

# CHIPS IN MOTORCYCLES

MLX90371 dual disk (Hall angle position sensor)  
MLX90293 (Linear Hall sensor)  
MLX90365 (Hall angle position sensor)  
Accelerator position

MLX90817 (Pressure sensor)  
Manifold air pressure

MLX91804 (TPMS)  
Tire pressure monitoring system

MLX92242+IMC (Hall switch)  
Wheel speed (ABS)

MLX90365 (Hall angle position sensor)  
MLX90371 (Hall angle position sensor)  
Electronic throttle body

MLX92231 (Hall switch)  
MLX92241 (Hall switch)  
Tilt angle sensor

MLX80301 (BLDC motor driver)  
Fuel injection pump

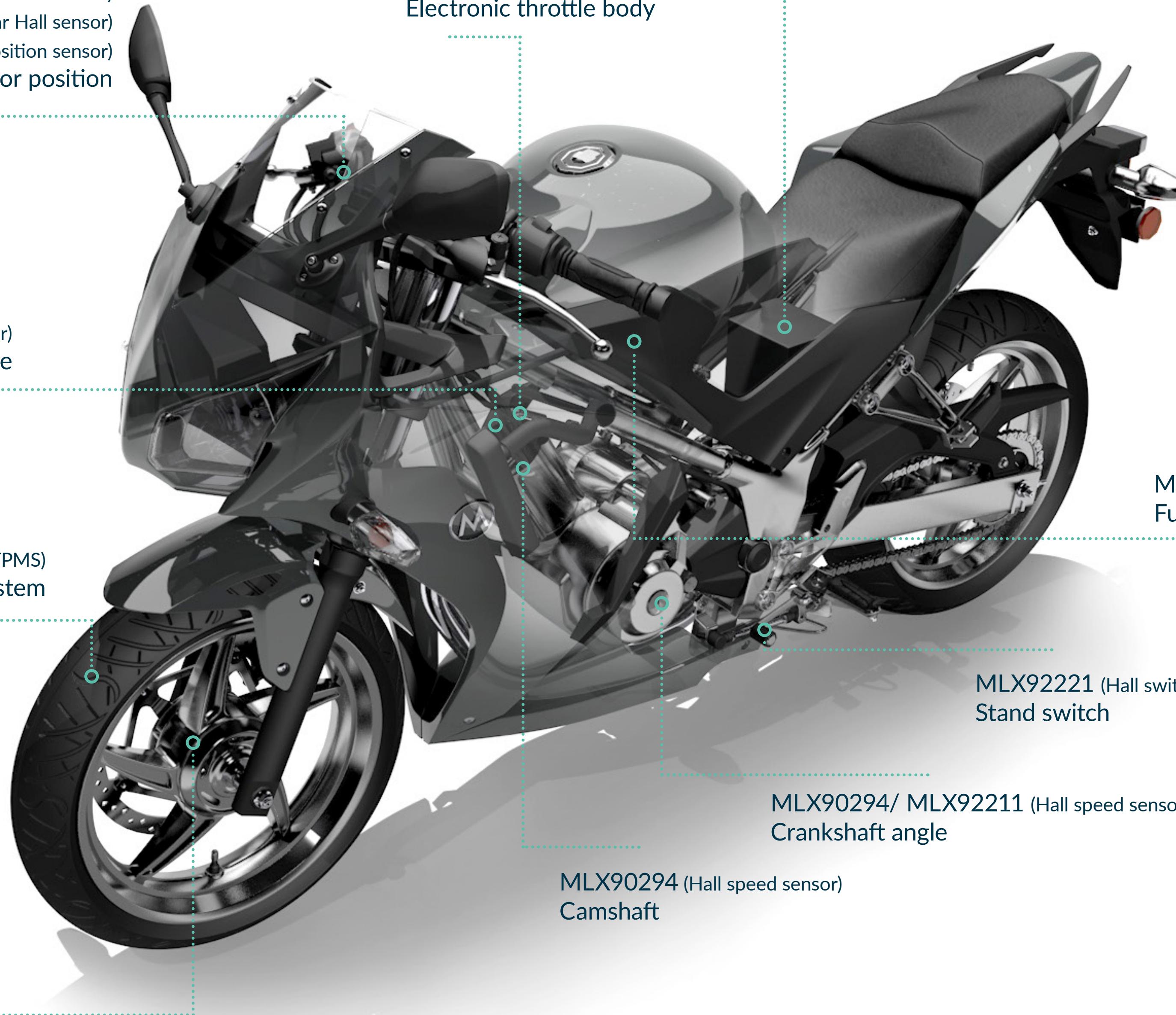
MLX92221 (Hall switch)  
Stand switch

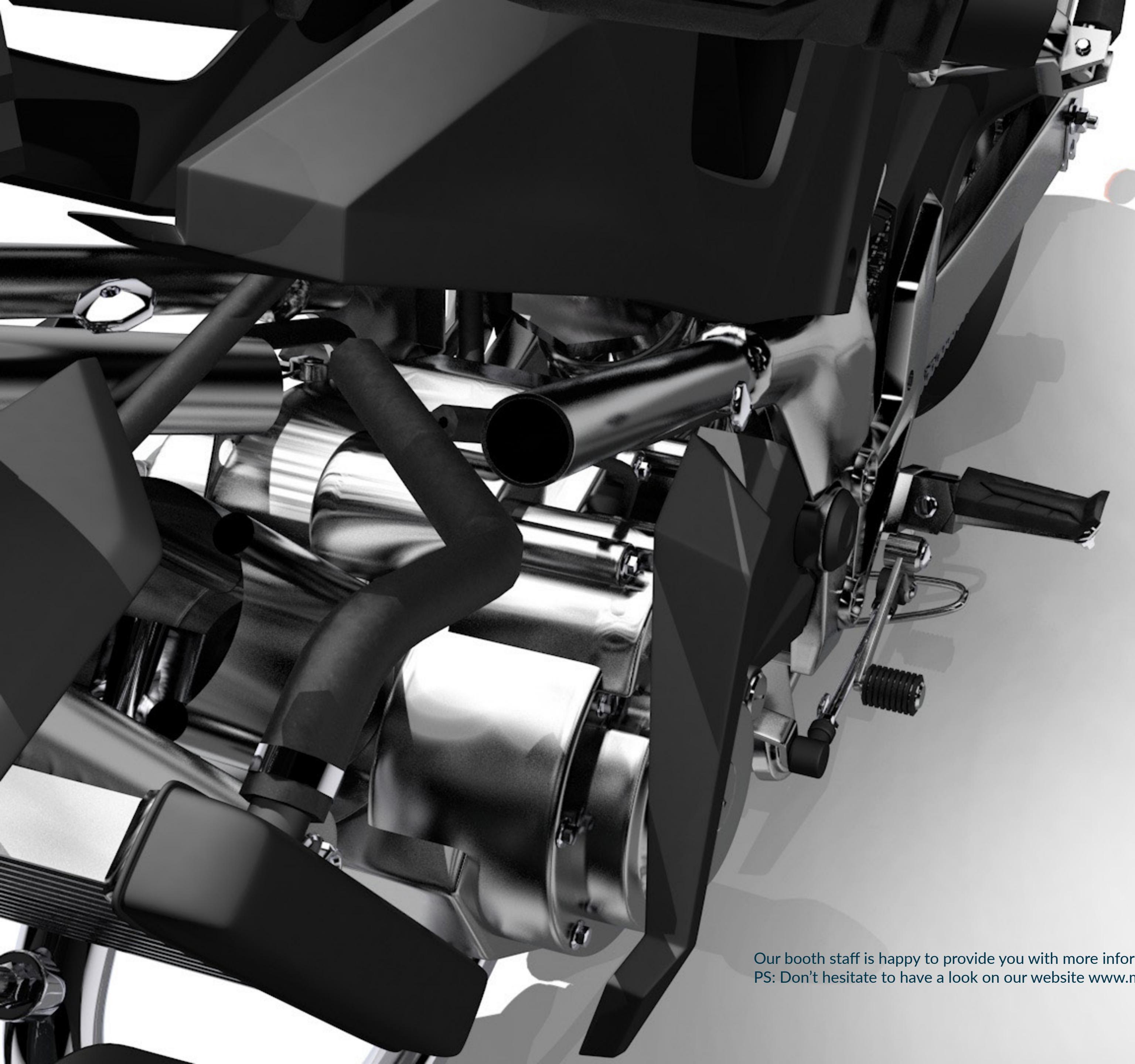
MLX90294/ MLX92211 (Hall speed sensor)  
Crankshaft angle

MLX90294 (Hall speed sensor)  
Camshaft



Touch the application  
to find out more!





## Electronic throttle body

### What is it?

A throttle body controls the amount of air let into the engine during operation and acts as the “supply” side of a throttle by wire system. An electric throttle body uses a motor (DC or BLDC) to open the air valve and the motor is controlled by an engine controller. This gives better control of the fuel/air mixture and consequently better fuel economy and emissions along with potential weight savings and easier integration as the throttle cable is no longer required.

### What is Melexis' role in it?

The electric throttle body requires a sensor to provide feedback to the engine controller as the motor is typically controlled via a PWM signal and closed loop control of the system is required. Melexis provides a wide range of suitable sensors like the MLX90365 and MLX90371 devices that offer analog, PWM, and SENT outputs along with programmable outputs to improve accuracy and set a specific output characteristic. For gasoline ETBs Melexis also offers fully redundant dual die packages that allow one output to be configured independently from the other.

### What is unique about the Melexis solution?

The Melexis sensors are based upon the Hall effect and are therefore non-contacting (no wearout), highly reliable, and immune to dust, dirt, or liquid contamination. Additionally, the space required is quite small, allowing for smaller package sizes. The PCB-less package further improves integration and reduction of system cost by eliminating the PCB from the system as well.

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## Accelerator position

### What is it?

The accelerator position sensor is the second half of the throttle by wire system (the first being the electric throttle body). The accelerator position sensor determines the amount of acceleration the driver desires and therefore constitutes the “demand” side of the throttle by wire system.

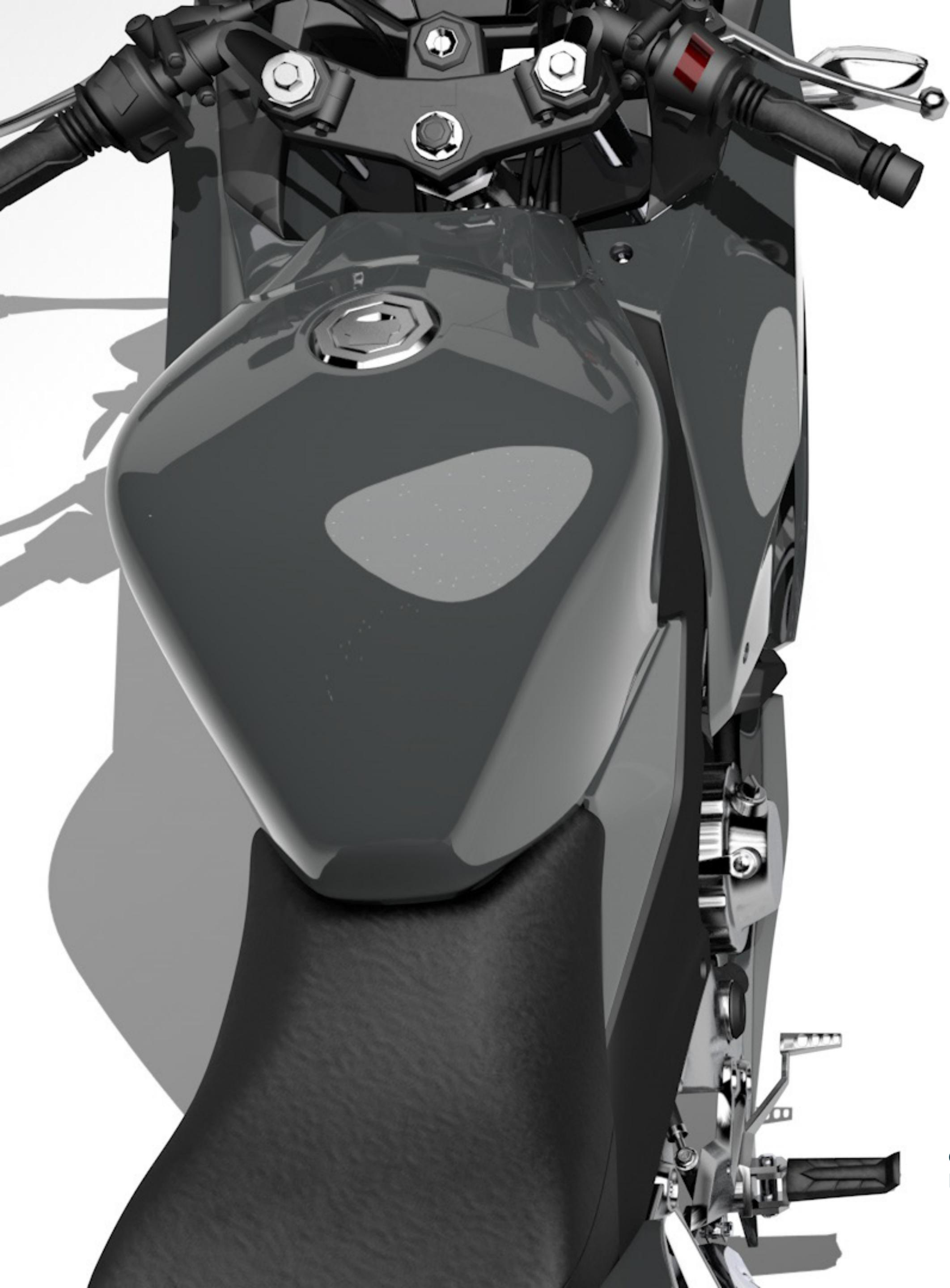
### What is Melexis' role in it?

Melexis offers many products that can meet the requirements for the accelerator position sensors. For angular sensing of on- or off-axis motion, the Triaxis family of products can be used. They are available in single and dual die packages and offer a functional safety level of B (MLX90365) or C (MLX90371). Additionally, for systems not requiring the flexibility and benefits the Triaxis parts can offer, Melexis also offers a suite of linear Hall effect sensors (MLX90293) that can be used with a ring magnet or other configuration providing a linearly changing magnetic field.

### What is unique about the Melexis solution?

The flexibility of the Melexis sensors allows for on-axis or off-axis sensing. This is especially beneficial if a solid shaft cannot be used; for example if wires need to pass through it for headlamp or turn signal switches or for lights. Additionally, the robustness to stray fields that the MLX90371 and MLX90372 devices offers means that they are much less sensitive to nearby magnets like those used for cell phone holders.

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## Tilt angle sensor

### What is it?

The tilt angle sensor detects if the motorcycle has tilted more than an allowed amount; for example if the motorcycle has fallen on its side due to an accident. The information from the switch can be used to shut off the engine and fuel pump, consequently preventing flammable fuel from spreading.

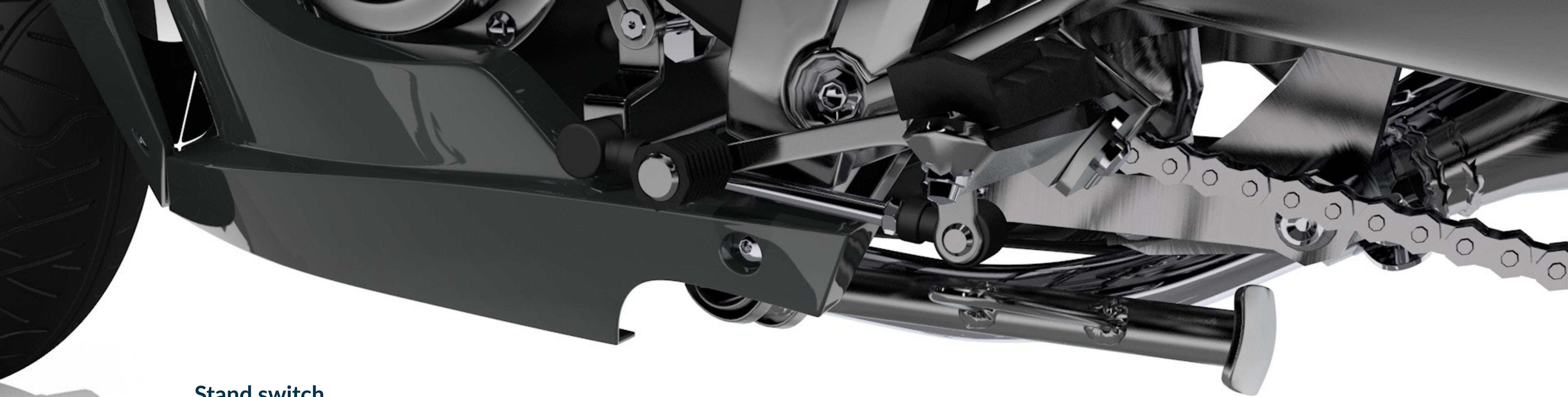
### What is Melexis' role in it?

Melexis Hall effect switches, such as the 3-wire MLX92231 and the 2-wire MLX92242 devices, can be used to detect if the motorcycle has exceeded a certain level of tilt. The sensor will detect precisely the change of the magnetic field and will trigger the ECU accordingly.

### What is unique about the Melexis solution?

Melexis offers a value optimized integrated PCB-less solution for this application, so that a compact design can be made without a PCB with an extremely high accuracy.

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## Stand switch

### What is it?

The side stand switch is a sensor that avoids accidentally starting of the engine. Side stand sensing is used to stall the motor when the side stand switch isn't in the right position.

### What is Melexis' role in it?

Melexis offers the MLX92221, a compact and accurate 2-wire latch that is used to measure the side stand switch.

### What is unique about the Melexis solution?

Melexis offers a value optimized integrated PCB-less solution for this safety critical application, ensuring a safe operation in all environments.

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## Crankshaft angle

### What is it?

The crankshaft sensor monitors the position and rotational speed of the engine crankshaft. This is used to control the fuel injection system and other parameters to ensure optimal fuel consumption and emissions.

### What is Melexis' role in it?

Melexis offers the MLX92211, a 3-wire latch for rotational speed feedback.

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## Wheel speed

### What is it?

Wheel speed provides speed information from the wheels to the ECU with a simplified design using a standard back biased magnet.

### What is Melexis' role in it?

Melexis offers the MLX92242, a 2-wire programmable switch with IMC that enables the use of a traditional low cost back biased magnet for wheel speed sensing.

### What is unique about the Melexis solution?

This is a value optimized solution where our programmability combined with our IMC technology allows you to use a standard 2-wire switch with a normal back biased magnet for this application.

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## Fuel injection pump

### What is it?

Fuel injection is basically replacing carburetors on motorcycles. The difference is that the fuel injection atomizes the fuel through a small nozzle under high pressure, improving the combustion. The main drive for electronic fuel injection is to lower emissions. Other advantages include a more dynamic fuel-air-ratio and better fuel economy.

### What is Melexis' role in it?

Fuel injection systems require a fuel pump to deliver pressurized fuel to the injectors. These can either be brushed DC or brushless DC (BLDC) pumps. BLDC pumps have better performance and reliability,

can be smaller and don't require maintenance of the brushes.

The MLX80301 offers a complete integrated system solution for 3-phase BLDC motors with RMS currents of max. 1A.

### What is unique about the Melexis solution?

The single die solution allows module miniaturization by providing integrated power FETs, a fully integrated charge pump and sensorless motor control with internal current limitation. Furthermore, the MLX80301 eliminates the need for any software development by integration of a state machine, with EEPROM configurability for system flexibility. The MLX80301 can be used as a standalone solution running the motor at full speed or with PWM input and speed feedback for speed control applications. The IC is developed for motorcycle fuel pump applications providing on-state and off-state diagnostics, is robust against ignition noise and has a fast start-up time from POR to full-speed operation.

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## TPMS

### What is it?

A tire pressure monitoring system provides the driver with real time information about pressure and temperature in the tires.

The sensor module is located in the tire and is powered by a small coin cell battery. The module is fully sealed so the battery can't be exchanged. The required sensor autonomy is up to 10 years.

### What is Melexis' role in it?

The core component of the TPMS sensor module is the sensor IC. The MLX91804 offers a highly integrated system-in-package solution which incorporates a 16-bit MCU with 16 kB FLASH memory, a MEMS pressure sensor and a dual-axis accelerometer, an energy efficient 315/433MHz wireless transmitter (supporting data rates up to 150 kbits/s) and a 125 kHz receiver for wireless communication - all this inside a robust 4x5 mm DFN14 package.

### What is unique about the Melexis solution?

The MLX91804 is the smallest TPMS sensor available on the market, with the lowest power consumption which leads to significant power savings and thus reduction of battery size. This allows for overall sensor module size and weight reduction while keeping the reach functionality and long sensor autonomy.



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## Manifold air pressure

### What is it?

The manifold air pressure sensor measures the amount of air that goes in the engine. This information is required to adjust the amount of injected fuel. With the right balance between the amount of air and fuel, a good fuel combustion can be achieved, which leads to more power and less fuel waste or CO2 emissions.

### What is Melexis' role in it?

Motorcycles are moving from carburetors to electronic fuel injection. Manifold air pressure sensors become a key device for engine management. The MLX90817 is a plug and play pressure sensor solution that can be used to measure the intake manifold pressure of the engine.

### What is unique about the Melexis solution?

The MLX90817 is the most accurate sensor on the market and offers the smallest size. Accuracy matters as it helps reducing the fuel consumption of the motorcycle and the associated CO2 emissions. Size matters as motorcycles have less space available for sensors than a passenger vehicle.



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