Robust Gloves For 3D Interaction In Mobile Outdoor AR Environments

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This poster describes the design of hand-worn gloves for interacting with mobile outdoor augmented reality systems. Most existing systems rely on more traditional 2D input devices such as mice and keyboards. Since augmented reality information is typically registered in 3D to the environment, user input devices need to be designed that are capable of supporting the more complex operations possible.

We use metallic thread and adhesive fabric to add conduction sensing to a standard set of leather gloves. Since the metallic thread is sewn into the seams in the gloves, it is protected from harsh treatment and is more reliable than externally mounted wires. A small low-powered MSP430F1232 microcontroller senses finger presses and consumes negligible power. A Promi-SD202 Bluetooth controller makes the gloves fully wireless, making them easy to wear and with no cables to interfere with operation. ARToolKit with a randomised thresholding algorithm is used for reasonably reliable 3D tracking of fiducial markers on the thumbs, and uses the existing video camera on the helmet.

Our Tinmith 2006 outdoor augmented reality system uses these gloves, a novel menu-based user interface, and our action and construction at a distance techniques to implement a modelling system capable of building shapes of buildings, trees, automobiles, and other outdoor structures.

Fig 1 - Tinmith 2006 outdoor augmented reality system in use outdoors, showing the gloves in use

Fig 2 - Modelling system in use outdoors, with (1) the gloves manipulating a newly created tree, (2) marking out feature points on a new building, and (3) manipulating pre-fabricated objects

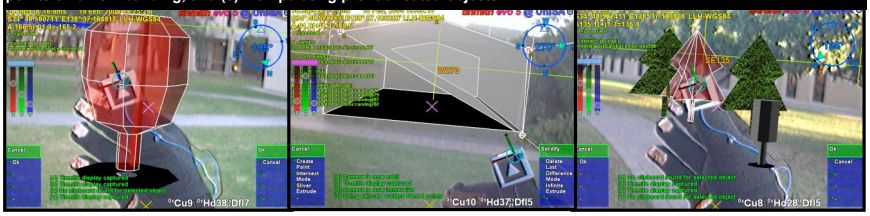


Fig 3 – Top view of the left glove, showing attached fiducial marker and glove controller circuit; Bottom view of the right glove, showing conductive pads. The wires are sewn into the seams in the fabric and are not visible.

Fig 4 – Augmented reality view, showing cursor overlaid onto the right thumb, and gloves about to be used to manipulate the virtual rendered 3D cat

Fig 5 – Top View Showing MSP430, Promi-SD202, voltage regulators, and various other glue components

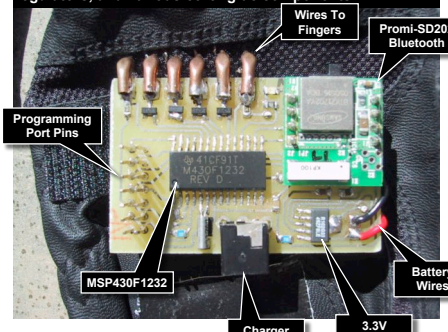


Fig 6 – Side view showing various layers, including the Bluetooth interface, main PCB, and the Li-Poly battery

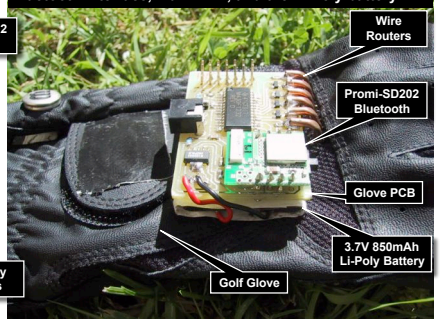
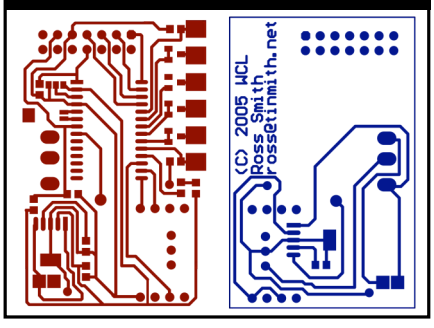


Fig 7 – Electronic schematic of the glove controller circuit



More Info at http://www.tinmith.net and http://wearables.unisa.edu.au

Please visit the Tinmith and Wearable Computer Lab web sites to find out more information about this project, as well as other interesting projects currently in progress.