



# Smart Embedded System for Continuous Monitoring of Shock Absorber Condition

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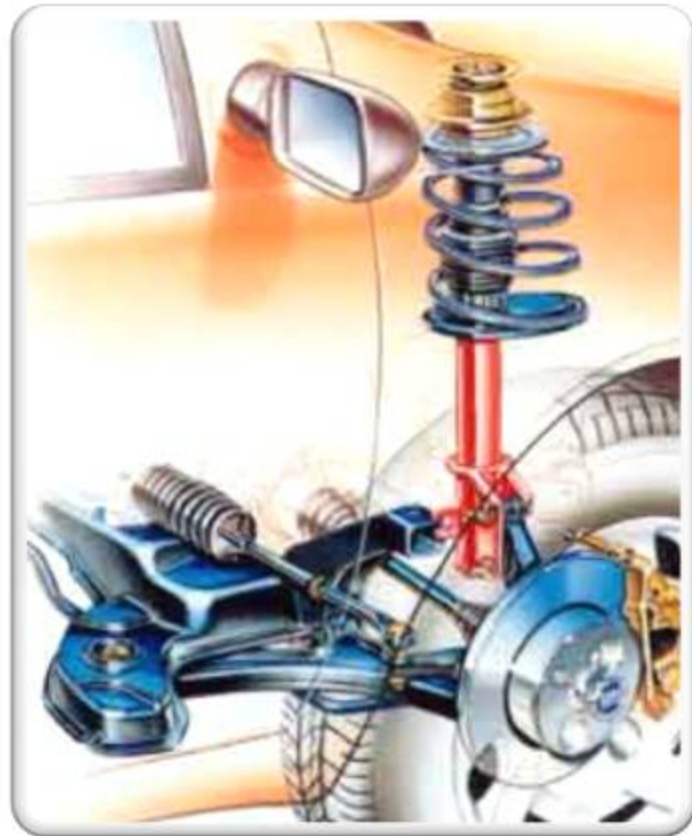
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# Presentation Outline

- **Motivation**
- **Facts**
- **Solution proposal**
- **Business Potential**
- **Project Team and Contacts**

# Motivation

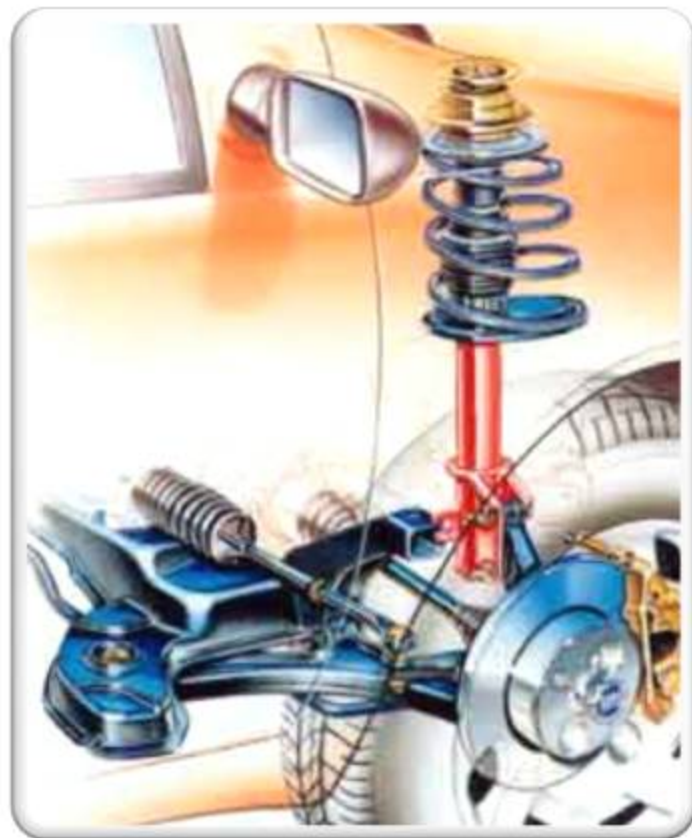


**Shock absorbers play a fundamental role in vehicle safety and drivability**

**As a mechanical device, they are subjected to progressive wear and failure.**



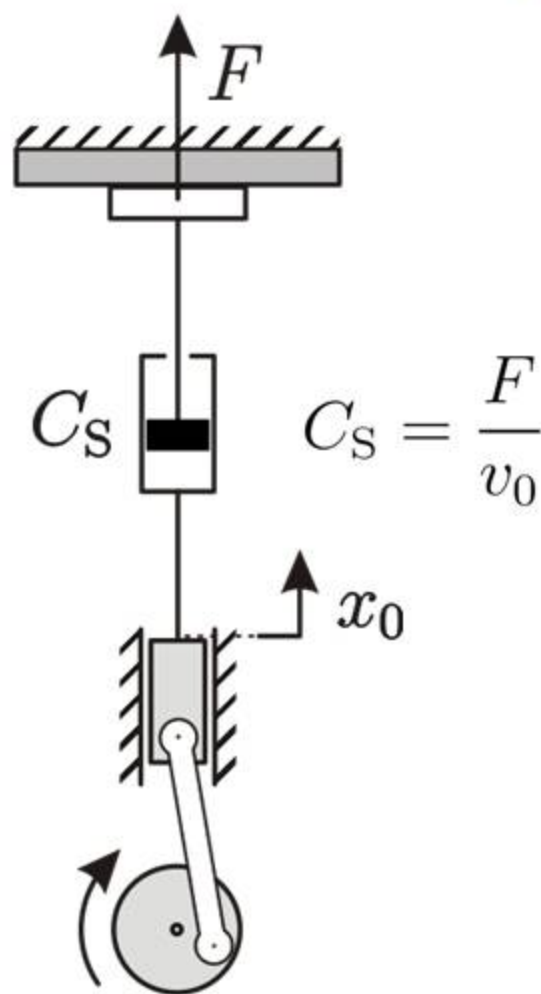
# Motivation



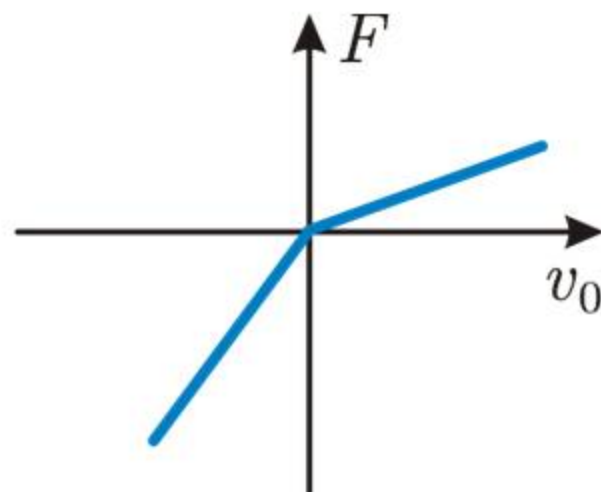
**Their condition is not easily assessed during normal car intervention or inspection**

**An automatic system that detects and alerts about shock absorber condition can be a breakthrough in vehicle safety**

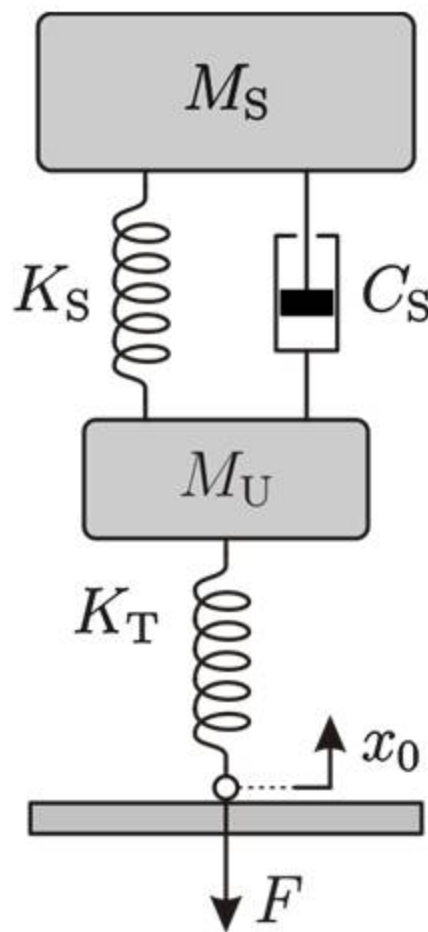
# Facts (I)



**Evaluation by removal on a workbench : COST**



## Facts (II)

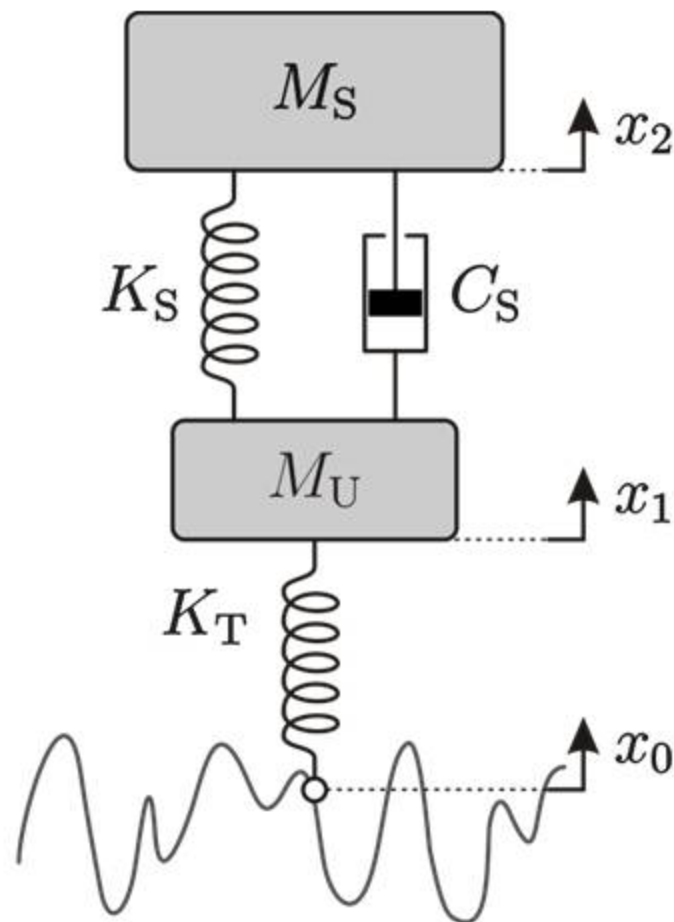


**Evaluation on IPO**

**Under known excitation conditions**

**Results by comparing both absorbers: WEAK**

## Facts (III)



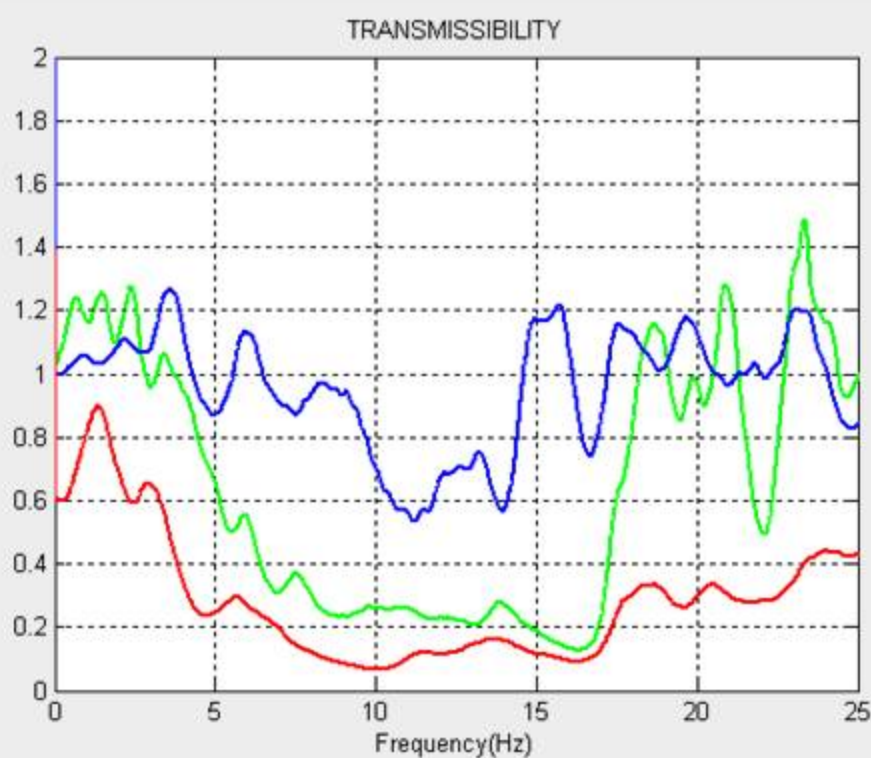
**Evaluation on the road  
during normal driving ?**

**What are the excitation  
conditions ?**

**How to measure shock  
absorber condition  
on-the-fly ?**



# Solution proposal

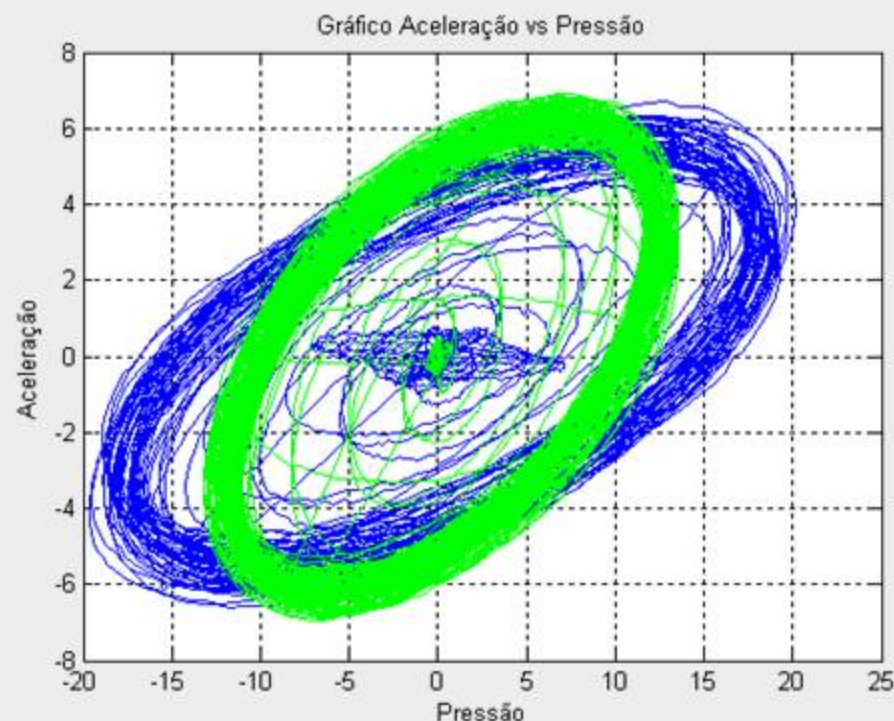


**Transmissibility between sprung and unsprung mass may give substantial information about shock absorber condition**

**However it may depends on a two point acceleration measurement ...**



# Solution proposal

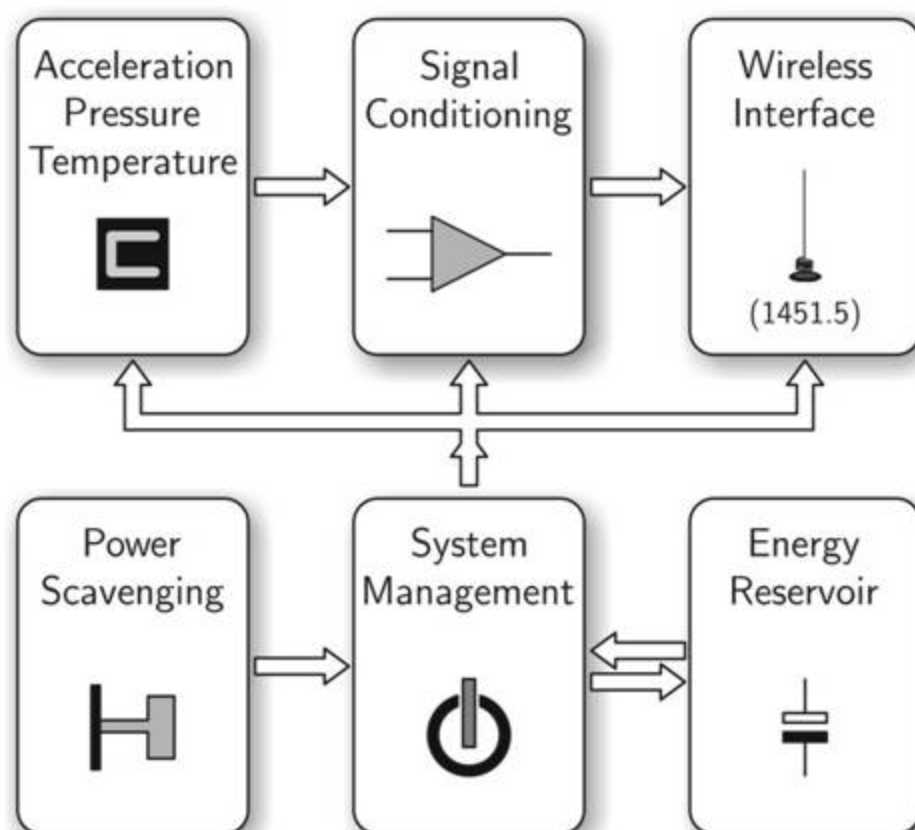


**Acceleration,  
Pressure and  
Temperature**

**measurements gives  
fundamental  
parameters that are  
used to compute the  
real condition of the  
shock absorber**

# Solution proposal

## Shock Absorber Integrated Smart Sensor



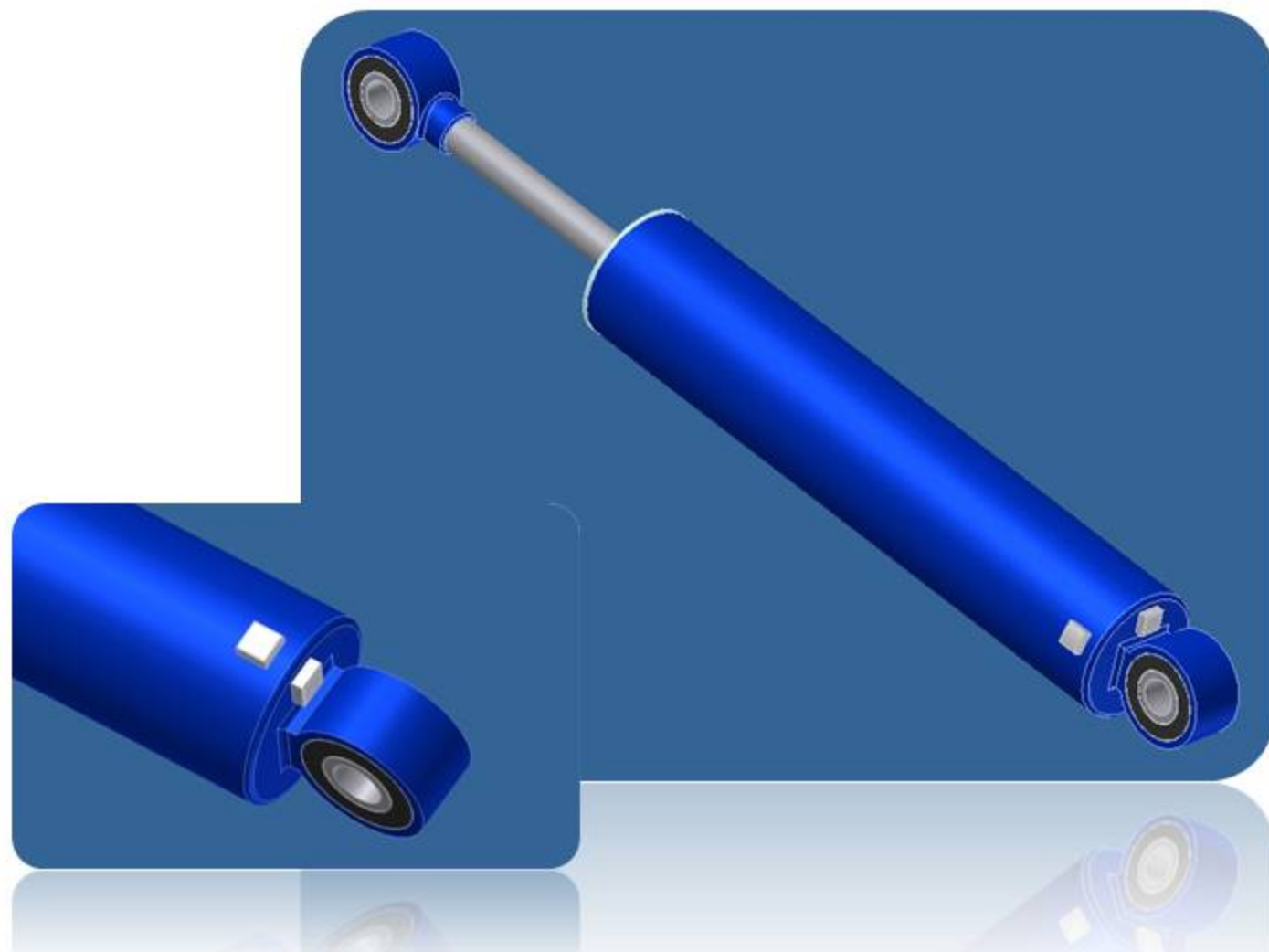
**A self-powered,  
autonomous system**

**Monitors key absorber  
parameters, and  
transmit them to a  
central diagnostic unit**

**The driver can be  
alerted when  
preprogrammed  
conditions are verified**

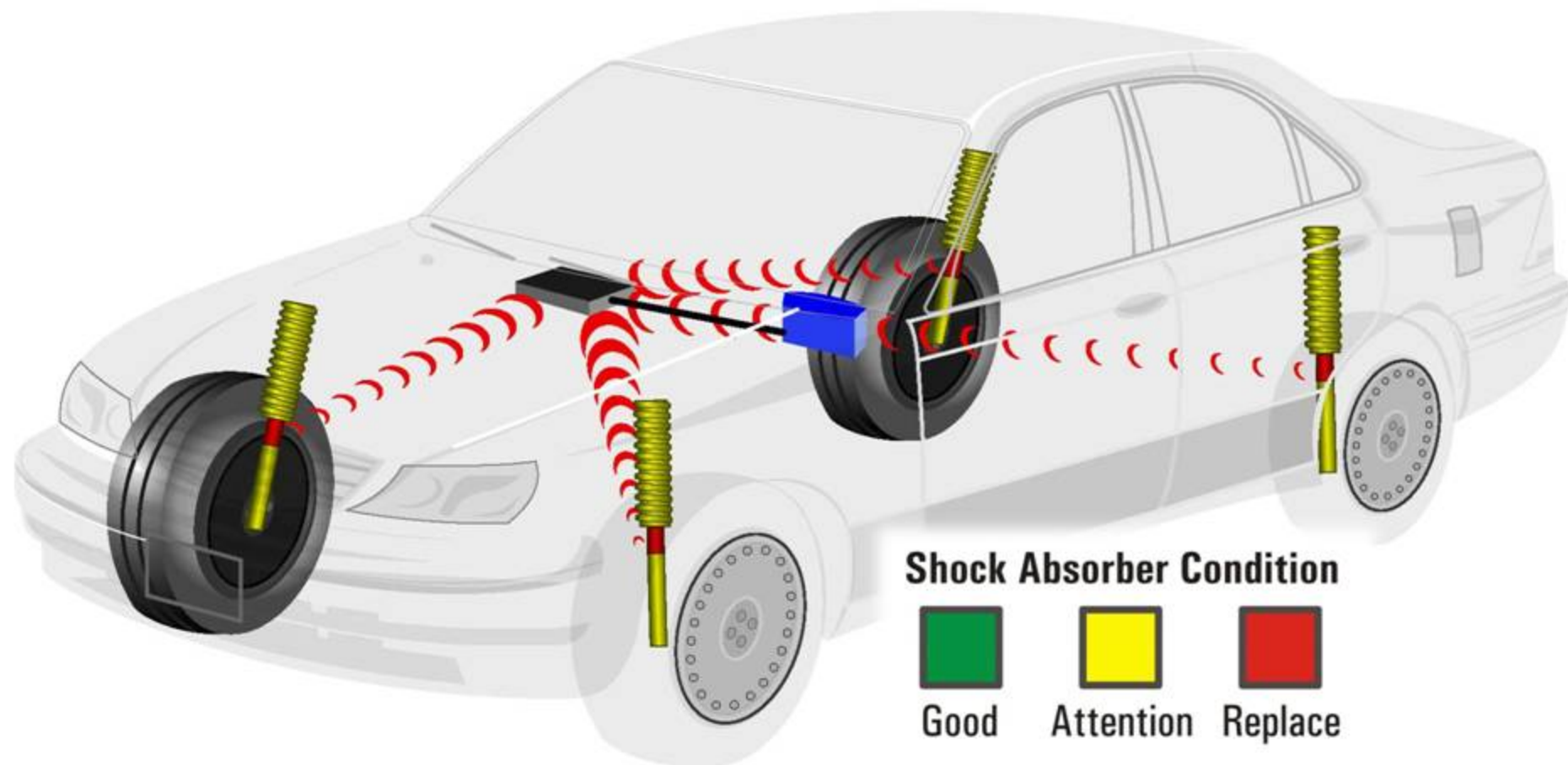
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# Solution proposal





# Solution concept



# **Business potential**

## **Key Advantages**

**Safety is a strong marketing argument in the very competitive automotive business . . .**

**Stand-alone and smart-system embedded in the shock absorber that helps to know when to replace an automotive shock absorber.**

## **Main Market**

**Vehicle industry (car makers and 3rd party suppliers).**

# Project Team

- **Raul Moraes dos Santos (Project Leader), António Valente & Manuel Cabral (UTAD)**
- **Paulo Ventura, Carlos Ferreira & Carlos Neves (ESTG- IPLeiria)**
- **OTIC/GAPI UTAD**

## Contacts

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