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## **SmartPad: a predictive wear model based on the thermal dynamics of brake pads**

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Brake pads and braking systems are among the parts of the vehicle that are harder to innovate. The extreme temperatures and pressures and the presence of dust make them an inhospitable environment for sensors and electronics. Despite these difficulties, GALT. | an ITT company managed to develop SmartPad, an innovative technology that acquires data from the braking pads. It aims to elaborate these signals and to give feedback about the status of the braking system that can be used to reduce fuel consumption, pollution and to enhance safety.

The analysis of the acquired data poses interesting statistical problems, one of which is the estimation of the remaining thickness of a pad based on its thermal dynamics. According to a simple hypothesis, the volume of the removed material in a time interval is proportional to the work caused by friction forces. Since such work is mostly converted into thermal energy, we can estimate it from the time series of the pad temperatures. Different practical implementations are discussed and experimental results are presented.

### **Keywords**

parameter estimation, wear estimation, brake pads

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