



# Live Motion Sensing and Balancing: Research Paper

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## Abstract:

This paper presents various aspects of new design for suspension system which can eliminate the damping caused by spring and hydraulic type suspension system. This new design can also be used in ships as a suspension system. And this new design of suspension system can also generate electricity. A suspension system isolates the vehicle from wheel and road vibration and absorbs most of the shock. In this paper research has been done for the new design that is **Live Motion Sensing And balancing** (Electric motor as a suspension). Various design model has been made through CAD Software like SolidWorks. Different design parameters have been reviewed

**Keywords:** Live Motion Sensing and Balancing, Suspension System, Microcontroller, Servo Motor

## Introduction:

These days because of fast development and advancement in innovation and ascend in the ways of life the quantity of car vehicles on street is likewise expanding quickly. This has prompted immense increment in energy utilization, squander creation and different issues like environmental pollution. Thus, we should discover approaches to preserve energy and non-regular sources to deliver it. As of late, EVs have picked up fame because of lower energy utilization and decreased contamination. Be that as it may, because of the inadmissible battery limit and unwavering quality, the EVs are not utilized properly. At the point when vehicle is driven on any road surfaces like steep slope, curved road, the passenger inside gets uncomfortable as he/she get thrown out in circular curve due to centripetal force and at the steep slope passenger inside experiences downward force. So, to eliminate these forces on passenger and to have a comfortable ride new design is developed which will sense the motion and position of chassis and will balance the compartment. This design is mostly effective in ships.

For the most part, a conventional suspension system contains a curl of spring and a damper. A damper is gadget which changes over the vibrations into heat and disperses it to the encompassing. This disseminated heat energy originates from the fuel energy of the vehicle. Thus, a lot of fuel energy is wasted. This lost energy can be recouped utilizing a regenerative shock absorber. A regenerative shock absorber is a device which can adequately weaken the shocks experienced by the vehicles and rather scattering the active energy from the shocks into dissipating heat energy, its damper converts it into helpful electrical energy. This valuable electrical energy can be put away in batteries for some time in the future. It can likewise be utilized to improve the damping ability of the shock absorber or to run the hardware of the vehicle to expand the eco-friendliness of the vehicle. This paper has

various sections, which review different researches on regenerative suspension system. The first section reviews the research done on the amount of energy that is dissipated from a moving vehicle. Then the next section reviews the potential of recovering the lost energy through the suspension system.

This design will eliminate the damping caused by spring type suspension. This new design is electrically operated and generates electricity at shocks. This is mostly effective in ships as there is too much instability, this design has servo motors, gyroscope sensor and microcontroller which provides two – degree of freedom suspension system. Gyroscope sensor monitors the position of vehicle continuously and gives signal to microcontroller further microcontroller gives signal to servo motor. Many regenerative suspension systems are available in market such as electromagnetic suspension, this suspension acts as a spring type suspension and also generates electricity. But this system cannot absorb small shocks, as it takes few milliseconds to respond as the signal passes through gyroscope sensor to servo motor through microcontroller.

If a ship is travelling through sea, it has no stability as it goes up and down due to sea waves and the things are unstable on deck. So, to provide stability on the deck this design can be used.

If a vehicle is climbing over steep slope, then this change is detected by gyroscopic sensor and gives signal to microcontroller and to eliminate the change in position the microcontroller gives signal to servo motor and rotates the compartment at a position where it is stable.

#### **Contributions of various researchers:**

Padraig Dowds et al. [1] investigated on Modelling and control of a suspension system for vehicle applications and gave review it. They concluded that the active suspension system facilitates significantly improved regulator response when compared to the passive suspension system. The controlling element of the active suspension system is generally based on an actuator; the main practical difficulty in implementing active suspension is the power consumption of the actuator.

Nikhil et al. [2] investigated on Control strategies and models for suspension system and gave review it. They concluded that suspension system covers a board range of design issues and challenges. As degrees of freedom goes on increasing from one degree to four, seven, eight etc. Complexity in analysis increases. While two – degree of freedom suspension system can give effective performance measurement with less complexity and simple structure.

Aniket Bharambe [3] investigated on Magnetic Suspension for Motorcycles and gave review it. They concluded that the magnetic suspension is a revolutionary idea which will provide a comfortable ride by minimizing the vibrations and other factors. It would also allow to set the suspension stiffness as per requirement. Thereby magnetic suspension will be a best substitute for current problems and providing ultimate vehicle dynamics.

#### **Conclusion:**

Suspension system is one of the most important systems to consider when designing a car. Suspension is the key to connect car chassis with the wheels and has relative motion between them.

Electric-Motor suspension will be the future trend of automotive and watercraft due to stability in abnormal roads, steep slope and sea waves, high ride quality, good handling performances, flexible force control and energy generation. The future research and development of Electric-Motor suspension should focus on three aspects. One of which is to research and develop the design in compact form with 2 degrees of freedom. And another is to build a servo motor which has high weight handling capacity. The former includes configuration design, for small shock absorption.

**References:**

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