening due to the transmission of power from the shaft to the ratchet gear and then to the axle and hence to the wheels. So in mechanism the unwanted power loss in the due course of transmission through the gear wheel is reduced.

**Keywords:** Kinetic Energy, Suspension, Electromechanical

## I INTRODUCTION

In the inclination state, the most important issue to the drivers is to stop their car on inclination and to go in a forward direction. While holding up in the action, the car needs to move forward continuously, this situation is problematic, for the drivers to make their car not to roll back on the inclination. So the system must be developed to keep the vehicle from moving back and it should not stop the vehicle from forward motion may be overcome. This limit can be proficient by using ratchet and pawl instrument. The ratchet and pawl should be arranged and should be fit in the rear drive shaft.

Hill road ratchet and pawl mechanism are characteristic to arrest the motion to rear shaft anti roll back mechanism has been invented and tested on rear shaft assembly. The mechanism works well. Ratchet and pawl mechanism is employed in several applications effectively wherever the one during this work the mechanism has been developed to prevent them from rolling backward once the vehicle moving on the vehicle aspect power transmission is needed.

The proposed mechanism is to reverse brake using ratchet gear. By reverse lockup the differential is disengaged from the shaft. This power is directly transmitted to the shaft and therefore to the wheels.

This wheel significantly reduces the ability loss in some occasions once the unwanted loss is going on due to

transmission if power from the shaft to the ratchet gear so to the shaft and thus to the wheels.

## II PROBLEM STATEMENT

1) In Sloppy areas of hill station vehicles roll back while on driving are in stationary position. While rolling back vehicle may collide with behind vehicle, this causes accidents and loss of assets.

2) When vehicle is coming out from parking of mall the its way may behaving like 45° slope. There is a condition applied to clutch and brake because of the vehicle ahead. But vehicle moves forward it is rolling back.

3) While a vehicle in normal surface with release of the clutch, with little or no acceleration, because of that is enough for vehicle move forward. But on slope zero or little acceleration is not enough that's why vehicle moves backward.

## III OBJECTIVES

1) To design and fabricate a prototype model for showing the concept of automatic brake in vehicle while driving on slopes in hilly road conditions.

2) To fabricate the model of the same to show the working desired working by emergency braking on slopes in hilly road.

3) To provide safety options while driving a vehicle on hilly areas.

4) To test the model under different conditions of speed and slopes.

## IV LITERATURE SURVEY

[1] Pranav Patil, Himanshu Sharma, Karan Shende, Prithvijit Parmar ,V.M. Chavan, "Design and Development of Automatic Braking System"

The aim is to design and develop a control system based on intelligent electronically controlled circuit called "AUTOMATIC BRAKING ON SLOPE REGION". In the hill station, the most common problem to the driver is to park their cars in the slope and to start up the car. While waiting in the traffic, the cars have to move on step by step very slowly; this situation is a difficult one for the drivers to make their car not to roll back in the slope. So the mechanism has to be developed to stop the vehicle from rolling back and it should not stop the vehicle in accelerating forwards. This function can be achieved by using the ratchet and pawl mechanism. The ratchet and pawl has to be designed and has to be fit in the rear drive shaft in case of the rear drive vehicles. In this work the instrument has been made to keep the vehicle from

moving backward when the vehicle is moving on the slant roads. Ratchet and pawl part has been recognized to catch the development to the rear rotating axle. Antagonistic to Roll Back part has been produced in this mechanism.

Thus the mechanism can stop the vehicle from rolling back on slopes. This would be more helpful for the drivers to drive their cars comfortably on hilly roads and he can take off the car in the uphill without rolling back the car. The project "automatic braking system on slope region" has been successfully designed and tested. It has been developed by integrating features of all the hardware components used. Presence of every component has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced IC's and with the help of growing technology the project has been successfully implemented.

[2] Ramu S, Babuganesh K, Harishankar K, Kolanchimani V and Thennarasu S, "ANTI-SLIDING BRAKING SYSTEM FOR VEHICLES IN INCLINED ROAD"

A prototype of Safety Anti-Sliding Braking System is designed and tested. The prototype has been developed by the integrating features of all hardware components used. Presence of every Component has been reasoned out and placed carefully thus contributing to the best working of the unit. In future, the Safety Anti-Sliding Braking System can be used in many vehicles to avoid collisions and accidents. This type of braking can be used in any type of hybrid vehicles and we can reduce the use of fossil fuels. The system was mounted on a miniature car and tested. When the distance was getting closer, the Anti-Sliding-braking system was working and the speed will slow down if a driver does not reduce the speed of automobile. We will replace an ultrasonic sensor with an IR sensor as the Anti-Sliding-braking system is mounted on a real automobile. If the obstacle is detected by the IR sensor, it passes the signal to power circuit and relay circuit to activate the DC gun. The DC gun provided with a Pneumatic type, push the spring and lock the ratchet. The vehicle get sudden break and can't move further backward motion. When a vehicle moved forward motion the lock gets released and a vehicle is allowed to move backward motion or reverse gear motion.

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of fossil fuels. The system was mounted on a miniature car and tested. When the distance was getting closer, the Anti-Sliding-braking system was working and the speed will slow down if a driver does not

[3]Vaibhav Devadkar, Vinayak Deshpande, Omkar Dhamale, Bhaskar Erande, Rohit Patil, "Design and Fabrication of Automatic Brake in Vehicle"

The aim of the project is to design and construction of a module used for vehicles within the hill stations. Automotive vehicle braking system is used once vehicle is moving upward direction. These sensors began within the automotive business particularly for crash detection in airbag systems. During this work, Ratchet and pawl mechanism is known to arrest the backward motion to the automotive. The ratchet is placed within the front drive shaft and also the pawl is fitted with the frame. Once the vehicle is moved within the hill road, the lever should build the pawl to the touch the ratchet. If the vehicle tends to move backward direction, the pawl would stop the ratchet to move Counter Clock-wise direction with respect to front wheel. Because the vehicle is in neutral position, the pawl engaged the ratchet and also the vehicle didn't move in. The IR TRANSMITTER circuit is to transmit the Infra-Red rays. If any obstacle is there during a path, the Infra-Red rays mirrored. This mirrored Infra-Red rays are received by the receiver circuit is termed "IR RECEIVER". The IR receiver circuit receives the mirrored IR rays and giving the management signal to the negative feedback circuit. The negative feedback circuit is used to activate the solenoid valve.

Thus the mechanism can stop the vehicle from rolling back in hill roads. This would be more helpful for the drivers to drive their cars comfortably in hilly roads and he can take off the car in the uphill without rolling back the car. The project safety auto brake system for hill station vehicle using IR sensor has been successfully designed and tested. It has been developed by integrating features of all the hardware components used. Presence of every component has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced IC's and with the help of growing technology the project has been successfully implemented.

[4]M.Anbalakan,V.Jagadheesan,V.Karthee,P.Karthi,D.Karthi charan,"AUTOMATIC BRAKE FOR HILL STATION"

Vehicle accidents are ubiquitous in recent years. This is because of heavy increase in population of vehicles, due to its high demand. They pose a serious threat to life and property. A system must be designed to minimize the effects of these accidents. The aim of the present study is to design a device which can successfully scan the surroundings during driving and apply brake to avoid front end collision of the vehicle. The technology of pneumatic plays a major role in the field of automation and modern machine shops and also

**AND ENGINEERING TRENDS**

the hydraulic control system is to using apply the braking to stop the vehicle motions. The aim is to design and develop a control system based intelligent electronically controlled automatic braking system. IR sensor provided of the vehicle detects and to presence of the obstacle the use of hydraulic and pneumatic system can prove to be useful in automation due to its simplicity and ease of operation. So, the aim is to design and develop a system based on automatic control of vehicle.

The beginning of the 21st century could very well mark the final period in which internal combustion engines are commonly used in cars. Already automakers are moving toward alternative energy carriers, such as electric batteries, hydrogen fuel and even compressed air. Intelligent braking is a small, yet very important, step toward our eventual independence from fossil fuels. These kinds of brakes allow batteries to be used for longer periods of time without the need to be plugged into an external charger.

[5] R. Vijaykumar, A. Anantharaj, S. GokulaKannan, N. YuvaBharathi, "Emergency Braking System for Hill Station Vehicle"

In this project we are introducing the automatic brake for hill station vehicles. The main reason to fabricate the automatic brake is to avoid the reverse movement of vehicle during the vehicle is in off condition .this project is to avoid the accident due to reverse movement of the vehicle in hill stations. The project contains simple mechanical arrangement. This project consists of following parts sprocket, reverses braking, linkage joint, linkage support and motor. In this project we are introducing the automatic brake for hill station vehicles. The main reason for fabricate the automatic brake is to avoid the reverse movement of vehicle during the vehicle is off condition due to the reverse movement the vehicle get accident for impacting to other vehicle so this project is highly avoid the accident due to this reverse movement on the vehicle. The project contains simple mechanical arrangement and operation is simple.

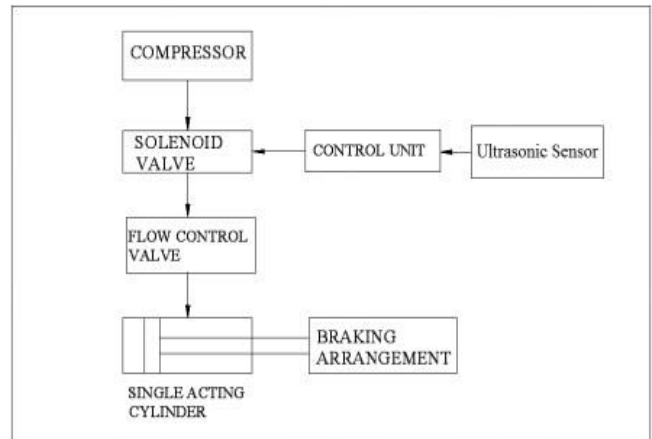
A ratchet is a device which is used in vehicles over a few decades and when a vehicle is negotiating a turn, the outside wheel travels a greater distance and turns faster than the inside wheel. The ratchet gear is the device transmitting the power to each wheels, allows one wheel to turn faster than the other.

**V PROPOSED SYSTEM**

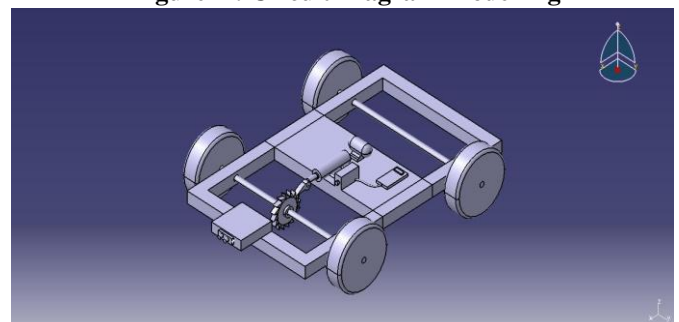
The Ultrasonic Transmitter circuit is used to transmit ultrasonic rays. If any obstacle come ahead is on a path. The ultrasonic rays mirrors, These mirrored ultrasonic rays is received by Ultrasonic Receiver. The Ultrasonic Receiver circuit receives the mirrored

Ultrasonic rays and gives feedback to the negative feedback circuit. The negative feedback circuit employed to activate the solenoid valve. If the solenoid valve is activated then compressed gas passed to the cylinder.

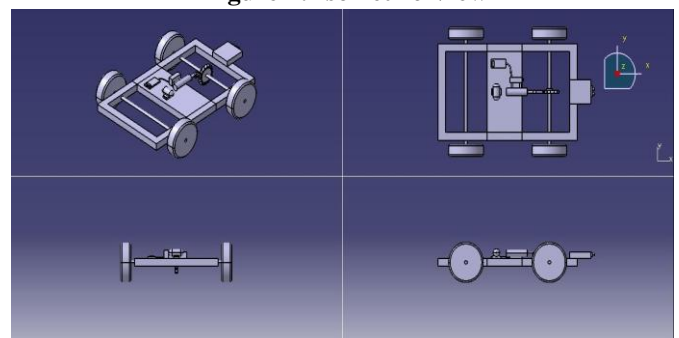
The compressed gas activates the gas cylinder and moves the connecting rod if the piston moves forward, then the braking arrangement is activated. The braking arrangement is employed to brake the wheel gradually or suddenly as a result of piston movement. The braking speed is varied by adjusting the flow Control valve as mentioned in the block diagram below.



**Figure 1 : Circuit Diagram Modelling**



**Figure 2: Isometric View**



**Figure 3: All Views**

**Advantages**

1. Brake cost will be less.
2. Free from wear adjustment.
3. Less power consumption
4. Less skill technicians is sufficient to operate.
5. It gives very simplified operation.
6. Installation is simplified very much.

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