Neural Impulse Actuator 64-bit Edition

Advanced BioTechnology for Gaming

Play Games Using Biosignals

Translate electrical biosignals of your body directly into computer commands and take advantage of total immersion into game play. Customize behavioral profiles of your character and let your subconsciousness take over.

Hone Your Reflexes

Where others have to practice reaction times, you can use reflex-based game play to get the better of your opponents by cutting your reaction time by 50%.

The award-winning Neural Impulse Actuator is now ready for your 64-bit OS!

Use Space-Age Technology

The headband uses carbon nanofiber-based sensors to provide the highest possible dynamic range for the recording of bioelectrical signals that are amplified and digitized and further de-convoluted into computer commands.

Become Your Character

Streaming biopotentials into the computer and witnessing real-time feedback through the game will result in a novel way to experience virtual reality. Enter a virtual world where abstractions like keyboard commands are replaced by intentions converted into tensions and translated into command structures

One Size Fits All

Adjust the nia headband for optimal functionality and comfort

Powered by USB

The nia is powered directly by your PC via any USB 2.0 port

USPN: 5,474082, 5692517, 6636763, Patent Pending
Powered by Brainfingers Technology

***Part Number*: OCZMSNIA** **UPC: 842024010494**

The first model of the nia was introduced at CeBIT 2007 and sparked a buzz in the enthusiast community. Today the nia is a full-fledged gaming product designed to revolutionize the way we play PC games. The nia has received glowing reviews from around the world and continues to be an awe to gamers everywhere.

Praise for the nia

"The NIA is an excellent product that delivers on all advertised features."
- Hot Hardware

"The device is certainly a revelation as there is simply nothing else out there on the market that can compare..."
- Overclock 3D

"Astonishing isn't the word for it. Astonishing is what you'd call a chicken that can play the violin. This is something else. This is heaven."
- PC Gamer

"The shocking twist? *It works.*"
- Maximum PC

"Trust us, you've never experienced anything like the NIA."
- PC Format

"The nia is a great product for 'geeks' but also professional gamers that want to improve their reaction time."
- PCGH Magazine

ENGLISH:

Please make sure to visit our dedicated NIA website www.ocztechnology.com/NIA for the latest drivers and product information.

OCZ NIA additional information:

The NIA is an innovation the gaming industry has been waiting for, it takes gaming experience to a next level and will change the ways gamers interact and control certain elements.

The NIA has to been seen as a new innovative peripheral rather than a replacement for keyboard or mouse. It is the first commercially available BIC (brain-computer interface) specifically for PC Gamers.

How does the NIA work?

The NIA (Neural Impulse Actuator) works by **reading neuronal discharges in the brain**, that is alpha, beta and gamma brain waves**, electro-oculogram components** (the positional differential between the front of the retina and the retinal pigmented epithelium which changes relative to the eye orientation) **and electro-myograms** (the neuro-muscular signals along with the electrical discharges resulting from the depolarization of the muscle cells).

Those are the three major components that are contributing to the signals that are captured. **The raw signals of three separate inputs are then amplified and streamed into the PC using a high speed USB 2.0 protocol.** Of course, the signals that are picked up by the sensors are what is called "mass potentials" or "mass discharges" of all factors that are contributing at various amplitudes and levels. This makes it necessary to digest the signals into the individual components, which is done using some quite sophisticated mathematical operations including Fast Fourier Transformation.

On the software level, we moved away from a single-threaded program to a fully multi-threaded version that can operate either in text mode (when on the desktop) or else ports directly into the DirectX platform using the DotNET framework. The beauty of this is that because of the thread level parallelism, **the signals that are converted into key strokes are seamlessly integrated into the game play**, moreover, since the threads are given low priority compared to the actual game play, **they will not compete with the actual game for CPU resources**. That means that critical computations necessary for the game play will always be executed first, since it really does not matter whether there are a few microseconds delay in the computation of the key strokes that are executed for user input.

The biggest advantage of using the NIA over a mouse **is that the actual reaction times are about 30% to 60% shorter than what one can realistically achieve with a mouse.** The reason is that any mouse click requires processing of the retinal signal by the visual cortex, then relaying the result to the motor centers at the substantia nigra in the brain and finally through the spinal cord out to the peripheral nerves that innervate the finger muscles. This process takes on average some 200 milliseconds, whereas for example an eye-lid reflex is in the order of 50 to 100 milliseconds and the advantage becomes very tangible in game play since many of the actions are triggered by natural reflexes. This type of reflex-based gaming is what most of the pros are using, however, it takes them several years of practice to get to this point whereas with the NIA, reflexes are taking over within a few minutes or maybe hours of getting accustomed with the setup.

Muscle or brain activity?

This is an interesting question. Originally we had been trying to separate the different signals into the different components and then assign specific functions to each. As it turns out, however, this is not really how it works. Just think about how you walk. Is it the muscles that make you walk or is it the brain or is it the spinal cord? Or even the bones? If you take away one of these components, the system doesn't work anymore, classic examples are paraplegics, MS patients or individuals with Parkinson's disease. Or somebody with a broken leg. We found that **it is always a combination of different factors that trigger or suppress a specific action.** In other words, you have EMG, EOG and EEG signals and the permutations of the different combinations are the actual output. Of course, some of the signals are more specific than others or just easier to learn. Everybody can squint the eyes or look left and right or clench the jaw and that is a good way to start. In reality, however, those crude signals become pretty irrelevant after a while, in fact, I have given demonstrations where I was talking (which includes a lot of jaw and tongue movements) and I can selectively filter out these signals on what I believe is a brain wave level so that they are not in the way of my game play. What it comes down to is that **depending on the individual user and level of experience, different signals will become more prevalent than others**, but as a rule of thumb, cerebral signals will take over where originally muscle signals were used. When I say cerebral, that also includes the sympathetic / parasympathetic system, in fact, that particular component appears to play a major role.

What's new?

There have been many attempts in the past to use similar devices but most of them were doomed because the signal breakdown was not good enough, which necessitated the "brute force approach" of using for example only the muscle signals.

The new headbands we are using embrace **sensors based on carbon nanofibers that are about 100 times more sensitive than older technology.** This allows for a much wider dynamic range and also to pick up signals that were completely masked in previous approaches and that makes the use much more intuitive and easier.

The second issue regarding acceptance is that using the extra workload of decoding brain signals almost requires a separate co-processor and that was something that nobody had. The alternative is the multi-threaded approach on an SMP (symmetric multiprocessor) platform where the workload can be toggled between the different cores depending on the thread priority in the application workload. In other words, there are minimum hardware requirements that should be met. Especially with the older version we had and that was running over a serial RS232 interface, single core systems would easily choke, for example, it was easy to play Unreal Tournament 2004 with the first generation NIA as long as there were not too many enemies but as soon as it got crowded, the "command decoding" started lagging and if you try to shoot in a first person shooter game and the system waits until the scene is less crowded, then you are dead by the time anyway. The new hardware and software largely solve this issue but there is definitely an advantage to play on a multiprocessor / multi-core platform. In other words, two years ago, the PC technology would not have been advanced enough to see a real advantage of using the NIA, and we believe that this is a golden window of opportunity to come out with it now.

There is also the issue that brain research has advanced but we are not too concerned with the dissection of the signals into specific origins of neuronal / muscular groups, rather, as mentioned above, it is the synergism of all physiological activities that is the critical signal we are trying to read and understand to the point where we can use it.

Replacing the keyboard / mouse?

Playing computer games with the NIA as opposed to a standard keyboard is different, meaning that the user needs to forget some of the learned habits and to acquire a different set of skills in order to interface with the computer. The NIA takes just a few steps to configure and gamers can be literally up and running in your favorite game in a matter of minutes. Just like there is conventional memory and muscle memory, the user will also develop NIA memory and within a short period of time, the body will remember the reactions it underwent to achieve the desired actions on the computer.

In fact, a keyboard is a poor comparison, it is more like a joystick and that should probably give you a more global answer to some of the questions you had with respect to applicability. Would you type with a joystick? Probably not. Have you played Flight Simulator with a joystick? Let me tell you, it is nothing compared to flying a helicopter just with your NIA.