Technical Article

How Diagnostics Help Your ADAS Design Achieve Higher Levels of Functional Safety

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As the automotive industry pushes toward more automated driving functions, the need for advanced driver assistance systems (ADAS) with a higher Automotive Safety Integrity Level (ASIL) increases. Until recently, ADAS equipment was mostly used to improve visibility or warn drivers of potentially dangerous situations. But now, many new cars can prevent drivers from rear-ending stopped vehicles, unintentionally drifting outside lanes, and allows drivers to maintain a safe distance from cars ahead on the street. You may recognize these ADAS functions as automated emergency brake, lane-keep assist and adaptive cruise control.

When it comes to automotive design, dealing with various types of system faults is not a new problem. However, within ADAS, the ability of a car to detect, identify, and even tolerate faults is fairly new. As cars move from automated driving level 0 to level 1 and above, many newer ADAS sensors units – especially camera modules, radar modules and fusion systems – will need some if not multiple forms of fault detection to meet the overall system safety goals for automated driving.

Diagnostics and Monitoring for Fault Detection

Equipment that's designed for higher levels of functional safety commonly will include components with specific power-supply requirements. For example, safety microcontrollers in almost all cases have one or several supply rails that must be monitored.

Fault detection blocks for safety microcontroller power can be implemented in several ways. These can vary from independent supplies and voltage supervisors and diagnostic ICs, to highly integrated solutions that can provide power as well as the protection, diagnostic, and even watchdog timer functions within a single IC.

The level of integration and component selection will not only depend on functional requirements, but also on customer specific system architecture.

Over and Under-voltage Monitoring for Higher ASIL Ratings

The ability to detect a fault, especially an overvoltage or under-voltage condition on a power supply, is critical to achieving higher ASIL and can be made possible with voltage monitoring and supervision. Whether you are designing fault detection for a small solution for a space-constrained camera, or multi-channel for a larger, complex sensor fusion system, TI offers diagnostic and monitoring products designed with system and functional safety requirements in mind. Stay tuned for the second part to this blog which will discuss diagnostic and monitoring products within the context of functional safety in greater detail.

Additional Resources

- Review the reference design, "ADAS power reference design with improved voltage supervision."
- Simplify your functional safety design process with these resources.

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