Development Of Computer Pointing Device Evaluation System For People With Disability

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INTRODUCTION

Researchers believed that people with disability were difficult to manipulate conventional computer pointing devices. People could accomplish the same computer task by many ways, and practioner could not interpret hand function from the point view of disabled person. That were difficult to evaluate disabled person which device suit for them. This research provided a sytem use a common “cut-paste” task and adapted buttons to evaluate operation time as performance for disabled person. One invitee evaluate by this system and found a coventional mouse with separate buttons can reduce time, especially in fine movement stage.

METHODS

These systems contained three components: adapted buttons, software emulated mouse buttons, and a panel to analyze captured signal.

Adapted buttons connecting with a data acquisition card (National Instrument DAQ card 6024E) were fixed on the desktop. System written with LabVIEW record all buttons pressed and released. Software emulated four mouse button functions: left click, left double click, drag and right click. There were three types of buttons patterns: one button scan these four functions, two buttons as left key and right key, separated four function to four buttons.

Software showed a window for participants to complete a task. Windows shows a string “456123”, participants should select, drag and cut “123” and paste before the “456”. Software recorded mouse events (Double click, Move, Drag, Cut, Insert, Paste) during “Cut-Paste” task for analysis: buttons patterns, mouse move, buttons press and release with time. Researcher could easily find the boundary of every subtask: select, drag, cut and paste. Researcher could get each time to compare with each other.[1]

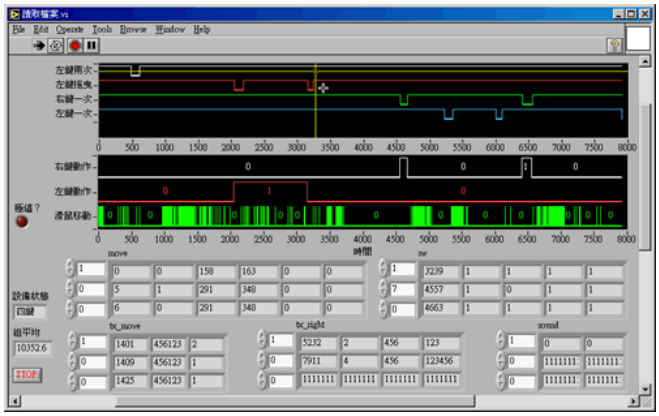

Figure1: Software record events in time line.

Participant joined the test could run with several methods ten times: use domain hand to manipulate buttons and mouse, manipulate buttons and mouse with each hand, and original used device if people had. Research would compare the time which methods use less.

RESULTS AND DISCUSSION

One 23 year-old male with high level (Cervical level 5) incomplete spinal cord injury joined the test. Domain hand is right hand, both hand can rise to head, but had no fine finger movement. He had an adapted trackball proved from an assistive technologies center.

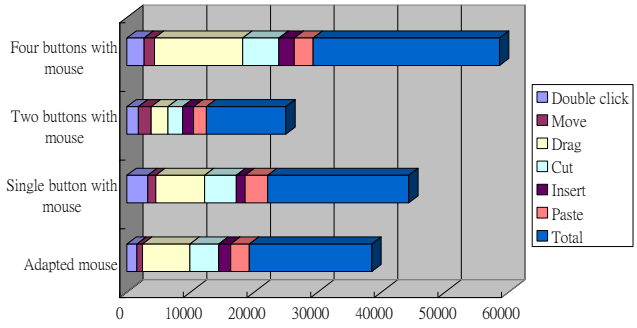

Figure2: Sum and separate time with various test mode by participant.(ms)

Participant showed he can use a mouse with separate button more efficient than used adapted mouse. It shows disabled person can move a conventional mouse, but could not click button when holding a mouse. He spent more time in using four buttons with mouse. It could cause by absence finger touch sense, he must move his hand with eye sight.

Future modification can use micro controller to replace DAQ card, it can be more available for clinical practitioner, use more convenient way to install the hardware, like USB (Universal Serial Bus). Call for more participants to compare difference in each method.

REFERENCES

1. H-R Chen: Master Thesis, 2005, National Yang Ming University.

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