

## **The Interactive Surface System: Concept and Development**

M.M.D. Maduranga and R.W.V.P.C. Rajapaksha  
*Uva Wellassa University, Badulla, Sri Lanka*

### **Introduction**

In the present digital era, the integration of natural interfaces between humans and machines is becoming more important than before. This is particularly relevant to education and business domains as the utilization of interactive tools can provide clear advantages by improving teaching practices, facilitating the comprehension of complex concepts and permitting collaborative work etc. More particularly, interactive whiteboards are gaining importance in our society, both at a business level and, especially, at educational level. However, the products offered by the major manufacturers have a major barrier to their acquisition: very high prices. There is an urgent need to use new technologies in order to provide solutions that present the same performance levels than typical interactive whiteboards, but with a significantly reduced cost.

Major drawback of projection screen is that the presenter should come to the computer to change the projected screen. This usually distracts the presenter's as well as audience's focus. While the presenter is at the computer he/she cannot simultaneously use the white board. The interactive surface system gives the solution for that drawback.

### **Methodology**

The interactive surface system is a system for controlling the computer remotely. This system can be used mainly in class room, lecture room, and any other place where projector is used to discuss or teach something. Design of the system is based on assigning mouse functions to finger movements. Without using mouse, user can control projected screen in front of the web cam. The main challenge of this method is environment brightness and quality of the web cam. If user can find high quality web cam and good lighting environment this system works properly.

The proposed system is based on the Open Source Computer Vision (OpenCV) library and some of the image processing techniques such as Thresholding, RGB and HSV color space etc. The system control is based on a webcam, based on color, which supports most of the mouse events such as mouse pointer movements, single click, double click.

Similar systems such as "Smart Board" have been deployed. The Smart Board is an interactive whiteboard that uses touch detection for user input – e.g. scrolling, right mouse-click – in the same way normal PC input devices, such as a mouse or keyboard, detect input. A projector is used to display a computer's video output on the interactive whiteboard, which then acts as a large touch screen.

### **Discussion and conclusions**

There are many advantages of using this proposed system. Firstly, the cost of this system is much lower than the existing interactive systems, because there is no much expensive equipment needed in the system as in the similar existing systems. Secondly, the key components of the system are webcam, computer and a projector. Computer and the projector are already installed in most universities/company discussion rooms and educational classes so we can easily upgrade the existing systems to the proposed

interactive system. Thirdly, for the same reason, this system is more portable than the other systems. Fourthly, there is no theoretical limit in the size of the projected image so we can use the proposed system for size and dimensions that most of the existing interactive systems cannot act. In many interactive systems, the size of image is related to size of display that is used in that system.

Having most of the advantages, this system also may have some disadvantages too; if brightness of environment is too high, the system will not operate very well and if there is an obstacle between finger and the camera, system will not be able to receive user's instructions, which is occlusion problem.

In future we can extend this system as a fully remote controlled system for the computer. From this kind of an improvement the user of the system needs to wear multiple color clips in hand and all function in computer can be handled remotely.

### **References**

- Andrew, D.W., 2004 TouchLight: an imaging touch screen and display for gesture-based interaction, in Proceedings of the 6th international conference on Multimodal interfaces., ACM: State College, PA, USA.
- Jun, R., 2002, "SmartSkin: an infrastructure for freehand manipulation on interactive surfaces," in Proceedings of the SIGCHI conference on Human factors in computing systems: Changing our world, changing ourselves. ACM: Minneapolis, Minnesota, USA.
- Kennewell, S. 2001 Interactive whiteboards – yet another solution looking for a problem to solve? *Information Technology in Teacher Education*, 39:3-6.