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Hack: The Nintendo Wii

Technology Review looks at the inner workings of the Nintendo Wii game console.

by **Daniel Turner**

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Initially discounted by game-industry watchers as graphically underpowered compared with the Sony PlayStation 3 and Microsoft Xbox 360, the Nintendo Wii has wiped the sales floor with its competitors. In February 2007, 335,000 Wiis were sold in the U.S., versus 228,000 Xbox 360s and 127,000 PS3s. Behind the Wii's success is its unique controller: simple and wireless, it responds to your movements in a natural manner, turning into a baseball bat, a sword, or a hand, as necessary. It is, in a word, fun.



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have been around for a while, but adding the third axis presented challenges. “You have moving parts that you have to protect from the environment,” says Christophe Lemaire, a marketing manager at Analog Devices, which makes the sensor used in the Wii Remote. Most MEMS sensors come in hermetic packages made from ceramics or metals. But this increases the devices’ size and cost—a problem that the additional sensory dimension was only going to aggravate. “What we do,” says Lemaire, “is put a cap over the sensor elements at the wafer level.” That creates a hermetic cavity and enables the use of a cheap, small, lightweight case.

– Flash Movie. Do not edit.–



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Bluetooth

The Wii Remote uses a Broadcom Bluetooth chip to wirelessly send a constant stream of position, acceleration, and button-state data to the Wii console. The chip also contains a microprocessor and RAM/ROM memory for managing the Bluetooth interface and converting voltage data from the accelerometers into digitized data.

MEMS Sensor 2 (Nunchuk)

Many games on the Wii take advantage of a second controller, called the Nunchuk, which plugs into the Wii Remote. It features an analog joystick and two buttons, but it also has its own MEMS accelerometer, this one provided by STMicroelectronics. Benedetto Vigna, an STMicroelectronics physicist, says that the company’s three-dimensional accelerometer had a “really quick” development time; the

Multimedia

[View a hack of the Wii.](#)

company first met with Nintendo about the Wii in March 2005, only nine months before the product shipped. Vigna notes that there are two chips inside the 5-millimeter-by-5-millimeter-by-1.5-millimeter plastic package—the accelerometer and another chip that translates the tiny wiggles of the sensor into voltage. As in the Wii Remote, the voltage readings are then translated into



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the Wii comes with a “sensor bar,” to be placed at the top or bottom of the screen. The bar sends out an infrared signal, which is picked up by detectors at the front of the Wii Remote. The Remote uses distance and angle information to triangulate its location, which it sends, along with acceleration data, to the console.

Wi-Fi

Nintendo saw the value of adding Wi-Fi wireless connectivity to its popular DS handheld gaming device, which allowed users to play against others wirelessly, so it did the same with the Wii. If you have an Internet connection, you can use the Wii to surf the Web or access information hosted on Nintendo’s servers, such as weather and news. Developers have said there will be Wii games that offer online play, though as of this writing only one—a Pokémon title—has been released. **T**

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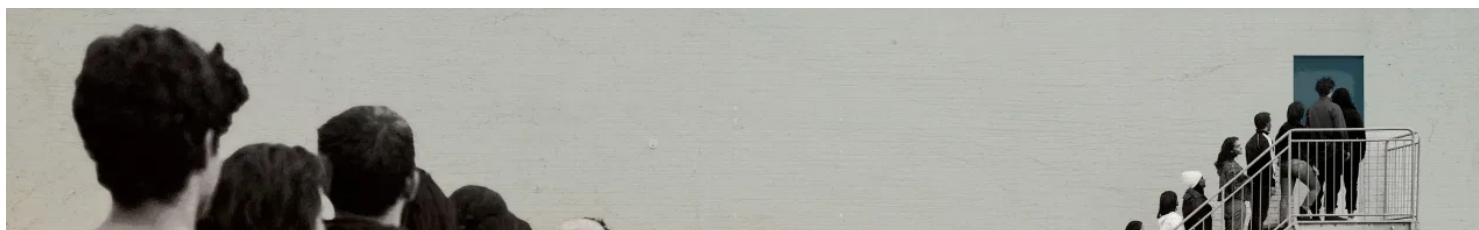
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Pandemic Technology Project May 25

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