

Nintendo WiiMote

The Nintendo WiiMote (short for Wii Remote) is a controller for the Nintendo Wii. In addition to the traditional sets of buttons, it was the first of the “motion controllers,” intended to change how video games are played by allowing the console to interpret movement of the remote and utilize it for game input. While intended to serve as a game controller, the WiiMote offers some incredible opportunities for educators.

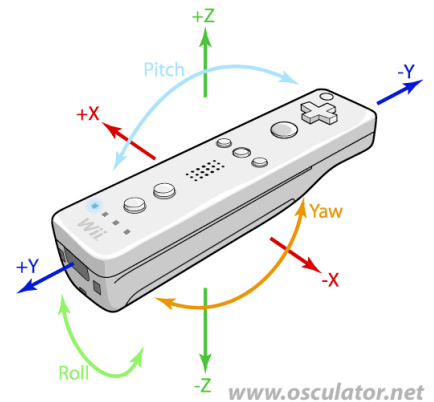


Bluetooth Connectivity

The WiiMote uses bluetooth to communicate with a paired Nintendo console - but it can also be used to connect the WiiMote with any bluetooth-equipped computer. When used with an appropriate software driver we can communicate with the WiiMote, allowing us to receive its many inputs, and use its built-in speaker, vibration generator, and lights.

Accelerometer

The WiiMote uses a three-axis accelerometer, much like those found in cell phones, to measure acceleration along three axes: the Y axis is aligned with the longest dimension of the WiiMote, the X axis runs side-to-side, and the Z axis runs up-and-down. An improved version - the WiiMotion Plus or WiiMote plus, adds a tuning fork gyroscope for better accuracy.



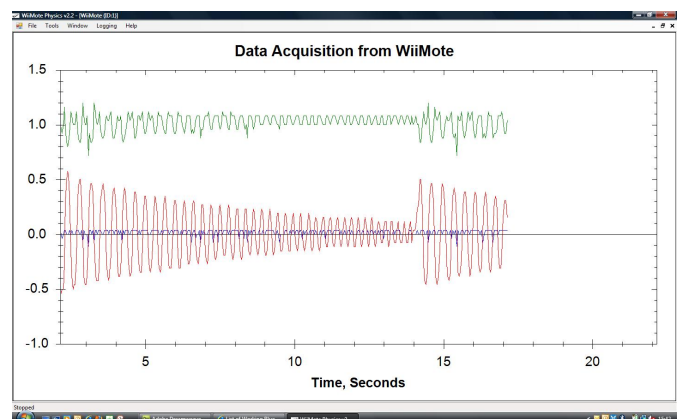
Infrared Camera

The WiiMote also sports a 128x96 pixel monochrome camera that is filtered to accept only infrared light. This camera faces out of the front of the WiiMote, and is used in conjunction with a “sensor bar” that supplies two infrared light sources. The Wii uses the captured images from the camera to perform triangulation and determine where the WiiMote is pointed. The sensor bar supplies infrared light from LEDs, but any two infrared light sources (light bulbs, candles, etc) will work reasonably well.

WiiMote Physics

WiiMote Physics is a Windows application developed by Martyn Wheeler that performs real-time graphing of a WiiMote’s streaming accelerometer data. You can see each of the three-axis’s readings in the screenshot to the left. In addition to a real-time display, WiiMote Physics can also capture the same data and save it to a CSV or Excel file.

WiiMote Physics is an extremely useful tool for teaching physics. The real-time



streaming display provides both a clear and immediate visualization of acceleration imparted on the WiiMote - helping to establish the relationship between the two that is difficult to grasp in the abstract. In addition, the ability to act as a data logger allows for accurate data collection.

In K-State's INSIGHT program we have had great success working with WiiMotes in multiple grade levels and subjects. We've used them to teach basic motion principles, including pendulum motion (by tying a string to a WiiMote and turning it into a pendulum) and centrifugal acceleration (by tying a WiiMote to a spinning bicycle wheel). We've also used them in conjunction with "rubberband racers" as well as to measure acceleration on impact in "egg drop" activities and crash simulations. A WiiMote provides for interesting hands-on physics activities.

Cost and Availability

As a mass-manufactured videogame accessory, WiiMotes are surprisingly affordable, starting around \$20 for a standard WiiMote and \$35 for a WiiMote Plus. They are powered by two AA batteries.

If your computer is not equipped with Bluetooth, you will also need a bluetooth USB dongle, which costs about \$10.

WiiMote Physics itself is released under the Microsoft Public License, which means the software is free to use and modify. An installer, binary releases, and the source code are available from the project site: <http://wiimotephysics.codeplex.com>. In addition, the WiiMote Physics homepage: <http://wiiphysics.site88.net> offers advice on getting your WiiMotes connected and suggestions for physics experiments.

References

Wheeler, M. (2010). WiiMote Physics. Retrieved From <http://wiiphysics.site88.net>

Wheeler, M. (2010). WiiMote Physics. *Codeplex Open Source Community*. Retrieved from <http://wiimotephysics.codeplex.com/>

WiiMotes (2012). Retrieved March 4, 2012 from the WiiBrew Wiki: <http://wiibrew.org/wiki/Wiimote>

