

Our Electronics Technologies Open Up the Future



In pursuit of new technological possibilities for the future, we progress day by day.

Development of MURATA BOY

The evolution of electronic devices entails the evolution of electronic components: they must achieve ever-higher performance and ever-greater functionality. However, it is very difficult to keep the public aware regarding the appearance and performance of electronic components, since people generally have few opportunities to directly perceive such components. To convey to many people the roles of electronic components in an easy-to-understand manner, we have developed MURATA BOY, a bicycle-riding robot incorporating Murata electronic components.

The first version of MURATA BOY was created in 1990, 16 years ago. The first MURATA BOY was a simple robot. His bicycle handle was remotely radio-controlled, and he pedaled the bicycle without falling down by keeping his balance via a built-in controller. About a dozen years later, the Company decided to create the second version of MURATA BOY, and to unveil it at CEATEC JAPAN 2005, an international exhibition of Advanced technologies, held in October 2005.

Our Technologies Continue to Evolve

Needless to say, the performance of sensors and other electronic components were much improved in comparison with the first MURATA BOY. However, the new challenge we faced was how to embody these improvements in the new version. We worked out a solution: free standing. In other words, have the bicycle-riding robot stop in place, feet on the pedals, without falling. Imagine trying to do that yourself on a stationary bicycle, and you will understand how difficult it was to realize this task.

The free-standing MURATA BOY was enabled by Murata's gyro sensors (angular velocity sensors) and technology for controlling them. While stationary, an object inevitably begins to lean either right or left. However, MURATA BOY features a gyro sensor that detects the slant angle to a precision of 0.1 degree; he can therefore maintain balance by rotating a large disk (flywheel) inside his chest. He is also equipped with another gyro sensor for detecting position. In combination with the rotary encoder installed on the front wheel, the gyro sensor can determine how far he has traveled in the horizontal direction (the direction of travel). With these sensors, MURATA BOY can precisely steer his bicycle along a path predetermined on a personal computer. Furthermore, he can easily run on a balance beam of nearly the same width as the tire of the bicycle he rides, by capturing images ahead of him with an eye camera.

MURATA BOY's components

Finds and avoids obstacles Ultrasonic Sensor

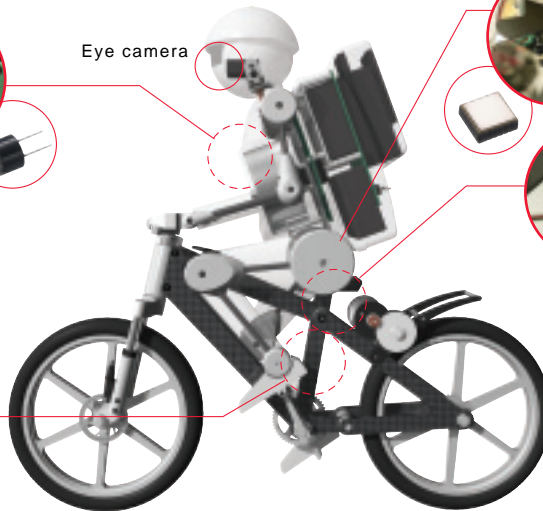
He has a second set of eyes on his chest. The right eye emits a 40kHz ultrasonic wave; his left eye receives the wave's reflection. He measures how far an obstacle is by using the time difference between emission and reception. This technology is also used for automobile backup sonar etc.



Eye camera

Senses and rides over bumps Shock Sensor

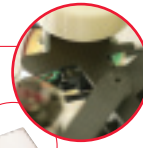
MURATA BOY's shock sensor lets him know how bumpy the road is by detecting body vibration, so that he can stabilize himself at low speed. This technology is used to protect laptop computer HDD from damage.



Advances and stops without falling Gyro Sensors (GYROSTAR®)

Position detection Detects horizontal angular velocity; in other words, how far he has turned. By combining this information with the distance traveled, he can determine his current position.

Slant detection Detects left and right slant velocity. MURATA BOY uses this information to avoid falling by steering while in motion, or by rotating a flywheel inside his chest while stationary.



Official website of MURATA BOY <http://murataboy.com/>

Sensors that Support Our Comfortable Lifestyles

The gyro sensor used in MURATA BOY to detect horizontal angular velocity has various applications. Familiar examples include compensation for digital camera shake and self-contained navigation of car navigation systems.

Among other technologies that MURATA BOY features is the ultrasonic sensor, which functions as his eyes, detecting whether or not there is an obstacle ahead, and measuring how far away it is by using the ultrasonic wave emission/reception time differential. This technology has been put to practical use as a parking assistant system incorporated into automobile bumpers. In addition, MURATA BOY employs a shock sensor to detect vibration and enable smooth running. This sensor lets him know how bumpy the road is by detecting body vibration, so that he can stabilize himself at low speed. This technology is used to detect vibration in laptop computers so as to protect the HDD.

As mentioned above, Murata's electronic components and modules are used in various types of electronic devices, and are constantly evolving as we do our part to realize a more prosperous society.

Voice



MURATA BOY Development Team members

We always take the ambitious approach, transcending departmental boundaries

Despite the differences in jobs and departments, all those involved shared the same determination to complete MURATA BOY. In the course of development, we faced many difficulties. However, by steadily performing theoretical simulations we managed to complete MURATA BOY immediately before his unveiling at CEATEC. At the CEATEC venue, MURATA BOY attracted many visitors. We were especially delighted to see the excitement of so many children watching the bicycle-riding robot, wondering why he could remain still without falling over.