

# Automatic Ground Clearance Adjustment System

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**ABSTRACT:** The vehicle dynamics and parameters plays an important role in vehicle handling. The vehicle's handling is determined by several factors, one of which is the vehicle's center of gravity. We need to keep the vehicle's center of gravity as low as feasible for optimal handling. It is always kept low for sports automobiles, although it compromises its performance for passenger cars. The vehicle dynamics and parameters plays an important role in vehicle handling. The vehicle's handling is determined by several factors, one of which is the vehicle's center of gravity. We need to keep the vehicle's center of gravity as low as feasible for optimal handling. It is always kept low for sports automobiles, although it compromises its performance for passenger cars.

**KEYWORDS:** Ground clearance, vehicle safety, efficiency & comfort Ground clearance, vehicle safety, efficiency & comfort

## I. INTRODUCTION

The vehicle dynamics and parameters plays an important role in vehicle handling. The vehicle's handling is determined by several factors, one of which is the vehicle's center of gravity. We need to keep the vehicle's center of gravity as low as feasible for optimal handling. It is always kept low for sports automobiles, although it compromises its performance for passenger cars. The vehicle dynamics and parameters plays an important role in vehicle handling. The vehicle's handling is determined by several factors, one of which is the vehicle's center of gravity. We need to keep the vehicle's center of gravity as low as feasible for optimal handling. It is always kept low for sports automobiles, although it compromises its performance for passenger cars. The vehicle dynamics and parameters plays an important role in vehicle handling. The vehicle's handling is

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## II. MODELING AND ANALYSIS

Components Used during the working of the model are

1. **Ultrasonic Sensor** - An ultrasonic sensor may be a device that uses ultrasonic sound waves to work out the gap to an item. A transducer is employed in an ultrasonic sensor to emit and receive ultrasonic pulses that relay information about the proximity of an item. High-frequency sound waves bounce off walls and make different echo patterns. Ultrasonic sensing is one among the foremost reliable ways to sense closeness and measure levels. Ultrasonic sound encompasses a frequency that's above that of human hearing.
2. **Pneumatic Cylinder** - Pneumatic cylinders are mechanical devices that use propellant power to come up with force in a very reciprocating linear motion. Something compels a piston to maneuver within the desired direction, kind of like hydraulic cylinders. The piston could be a disc or cylinder, and also the connecting rod transmits the force developed by the piston to the thing

being moved. Pneumatics are sometimes preferred by engineers because they're quieter, cleaner, and need less room for fluid storage.

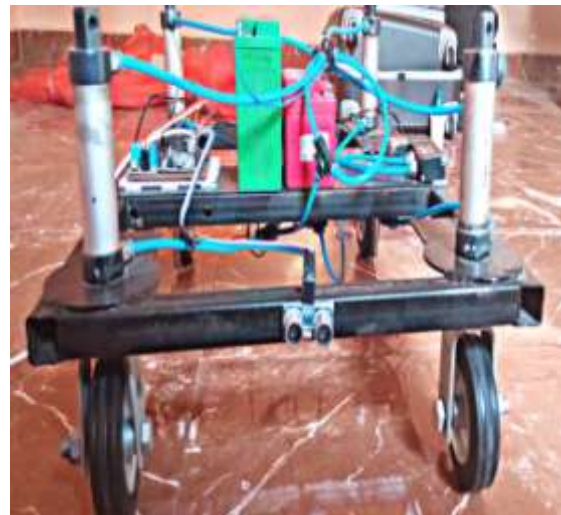
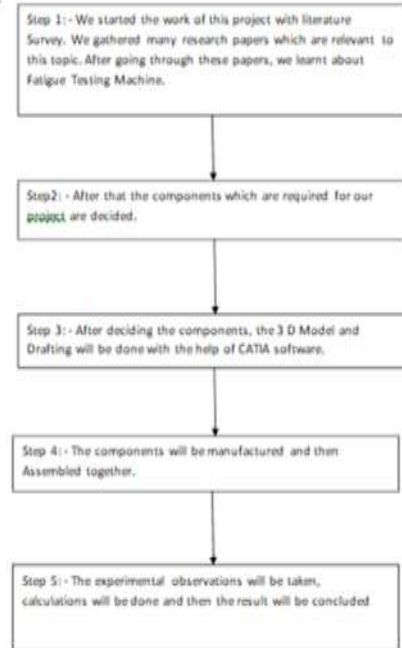
3. **Motor** - An electric motor may be a machine that converts power into energy. Most electric motors work by generating force within the variety of shaft rotation by interacting between the motor's field and current in a very wire winding. electrical energy (DC) sources, like batteries, automobiles, or rectifiers, or AC (AC) sources, like an influence grid, inverters, or electrical generators, can power electric motors. an electrical generator is mechanically admire an electrical motor, but it converts energy into electricity within the opposite way.
4. **Battery** - An electric battery could be a source of electrical power made of one or more electrochemical cells connected to the surface world to power electrical equipment. The positive terminal of A battery is that the cathode, and therefore the negative terminal is that the anode when it's supplying power. The negative terminal is that the source of electrons that may flow to the positive terminal via an external electrical circuit. A redox reaction occurs when A battery is connected to an external electric load, converting high-energy reactants to lower-energy products, and therefore the free-energy difference is provided to the external circuit as current.
5. **Solenoid Wall** – The solenoid wall in pneumatic is used to control the pressure from the compressor.
6. **Adriano Board** – A wide range of microprocessors and controllers are used in Adriano board designs. The boards have digital and analogue input/output (I/O) pins that can be used to connect to expansion boards ('shields') or breadboards (for prototyping) and other circuits. Serial communications ports, including USB on some models, are included on the boards and are also utilized to load programmer.

**Working** - The entire device is installed on a frame that moves around because of wheels and a motor. There's an Ultrasonic sensor on the system's side. The item before of the camera is detected by the sensor. (An ultrasonic sensor sends and receives one signal employing a transducer and receiver.) When an object is detected before of the system, an indication is shipped to Adriano board (which is powered by electric battery bank) which triggers the system pneumatics to boost. The prototype are lifted for 7 seconds before returning to its lower position. Pressure from the compressor

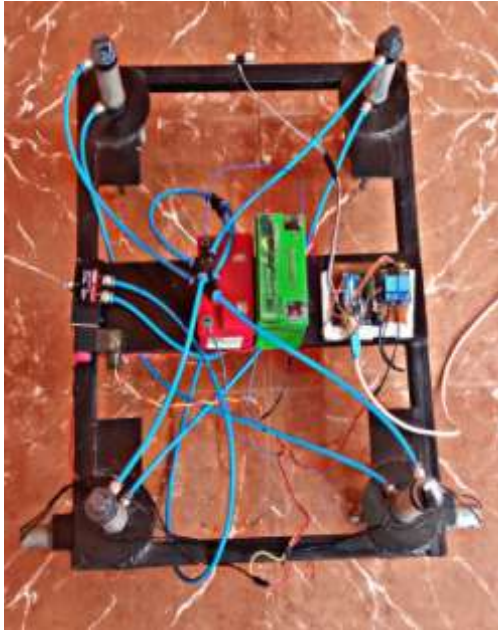
is controlled by a solenoid wall, and voltage is controlled by a two-relay system. In this way we an control the vehicle in very effective way.

### III. METHODOLOGY

#### Flow Chart



#### IV. PROTOTYPE



#### V. RESULTS AND DISCUSSION

We successfully tested the prototype and we get the desired outcomes. As the objective to fulfill the balance between the rough terrains as well as plain roads both were done successfully. We can further use the technology

- 1) We can integrate this system in military vehicles that need to travel on offroads quite often.
- 2) This system traces its use in various construction vehicles which are peculiarly subjected to rough road and cause many accidents due to obstacle hitting.
- 3) The low ground clearance vehicles can have this system to counter bumpers or speed breakers to ensure that the vehicle does not get damaged on the chassis.
- 4) This system can briefly be used on rovers that are sent to other planets like Mars rovers so that it can operate on clinging roads.

#### VI. CONCLUSION

The final product is ensured to the convenience and comfort of the driver as the driver can choose the ground clearance according to the road patch. The off-road paths and rough bad terrains can be driven smoothly with higher ground clearance and on-road like highways and city roads it can be driven with lower ground clearance. The automatic system works accordingly and the driver

gets a lot of benefits as lower ground height tends to high speeds and good stability and fuel economy increases. And higher ground clearance protects the car body from getting damaged with important components as not every car company provides an engine guard and a below bodyguard.

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