

# Novel Automotive Double Damper Suspension System

VTIP 21-096: “Novel Automotive Double Damper Suspension System”

## THE CHALLENGE

The automotive suspension system plays a crucial role in maintaining the vehicle dynamics of the car for changes in road input and variations in the normal weight distribution. An effective suspension system ensures passenger ride comfort for unpredictable input variations and allows enough tire-road contact for proper road handling. Conventional passive suspension systems come with the inherent limitation that they cannot cater to both road-holding and ride comfort at the same time.

## OUR SOLUTION

The Taheri lab has developed a novel, hybrid Skyhook-Groundhook controllable double damper system, equipped with multiple single axis accelerometers. Semi-active control is implemented in real-time by varying the orifice diameter of the bypass valve as per the relative velocities of the different parts of the damper. Experimental results have shown that the double damper system provides superior "comfort cost" associated as compared to conventional semi-active single dampers, indicating that the double damper provides a smoother and softer ride for the same input parameters as that of a semi-active single damper.

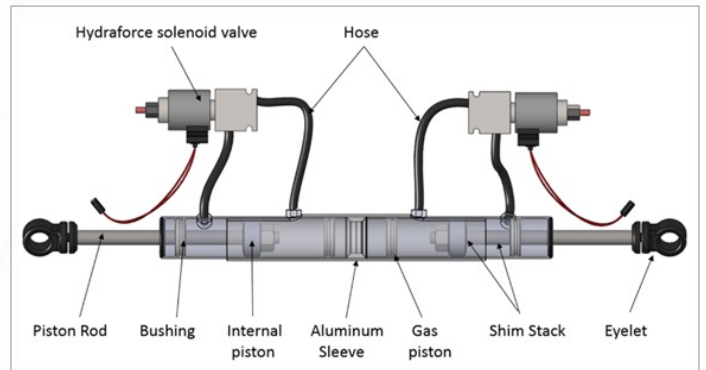
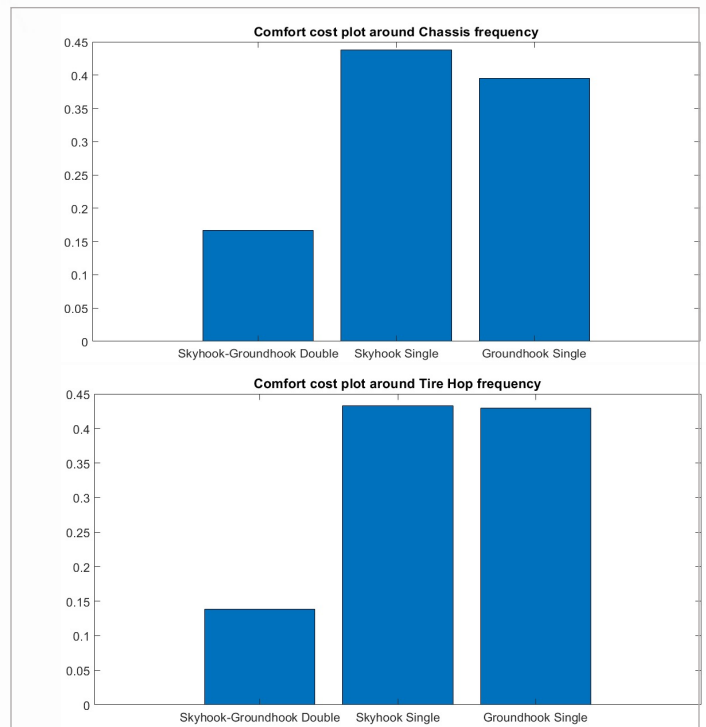


Diagram of the double damper.



Normalized comfort cost plots illustrate the Skyhook-Groundhook controlled double-damper’s superiority in terms of minimized tire hop and Chassis frequencies as compared to the traditional Skyhook and Groundhook control of single-damper.



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