Do not touch!

Please, do not touch! Because that doesn't have to be the case at all. A new generation of switches for touchless switching has been developed for exactly this purpose. Switching without touching. Switching without contaminating the surface with potentially harmful germs, viruses or bacteria. How do these switches work and what are they capable of?

SCHURTER TTS: high-precision, touchless Metal Line switch in optical ToF technology (Time of Flight)

The COVID 19 pandemic has given a boost to a technology that was previously known only to insiders in specialized applications: touchless switches. This sounds confusing at first. We are used to pushing buttons. We usually hear or feel a solid click and immediately know: Well, my input has been accepted successfully. This is what we call tactile feedback in the case of pushbuttons.
Other switch technologies such as capacitive or piezoelectric systems usually only provide optical feedback. Via a point or a ring illumination. Of course, it is also conceivable to add acoustic feedback to the switches. Illumination and a signal tone, that is rock solid then. The touchless switches do the same: feedback via illumination change.

The problem

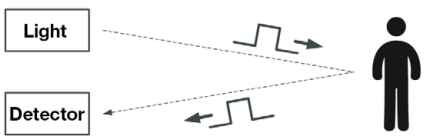
Hygiene, hygiene and hygiene again: that was the credo during the COVID 19 crisis. Pathogens can spread easily and quickly, especially in places with a high frequency of visitors. Touching contact surfaces (e.g., door handles) can transmit bacteria and viruses through smear infection. In the healthcare sector, but also in public buildings, catering or food processing areas, the risk of spread is then particularly high.

How does it work?

There are various technologies that can be used for touchless switching (see comparison table below). The use of optical IR sensors and microwave sensors is widespread. These two concepts also represent the two price poles. To describe them all in detail would go beyond the scope of this article. The basic principle of all these systems is similar to that of sonar. Instead of an acoustic signal, an optical signal is emitted, hits an object, is reflected and then detected. However, let's take a closer look at one of these systems, which may be less well known.

Time of Flight

A technology that works very precisely and quickly is called ToF. Time of Flight was introduced to the market in the 1980s. It is based on the pulse time of flight measurement of light.
Light is emitted by a transmitter and reflected by one or more objects. The reflected light beams are detected by a receiver and then the distance is determined. This technology enables highly precise settings.



Schematic representation of ToF technology: Light is emitted (diode), this hits an object (person), the light is reflected and then detected in the sensor. The distance of the object to the sensor can then be determined from this data.

Reliable and safe

False triggering can become a real problem depending on the application. Not exactly when cleaning the surface, even there the switch should not trigger of course, but perhaps in a hospital area. In use with automatic doors, where frail or severely injured people pass. ToF is very reliable here.
Another advantage of ToF is its insensitivity to colors. It does not matter whether the sensor is approached with white, red or black gloves. This has no influence on the detection. The signal is always converted with the same speed and precision. Other optical sensor technologies often have difficulty distinguishing between light and dark objects. They respond to this with different reaction times, which can lead to inaccurate triggering of the switch.

Application areas

Touchless switches are used wherever increased hygienic requirements for triggering door openings are demanded. These include hospitals with their operating room doors, laboratories and patient rooms.
But also in public restroom facilities, from door opening to triggering the toilet flush and hand wash faucet, everything can be actuated without contact. In residential and care facilities, especially for people with limited mobility, they make life a lot easier.
An interesting application is also the door opening for the service staff in the catering trade between kitchen and guest zone, where often no hand is spare. The same applies in hospitals when patients are moved.

Further advantages

Touchless switches offer a very high reliability due to the complete absence of any moving parts. Due to their enclosed design and the resulting high IP protection, they can usually be used outdoors without any problems.
A cool feature, which is rarely thought of at first, is the possible misuse as a light barrier. All you have to do is change the detection distance and you can open up countless new applications.

Potential disadvantages

However, depending on the technology used, these switches can also have problems – false triggering. An example: An insect (bee) flies directly along the sensor and triggers an impulse. Another example: when used outdoors, raindrops or snowflakes can get into the sensor area, which can also lead to unwanted triggering.
In addition to false triggering, there is another point: visually impaired people can neither recognize the distance to the switch nor whether it has triggered, if no acoustic feedback has been integrated in addition to the optical feedback.

Conclusion

Touchless switches form a new "species", which in their specific areas of application have properties that are difficult to top. We will be hearing a lot more about them.

About SCHURTER

The SCHURTER Group is a globally successful Swiss family business. With our components ensuring the clean and safe supply of power, input systems for ease of use and sophisticated overall solutions, we impress our customers with agility and excellent product and service quality.

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Reference

Datasheet TTS

		PIR	IR	Optical ToF	Ultrasonic ToF	Radar (mmWave)
Range		10cm to 5m	1cm to 0.5m	1cm to 4m	4cm to 10m	1cm to 100m
Resolution		Several cm	Few cm	Few mm	Few mm	Few mm
Field of view		Up to 180°	5° to 120°	1° to 120°	5° to 120°	5° to 160°
Integration		Requires lens	Behind IR-translucent glas/plastic	Behind IR-translucent glas/plastic	Exposure to medium (air) with membrane	Penetrates most material except metal
Environmental influences	Ambient light	No impact	No impact	No impact	No impact	No impact
	Smoke/Gas/Steam	No detection	False detection	False detection	No impact	No impact
	Temperature	Limited	No impact	No impact	No impact	No impact
Difference / unique feature		Limited detection at high temperatures Insensitive to static or slowly moving objects	Detection distance varies with different objects (acc. size, colour and texture)	Precise distance measurement and thus adjustment of the detection distance Detection distance independent of object	Can detect solid objects and transparent glass Can detect objects in smoky / gas filled environments Detection of several objects possible	Detects distance, angle and speed data Intelligent object differentiation possible Not affected by ambient conditions

Overview of different proximity technologies (Source: SCHURTER)

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