

Kinetic Space

Matthias Wölfel

The Kinetic Space provides a tool that allows everybody to record and automatically recognize customized gestures using depth images as provided by the Kinect sensors. The software observes and comprehends the user interaction by processing the skeleton of the user. The unique analysis routines allow to not only detect simple gestures such as pushing, clicking, forming a circle or waving, but also to recognize more complicated gestures as, for instance, used in dance performances or sign language. In addition it provides a visual feedback (see right image of Figure 1) how good individual body parts resemble a given gesture.

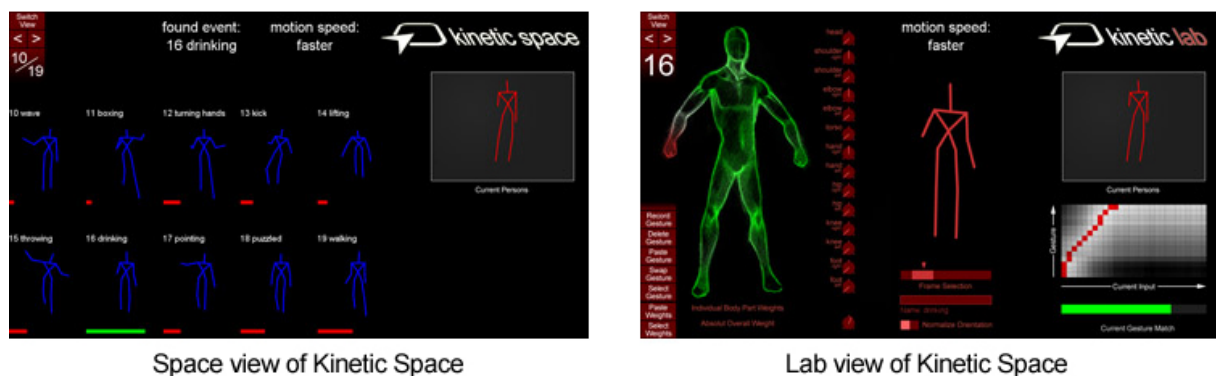


Figure 1: Two different views of Kinetic Space

The first version of the software has been published in July 2011 and has been, to the best of our knowledge, the first toolkit for recognizing user-defined gestures with the Kinect sensor. The current version can be either downloaded from the OpenNI Arena, <http://arena.openni.org>, where it is ranked as the most popular software out of 70 applications for depth sensors (web page accessed 3. October 2012) or Google Code, <http://kineticspace.googlecode.com>, with more than 6000 downloads in total.

The toolkit has already been used by interaction designers, game developers, media artists, dancers and alike to connect and to control a wide range of third party applications/software such as Max/MSP, Pure Data, VVVV, Resolume, etc. via the OSC protocol, to control presentation software such as PowerPoint via a keyboard emulation or to integrate the toolkit in other software projects. Besides the more obvious applications we want to mention a couple of use cases which we find particular interesting: The artist Chico MacMurtrie used Kinetic Space to determine poses in order to respond with appropriate poses of human-like machines. Paul Stoffregen used Kinetic Space to control pyrotechnics in a heavy-metal installation and Elke Reinhuber used the toolkit to realize an interactive movie, where the plot is affected as a function of conscious and unconscious gestures of the audience.

The software is written in Processing and can either use SimpleOpenNI, OpenNI and NITE or Microsofts Kinect SDK for Windows to connect to the Kinect sensor.

For those seeking a deeper understanding of the program should refer to special issue of the Journal of Machine Learning Research (JMLR) on gesture recognition.

The highlights of the software at a glance

- gestures can be easily trained: the user can simply train the system by recording the movement/gesture to be detected without having to write a single line of code
- gestures are person independent: the system can be trained by one person and used by others
- gestures are orientation independent: the system can recognize gestures even if the trained and tested gesture does not have the same orientations
- gestures are speed independent: the system is able to recognize the gesture also if it is performed faster or slower compared to the training and is able to provide this information
- gestures can be adjusted: the gesture configuration can be fully controlled by a graphical interface
- gestures can be analyzed: the current input data can be compared with a particular gesture; feedback of the similarity between the gestures is given for every body part
- gestures are independent of the used driver, you can use either OpenNI or Microsoft Kinect SDK

What the Press is Saying

For all of you that found yourselves wanting to use Kinect to control something but had no idea what to do with it, or how to get the data from it, you're in luck. Kineticspace is a tool available for Linux/mac/windows that gives you the tools necessary to set up gesture controls quickly and easily. [...]

- Hack a Day 2012/06/11

[...] What is it good for? Well, it can read a gesture from one person and register it on another and you can train it to register tiny movements and, potentially, allow for full motion control of your PC. Minority Report it isn't, but that future is getting closer and closer.

- Tech Crunch 2011/08/05

Map your gestures and have it ready for other people to use and make reference of. The Kinect Spaces is a gesture recognition and mapping software that gives programmers a reliable tool in creating and saving gestures via Kinect for their software use. This video by Matthias Wölfel shows us the nitty-gritty details of the program as well as how the Kinect Space can prove to be valuable to all Kinect hackers out there. [...] This is indeed a great addition in further enhancing the Kinect controls!

- Kinect Hacks 2011/07/21