Next Generation IoT Sensor

Autonomous Mobile Robots

Omron's new B5L Series answers the need for workforce-saving solutions. Capable of measuring the distance of people and objects in real time, the 3D sensor module impacts autonomous mobile robots (AMR) used in a number of applications: delivery, logistics, moving goods, sorting and picking, fulfillment and more.

Even as they advanced, 3D sensors presented challenges. They demonstrated unstable vision in sunlight and false detection from edge noise, leading to less accuracy in AMRs. The short life span was an additional pain point.

Omron applies next-generation technology to solve these challenges in Time of Flight (ToF) sensors. With a built-in high dynamic range (HDR) function, the B5L ToF sensor performs the measurement multiple times to provide high-accuracy readings for both near and far objects. This can be disabled for high-speed operation mode, calculating the distance in a single measurement.

A 3D image displays next to a distance data image and a live view of a person walking in a warehouse. (Omron)

The B5L ToF sensor also has a built-in edge noise reduction (ENR) function capable of determining the edge location and reducing the noise associated with these edges. This allows the sensor to reliably detect objects and minimizes the likelihood of false detections. With the ENR function enabled, the ToF sensor is able to capture a crisp image for object detection at any distance or reflectivity.

Omron used its unique circuit design and heat emission design with aluminum casting and heat sink to provide a long life of approximately 5

years under continuous driving. It also prevents signal interference for up to 17 ToF Sensors. The B5L's ambient light immunity is equivalent to 100,000 lx and has high output accuracy of ±2% at 2 m.

Customers can evaluate the ToF sensor with a free software development kit (SDK) provided by Omron. For quicker and easier integration, Omron also offers a sample robot operation system 2.0 (ROS2) code recently completed as an alternative evaluation software.

Thermal Sensors

Micro-electrical-mechanical systems, or MEMS, are moving beyond their original applications for detecting human occupancy accurately and into saving energy in homes, buildings and factories.

The ability to provide steady readings without false negatives improves accuracy in reading and evaluating human presence. Omron has increased the signal-to-noise ratio (SNR) in the [D6T MEMS Thermal Sensors](#) to the highest in the world.

And by enabling touchless temperature measurements with only one connector, the D6T sensor is easy to adapt for any type of system. This advancement beyond surface mount types makes the D6T sensors plug and play for unlimited applications.

Thanks to higher accuracy, smaller footprint, and ease of use, D6T sensors are now used in applications to identify fevers, save energy, sense motion with food and beverage and vending machines, and monitor sensitive fluid levels in machines.

The Omron D6T Thermal Sensor is positioned to monitor fluid levels in a machine. (Omron)

Precision is critically important when choosing IR sensors. By default, Omron's IR sensor guarantees absolute temperature accuracy of ±1.5°C, and clients can achieve accuracy up to ±0.2°C with 2-point calibration.

Omron offers software to give customers an easy starting point interpreting raw data into useful information.

The D6T series has multiple viewing angles based on its thermopile layout: 16 (4x4), 8 (1x8) and 1 (1x1). Matrix type 4x4, instead of single pixel, is recommended for fever detection for access control.

But if clients can't quickly install and begin using the IR sensors, they can't benefit from the high accuracy. The PCB module type includes the software to convert the signal to digital temperature output, enabling easy use of the microcontroller. Because the sensors are ready to use upon installation, the client does not need to develop their own calculations.

Analytical Instruments

The newer aerial switch uses the B5W sensor for hands-free technology. (Omron)

Omron has made significant advancements in touchless sensing. Previously, detecting shiny, black or transparent objects required more work hours for development and production processes. In addition, sensing was less reliable if objects shifted.

Omron's [B5W-LB Series Light Convergent Reflective Sensor](#) has a limited projection beam and light sensing area, so it reduces work hours needed to enable sensing or shiny, black or transparent objects. It's also unaffected by backgrounds. And by using four types of toroidal lenses, the B5W-LB enables sensing when objects shift, even at minimal light levels.

These advancements have implications in automatic handwashing, soap dispensing and hand dryers, as well as vending and coffee machines. They're also used in delicate analytical instruments for test tube detection and rotation control.

The newer aerial switch uses the B5W sensor for hands-free technology, and a see-through panel for the LED display, creates a cleaner design.

Continuing Advancements

Innovations continue at a rapid pace in other components as well, including environment, MEMS and imaging.

[Environmental sensors](#) now come in an ultra-small footprint, capable of tracking and wirelessly communicating multiple factors such as: temperature, humidity, light, UV index, barometric pressure, noise, acceleration and volatile organic compounds (VOC).

[Human vision components](#) incorporate 10 different image sensing functions to recognize conditions, in both wide-angle and long-distance types depending on distance and range needs.

And [sensor evaluation boards](#) enable clients to easily implement the development of new IoT applications that expand our possibilities every day.