As Handimation is a novel approach to computer animation that addresses the current bottleneck in the industry regarding collaboration and use of acting skills. The system allows an animator to record and playback animations in real-time using a sequence-based interface and inexpensive input devices. Handimation was designed by a professional animator to accelerate the process of creating animations. One goal was to be able to produce a two-minute film in one day, assuming the script was written, dialogue was recorded, and sets were created in advance. Another goal was to let animators create in real-time the movements of virtual characters while watching their performance on a sequencer metaphor was born. Seeing animators perform gave rise to the idea to incorporate input from various devices since different devices, e.g. physical marionettes with sensors, are better suited for different types of performances.

**DEVELOPMENT**

Handimation is a general connection interface that links input from different input devices to different virtual 3D objects. The prototype is built in 3DVIA Virtools, a complete development and deployment platform with an innovative approach to interactive 3D content creation. Each virtual character can execute input in real-time as input moves. A virtual representation is recorded in a 3DVIA Virtools Nano-form format. A sequencer-based interface is overlaid on the animation providing record and replay functionality through data tracks. The interface can be hidden so as to be able to use the entire screen to visualize feedback when animating. The virtual version of Handimation enables more tangible interactions. The enhancements make it possible to have more expressive interactions and support for a broader range of interaction devices. In this way animators can make use of a larger set of traditional crafts such as puppeteering. To create an affordable solution for novel input devices, support for the Nintendo Wii remote has been added through a 3DVIA Virtools plug-in. The Wii remote delivers 3D accelerometer sensing and several buttons as well as 2D movement, providing a flexible input source with a high level of granularity. The tangible extension of Handimation makes support for multiple user collaboration possible since multiple animators can animate the same character by controlling different parts. For example, one person can control the head and face while another walks and makes the body strike different poses. While this can result in quicker animations of individual characters another possibility is to let each animator control an individual character in real-time and the different animations interact with one another through their characters.

**POSITIVE INDUSTRY FEEDBACK**

Handimation with tangible support was presented to the industry during a workshop held in collaboration with Center of Visualization Göteborg (a regional organization promoting visualization), SVT (the national Swedish broadcast company), and Zink Animation, a regional animation that has co-produced films like Cancer in the Dark and Droplets. Professional animators attending the event gave very positive feedback, noting that they quickly got the feel of the system. Furthermore, they saw it as a way to bridge gaps in animation with traditional puppeteering, which would make it easier to find more animators. They also believed it made the process more democratic between the different skills involved. The system also sparked novel ideas on how animation can be used: the animators discussed new real-time performances and animating all types of objects, not only anthropomorphic ones.

As a final test of the software’s productivity, Zink Animation set out to use the system in a real production. In Autumn of 2008 they were commissioned to produce a music video for the singer Duncan Sheik. In all the computer generated scenes Handimation was used to animate the characters and the video was produced in less than three days. The finished video can be seen at http://blogs.usatoday.com/popcandy/2009/01/exclusive-duanca.html.

**CONCLUSION**

Anders Svensson sums up his experience, "3DVIA Virtools has been an excellent tool in the conceptualization and development of Handimation. It has enabled us to shift focus from the most common bottlenecks of animation production to the essential parts of development. 3DVIA Virtools helped create synergy when formulating our ideas and helped us avoid the drawbacks of developing an in-house graphics engine."