PROPOSED PRESENTATION/DEMONSTRATION OF THE CYBERLINK™ CONTROL SYSTEM

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The Cyberlink™ System is controlled by the bio-potentials found on the surface of the forehead. The Cyberlink™ system combines eye-movement, facial muscle, and brain wave bio-potentials detected at the user's forehead to generate computer inputs that can be used for a variety of tasks and recreations.

The forehead is a convenient, non-invasive measuring site rich in a variety of bio-potentials. Three different channels of control signals are derived from the forehead signals by the Cyberlink™ Interface. The lowest frequency channel is particularly responsive to eye movements thus we call it an EOG signal. This EOG signal is typically used to detect left and right eye motion. This signal can be mapped to left and right cursor motion or on/off switch control.

A second channel of information is band pass derived (1 -50 Hz). The Cyberlink™ software further subdivides this region into ten component frequency bands called 'Brainfingers™'. These frequencies reflect internal mental/brain-wave activity as well as subtle facial muscle activity. A wide range of facial muscles affect these frequency bands. Users typically learn control of their Brainfingers™ first through subtle tensing and relaxing of various muscles including forehead, eye and jaw muscles. After a little experience with the Cyberlink™ System, most users begin to experiment with more efficient, internal brain-based control methods. Since this frequency region is sensitive to both mental and muscular signals it is called the 'Brain-Body' signal.

Brainfinger™ control is continuous or analog and is typically used for such things as control of cursor vertical or horizontal movement. For example, one Brainfinger™ may be used to control vertical movement while a second Brainfinger™ (or other signal channel) is used to control horizontal movement.

A third channel is an EMG envelope detected signal (70-3000 Hz) which primarily reflects facial muscle activity. It is typically used in the Cyberlink™ System for discrete on/off control of program commands, switch closures, keyboard commands, and the functions of the left and right mouse buttons. It can also be used nicely for analog cursor control.

Specific facial and eye movement gestures can be discriminated by the Cyberlink™ software and mapped to separate mouse, keyboard, and program functions.

Continuous and discrete control capabilities have been incorporated into a Win 95/98 mouse driver. This hands-free mouse enables the user to steer the cursor, change its speed and resolution, perform left and right mouse button functions, and send keyboard characters and character string commands. This makes hands-free two-axis control possible not only with Cyberlink™ specific games and applications, but also with third-party software such as Gus, Words Plus EZ Keys, WiViK2 and Clicker Plus.

For individuals with limited control of their facial muscles, the Cyberlink™ software can be formatted to use Brain-Body or EOG inputs (instead of EMG) to activate switch closures and mouse button clicks.

The use of the Cyberlink™ system with a computer will be demonstrated. The presentation will demonstrate how the training software helps the user to learn to control the computer through the biofeedback paradigm provided in the venue of on screen visual presentations of the users brain and body signals and video games such as Pong and Tetris. This training facilitates the development of precursor skills for the higher level skills needed for written and voice output communication of the Internet and other third party applications using windows 95/98. A demonstration of the music generation program, on screen keyboards and other more advanced applications will give the audience the sense

of the wide range of potential for this Cyberlink™ interface brain actuated technology. It is hoped that the audience will see ways to adopt and apply techniques that we have developed for the Cyberlink system to their BCI applications.