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**Timothy Chartier, Donour Sizemore and Erica Dominic\*** (erica.dominic09@kzoo.edu),  
1307 Hicks Center, Kalamazoo, MI 49006. *Interpreting Imperfect Data to Perfect Performance in a NASCAR Race.*

Perhaps more than any other sport, auto racing requires finely tuned, complex technology in order to successfully compete. Despite that, telemetric data collection from the car itself is limited during a NASCAR race, and the team must rely on qualitative assessments from the driver as to the security of the wheels on the car. During a pit stop, however, the pit crew has a few crucial seconds to replace the old tires with new ones, each of which is secured by five lug nuts tightened with a pneumatic impact wrench. The time-varying pressure of this impact wrench can be recorded. The goal of our research was to automate the process of detecting tightened lug nuts based on the pressure data from this impact wrench, and the program successfully does so by manipulating the data with a Savitzky-Golay data smoother and convolution algorithm. Thus this program offers more information about the mechanics of the car where direct measurement is impossible, and can be used in real-time during a race to make judgments concerning the car and appropriate winning strategies. (Received September 24, 2012)