CAN Newsletter Online

INCLINOMETER

J1939 tilt sensor for vehicles in motion

Prova Systems' J1939 Vehicle Inertia Monitor formulates moving vehicle pitch and roll tilt estimates. It does so using sensor fusion and vibration monitoring for vehicle prognostics.

(Photo: Fleet Genius)

The Vehicle Inertia Monitor (VIM) is a dual mode J1939 CAN vibration analyzer and vehicle attitude sensor for heavy-duty vehicle prognostics and performance monitoring. The vibration mode helps maintenance engineers plot equipment performance over time to characterize normal operating metrics. It captures and highlights subtle changes in vibration through use of high-resolution sub-Hz analysis via multi-rate signal processing. This provides indicators pointing towards degradation in equipment performance. Subsequently, preventive maintenance can be performed to improve efficiency and avoid catastrophic system failure replacement costs.

It is not a typical digital inclinometer or tilt sensor like they are common in the J1939 market: many inclinometers are intended for static environments where the vehicle is not moving and therefore generate significant pitch/roll errors when the vehicle accelerates, decelerates, or turns. The VIM incorporates advanced signal processing techniques using dynamic modeling and detected vehicle motion from the J1939 CAN communication link. This results in accurate pitch/roll estimates when the vehicle is in motion. Additionally, the inclinometer filters noise from these attitude estimates via sensor data fusion within a predictive Kalman filter to provide data results in real-time.

The inclinometer incorporates the vehicle kinematic model and Kalman filtering for real-time attitude estimates. It uses CAN parameters, MEMS sensor data and vehicle frame dimensioning. Gyroscope and accelerometer data is fused via Kalman filtering. The sensor compensates for vehicle frame longitudinal and lateral accelerations and gyroscope precession compensation supports vehicle maneuvers on inclined surfaces. Designed to support 24/7 operation the sensor communicates its data over CAN to any monitoring tool which can perform SPN monitoring and/or queries. It ships with its own PC software to enable configuration, maintenance, and real-time monitoring. It can also be used with Vehicle Spy3 or any tool that supports the J1939 protocol.

Prova Systems (US) designs and manufactures Fleet Genius fleet management SAAS software and wireless OBD-II and J1939 vehicle monitors to support trip tracking, preventive maintenance management, driver performance monitoring, fuel economy management. and vehicle diagnostics and prognostics for use in fleet management. The company focuses on OEM and aftermarket technologies that make consumer and commercial vehicles safer, more fuel efficient, and greener.

ae