COGNITIVE AND EMOTIVE KINETIC CONTROL OF A COMPUTER PERFORMANCE SYSTEM EMPLOYING THE SENTOGRAPH.

Tamas Ungvary & Michael Kieslinger

Royal Institute of Technology
Dept. of Speech Communication and Music Acoustics
Kineto-Auditory Communication Research Group (KACOR)
Box 700 14
S-100 44 Stockholm, Sweden

Vienna Academy of Music and Performing Arts
Inst. for Electro-Acoustics and Experimental Music
Rienösselgasse 12
A-1040 Wien, Austria

E-Mail: ungvary@kacor.kth.se & mkies@magnet.at

The pressure sensitive input device Sentograph will be presented. It has recently been used as input device both for control of synthetizers and of parameters of real-time signal processing software. The workshop will

a.) offer the possibility for every attender to play with the Sentograph, i.e. to control sythetizers.

b.) Developement stages of the visual feedback of the Direct Manipulation Dialog and of the physical arrangement of the hardware will be presented, illustrated and their significance of efficacy is discussed both from the cognitive/emotive, kinetic and visual ergonomic point of views.

Keywords :
music - interaction - human information processing - organisationspsychologie - ergonomie - software design - input-controllers - traditionell instruments - music - composition - improvisation

One of the most important aspects of musical performance is the communication to the audience of emotions abstractly represented in the music. A vital link in the success of this communication is the musical instrument. In search of a computer equivalent for this essential communication tool, many different controller techniques have been tried. We will show the impact of types of movement controls have, particularly on the expressiveness of the conveyed motion. and demonstrate that the essence of this device is its extremely refined control of acceleration which we think is vital to expression.

The Sentograph, which is a touch-sensitive (3D) control device with three degrees of freedom, has been used both experimentally and on concerts (Stockholm, Berlin, Vienna) to interpret musical structures, to form and manipulate sonic material and to spatialize the final result during a whole piece. By touching the Sentograph with a finger one can control any three musical/physical parameters the user wish, i.e. any parameters the computer program and the attached synthetizer(s) or signal processing software allow to control. The most basic setup let the user control amplitude, pitch and the density of pitches with the Sentograph.. Other parameters are controlled paralell by faders, specially designed keypads etc.

The original Sentograph 2D has been invented by Manfred Clynes for neuro-physiological research. The original design has been improved by the Laboratory of the Dept. of Psychology, Uppsala University, Sweden, with the participation of Alf Gabrielsson and Tamas Ungvary. It consists of a rectangular box containing the mechanics/electronics and a button on an axle on the top of it. The new construction allows independent measurements of the of finger pressure in all three dimensions (instead of only two in the original construction). This is accomplished by using a linkarm system with ball-bearings to divide the finger pressure into there distinctly separated coordinates. The sensitivity of the Sentograph has an estimated range of 8 to 1000 grams. It's three analog output signals are converted into MIDI messages by a modified MIDI control device, the Fadermaster (J.L.Cooper), to be able to drive the MIDI controlled equipment. (the Sentograph has already been used at EMS (Institute for Electroacoustic Music in Sweden) in 1990 where Tamas Ungvary has attached it to the old hybrid system (PDP-15 computer interfaced with both analog and digital systhesizer modules) and composed the every last piece with that system, "Istenem, Uram !").

The control streams of the input devices are collected, processed and distributed by MAX programs, developed by T. Ungvary, M. Kieslinger and P. Lunden. MAX is a graphical programming environment mostly used by musicians and composers for real-time processing of MIDI parameters. (MIDI (Musical Instrument Device Interface) is the music industry's standardized communication protocol and hardware specification for computers and electronic musical instruments.] streams, developed at IRCAM (IRCAM is part of the Centre Georges Pompidou art center in Paris, France. MAX was invented by Miller Puckette at IRCAM. Sold since 1991 as a commercial product by Opcode Systems (Palo Alto, California), MAX runs on Apple computers. Another version of MAX runs on the IRCAM Music Workstation, which uses the NeXT computer. It is also ported to the SGI Indigo family of computers and capable to run extensive signal processing programs in real-time).