



A Real Game-Changer: BCI & EEG Use Cases for Video Games





Video games are a natural fit for Brain-Computer Interface (BCI) and EEG biosensor technology. Gaming hardware companies who wish to broaden their stable of interface device solutions should strongly consider the benefits of designing and manufacturing BCI headsets whose styles, colors, sizes and design features map to their specific brand identities and target user audiences. NeuroSky enables its OEM partners to create custom BCI headsets that are affordable, consumer-friendly and able to extend the gaming experience into new realms.

Creating the Next Big Video Game with EEG

We hope BCI and EEG biosensor technology will act as a springboard for creating different genres of games, and extending the way existing genres are played.

As a potential BCI gaming hardware OEM / ODM, it might interest you to know how the developer community you rely on to drive sales of your peripheral products via their content perceives opportunities in the BCI space. Obviously, the more compelling the use case is for BCI, the greater the demand for your piece of hardware.

Pioneering video game developers leveraged BCI as a secondary (supplement) controller to immerse players into telekinetic experiences. From knocking over cylindrical towers, bending spoons, floating heavy blocks and spinning windmills, manipulating objects through mental state control empowered users and simultaneously gave them a basic understanding of how brain activity could be harnessed.



Throw Trucks With Your Mind

Throw Trucks With Your Mind is a game that takes itself literally. In this multiplayer deathmatch game, players compete in a series of different competitions to use their mental powers to squish their opponents. They push objects with focus and shield themselves with meditation, using different brainwave-controlled powers to reign supreme.

Throw Trucks With Your Mind was a successful Kickstarter developed by Lat Ware. He was profiled in a Los Angeles Times story, where he shared how the inspiration for the game had roots in overcoming his own ADHD challenges. The game was a stepping point to enable Lat to start his own app development studio—Crooked Tree Studios. Their follow up game is already in progress, and Lat continues to manage the Throw Trucks community.



Essentially, in the BCI world, telekinesis was found to be the first killer use case. That idea has and will gradually change as new algorithm growth seeds more interesting and advanced methods of deploying the technology into game play. Indeed, the technology is already stimulating some alternative use cases that we hope will act as springboards to creating different genres of games and extending the way existing genres are played.



- **Third-Person (Avatar) Games** – We all seem to relate to our avatars. We customize these characters according to how we would like to envision ourselves in the real world. One important, yet lacking element in our avatar selves is the behavioral element. Yes, we can steer the avatar wherever we desire, but the ultimate complexity of our personal avatar is better served when our own mental and emotional complexity can be actually transmitted to our virtual selves. This translates into a more accurate behavior of our avatars such as mapping to particular physical movements, comments it expresses, choices it makes and, ultimately, whether it fits in with other avatar social groups or not. Avatars can develop mental profiles based on certain virtual experiences. Those avatars sharing similar profiles could become friends while opposite profile avatars may tend to avoid one another. BCI creates more realistic and mentally complex avatars that can more accurately resemble their owners and open up a multitude of scenarios in game play.
- **Magic Power Games** – BCI introduces a magical quality to the experience of game play. Magic potions and charms can be the source of one's mental powers being channeled to objects, characters and backgrounds / foregrounds.
- **Superhero Games** – Within the line of Marvel superheroes and villains, there are approximately 35 who exhibit mental and psychic powers. Games whose characters are empowered with mental powers are extremely compatible with BCI environments. Users can empower their superhero characters by channeling their own mental states to their virtual counter-part. This builds greater realism into the game by mapping true mental state feedback from the player. An example of this is using "The Force" in Star Wars games.



- **Sports Games** – The 7-time Gold Medalist swimmer, Mark Spitz, once declared that “competition is 10% physical, 90% mental.” What he meant by this is that when the game is on the line, when you are up against top talent who has trained equally and who are as strong physically, that the one separation between you and them is your mental advantage. Are you relaxed, focused, “in control” of the situation—in the zone? Whether it is in swimming or in any other sport, your mental qualities can put you ahead of your competition. Until BCI, sports video games had no way of incorporating this feature into game play. Whether BCI helps you to run faster, throw farther or shoot more accurately, mental feedback can build greater realism into sports games. MyndPlay’s Archery is one example of how BCI is applied in sports games.
- **Multi-Player Games** – Join forces to defeat enemies by combining your mental powers (e.g. lifting a heavy object together) or compete against your opponent by demonstrating superior mental capabilities (e.g. tug of war, wrestling, fighting).
- **Action Games** – Gamers enjoy the feeling of immersion. Action games are the most intense when there are strong immersive qualities that drag the player deeper into the action. Yet, how can immersion be somehow quantified for a particular player and how can that information be useful? One way is to use BCI feedback. Action games can be fast-paced, adrenalin rushes. A relaxed player or one who might be using limited mental workload during heavy engagements is not likely to be in a high state of immersion. This type of mental feedback could be useful to the game by introducing additional venues, characters and special effects until the gamer is brought back into a higher level of immersion. BCI feedback can be used as an important data point to quantify and individualize the user experience.

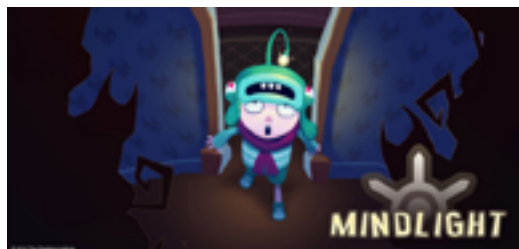




- **Social Games** – These games can combine elements of many of the topics included in this list, such as avatars, magic powers, sports and action game featured in a multi-player environment. Additionally, social games that incorporate player compatibility indexes (developer-defined) based on similar / dissimilar patterns of mental and emotional state feedback between players during shared experiences could be used for player match-making (dating), social group recommendations and user preference settings.
- **Virtual / Augmented Reality Games** – NeuroSky's EEG biosensor technology is highly compatible with head mount display (HMD) form factors. HMD OEM's should consider the advantages of the various BCI gaming categories, mentioned above, as evidence that BCI-based VR/AR HMD's will inevitably evolve as a complementary technology to today's VR/AR devices.

Other video game genres that fall outside the sphere of pure entertainment, yet incorporate entertainment components in order to stimulate greater interest and repeated use include:

- **Games for Health** – Gamers and game developers may not seem like the types of people who get excited about games that are actually good for you. Yet, gaming and health have a solid track record working together. With a global obesity epidemic and rampant heart disease around the world, gaming companies are not ignoring the connections between inactivity and negative health conditions. Quite the opposite, in fact—they're working to do something about it. Gaming hardware peripherals such as the Nintendo Wii and the Xbox Kinect have features conducive to capturing motion and, thus, offer an excellent platform for developers





to create games that promote more activity (e.g. virtual bowling, tennis, golfing). BCI takes healthy games to the next level—mental and emotional health gaming. From meditation, to stress and anxiety management, to impulse control and mindfulness, BCI feedback has been demonstrated to be effective in advancing the mental side of our beings. With gaming consoles able to collect massive amounts of user data onto the cloud, important health tracking data can be collected (both body and mind health) for user profiling, progress tracking and training recommendations. GainPlay Studios' Day Dream and PlayNice Institute's MindLight are examples of healthy games.

- Performance and Education Games – Academic performance can be a function of many attributes, including diet, socio-economic environment, level of maturity, and previous academic history. BCI can be used in conjunction with training tools that help individuals learn to improve focus and manage stressful situations associated with academic performance (e.g. test-taking, public speaking). Early developer activity in this arena was targeted toward more severe learning challenges, especially in children with

ADHD. Yet, these applications can be modified for the general population of non-ADHD



individuals to improve their ability to concentrate. They can also be used to assess how individuals engage with material (whether they struggle or have given up).

NeuroCog's Focus Pocus is an example of a performance game.

It's becoming clear that video games are no longer just entertaining distractions. Video games have the power to effect positive change, and BCI is the catalyst for that change.



NeuroSky: Pioneers of Consumer BCI Technology for Video Games

NeuroSky has credibly positioned itself as the preeminent BCI technology supplier to AAA gaming hardware companies. What is driving this greater attention and recognition of NeuroSky within the gaming peripheral space? There are several key factors that are converging to this important pivot point:

- **Trusted and Respected BCI Vendor Partner** – NeuroSky has proven itself as a reliable partner and supplier to the major brands in the rigorously challenging and competitive toy industry. These due diligence and trial-by-fire experiences have helped NeuroSky to overcome many doubters inside the gaming industry, removed much of the risk associated with taking on commercial BCI projects, and have gaming hardware companies ready to jump on board with BCI projects.
- **Entertainment Market Receptivity** – BCI technology simply amazes the general public with its incredible possibilities. NeuroSky toy partners have already built second-generation toy products that have won numerous awards for innovation and frequently sell out soon after they are launched.
- **Platform and Application Agnostic Headsets** – A Bluetooth-enabled BCI headset can communicate with any Bluetooth platform (PC, Mac, iOS, Android). In a similar way, any third-party application built with the NeuroSky APIs can interface with NeuroSky-enabled BCI headsets. Thus, a BCI headset becomes a generic device similar to a computer mouse that works equally well for multiple platforms and applications. Both the NeuroSky MindWave family of headsets, as well as 3rd-party, off-the-shelf headsets from our OEM partners can serve as the appropriate hardware peripheral to play games.



- **New Algorithm Growth** – NeuroSky’s algorithm library continues to expand and to spur next-generation game development approaches for years to come. The most recent algorithm releases (Mental Effort, Familiarity and Appreciation) are already driving new use cases within the developer community as they yield advanced insights into a gamer’s state-of-mind.
- **Differentiating Technology Features** – Ask the average gamer on the street if they have heard of BCI-enabled games and 9 times out of 10 the answer would be “no.” Yet, BCI has a tremendous “wow factor” and value-add to the gaming experience remains pent up and ready to be unleashed in the same way that BCI-enabled toys launched into younger audiences. Advancements in gaming technologies such as the Wii Controller and XBox Kinect transformed the way games are played, and BCI technology, as a supplement controller, builds a greater immersive quality into the overall experience.
- **Installed-Base of BCI Games** - The small, yet growing BCI developer community has created a broad scope of gaming applications ranging from “games for entertainment” to “games that are good for you.” The early developer pioneers have demonstrated how BCI can be integrated into the gaming world. These commercially-available games and game concepts will seed more advanced and complex uses by the resource-rich mega-publishers and developers who will ultimately advance BCI to the mass gaming audiences.

Are you interested in incorporating BCI into your next project or peripheral platform?
If so, schedule a discovery call with one of our experts today to see how we can help
make your million dollar idea a (video) game-changing reality!

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