

## FACTSHEET

### Adaptive Video Game Controllers

Since the beginning of video games, it has been crucial for players to have a way to interact with them. Through the use of a special hardware device called "video game controller", this interaction became a reality. Using it, players can select, move, jump, shoot and make every possible movement and action in the game.

The very first hardware ever used as a video game controller was a device for the game "Pong". It had two "dials" to control horizontal and vertical movement for players to navigate 'Pong' paddles.



Source: [https://en.wikipedia.org/wiki/Magnavox\\_Odyssey](https://en.wikipedia.org/wiki/Magnavox_Odyssey)

But the most known and probably the most used game controller was an Atari joystick.



Source: <https://www.shortlist.com/lists/history-of-the-video-game-controller>

As joysticks evolved over the years, players were able to make more complicated movements and actions. Additionally, as the gameplay evolved, new types of controllers appeared.

Probably the most iconic of these is Nintendo Entertainment System (NES).



Source: [https://en.wikipedia.org/wiki/Nintendo\\_Entertainment\\_System](https://en.wikipedia.org/wiki/Nintendo_Entertainment_System)

As game controllers evolve, they have become increasingly immersive for players (especially in Virtual Reality games).



Source: <https://a.co/d/hQl6yrT>



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Source: <https://blog.playstation.com/2021/03/18/next-gen-vr-on-ps5-the-new-controller/>

## What exactly is an adaptive controller?

A video game controller is essential to play a video game. But the usual controllers are used in the context of the following assumptions: the player can see and hear clearly, and make full use of their hands, feet and fingers.

For problems of small intensity and depth, such as fine mobility or dexterity, some software adjustments can be made to the controller, and it may be used relatively well.

For players with heavier issues, a normal controller becomes useless and they cannot play at all. This is where adaptive controllers "come into play" to support players.

## In which situations are an adaptive controller and software adjustments helpful?

Depending on the extent of the condition and/or the problem the player is facing, a different controller should be used, and the necessary settings should be made.

**Disabilities related to motor function.** Some of the difficulties a player with these disabilities may face in playing a video game may be related to precision in movement, ease in movement, or the ability to apply force to move the controller or press a button.

Sometimes motor difficulties are more severe and include the player's difficulty to move their arms/legs and the torso to the point of severe quadriplegia, making it impossible to use controllers. In these situations, mouth, lips, or even exhalation would be needed for game manipulation.



Source: <https://www.quadstick.com/shop/quadstick-fps-game-controller>

**Vision problems.** People with visual impairments could say that they cannot play video games, but this is not true nowadays. Games are designed with special scripts that manage and present the sounds and music of each game.

The new adaptive controllers, which even have haptic Braille chording capabilities, also provide significant support by converting sound to vibration and help people to generate accurate spatial representations that are necessary in every game.

**Hearing problems.** For hearing impaired gamers, the video games themselves provide significant assistance by offering translation and subtitles or even additional software.

Important sensory support is provided by controllers with vibration and feedback associated with the sound effects and musical scoring of games.

Besides, as stated in Hickman et al. (2017) "video gaming and virtual reality training will be an important part of future rehabilitation efforts".

Research for new adaptive controllers is ongoing and new implementations can even help to participate in para - esports events such as the one presented in Hassan et al. (2022).

A list of adaptive controllers for various problems, conditions and disabilities can be found here: <https://lifezest.co/adaptive-gaming-controllers>

## An example that needs to be mentioned

A very important and special example of hardware is Microsoft's adaptive controller XAC.



Source: <https://all3dp.com/microsoft-debuts-xbox-adaptive-controller-for-limited-mobility-gamers/>

This hardware is much more than a simple adaptive controller: it is able to operate successfully and autonomously for a number of adaptations, and can also act as a hub to connect more components/devices that expand the possible applications and uses.

In essence, this device provides something very important for players with disabilities: the easiest way to use different controllers by interfacing them into a single device with many possible software configurations.

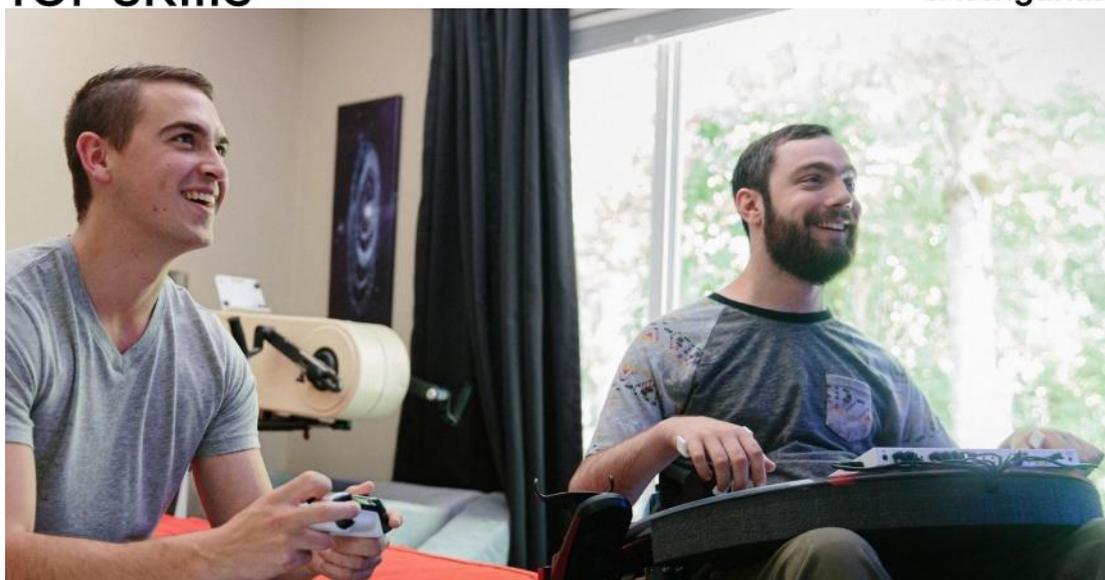


Source: <https://all3dp.com/microsoft-debuts-xbox-adaptive-controller-for-limited-mobility-gamers/>

## Conclusion

We believe that new and constantly evolving adaptive controllers will give more and more impaired or disabled people the opportunity to mingle and play with their friends, and to experience emotions that only video games can deliver.

As a matter of fact, both the rapid development of technology (hardware and software) and the ongoing policy of inclusiveness (at least in modern western countries) make us optimistic that new and more advanced solutions and implementations in the field will soon be available to all people who need them at a relatively low cost.



Source: <https://www.xbox.com/en-US/accessories/controllers/xbox-adaptive-controller>

## REFERENCES

Amazon official site: Amazon Luna Controller. Amazon Official Site: Amazon Luna Controller. (n.d.). Retrieved August 31, 2022, from <https://a.co/d/hQl6yrT>

Brook Wingman XB Converter for Xbox One (n.d.). Quadstick FPS Game Controller. QuadStick. Retrieved August 28, 2022, from <https://www.quadstick.com/shop/quadstick-fps-game-controller>

Hassan, M., Shimizu, Y., Hada, Y., & Suzuki, K. (2022). Joy-Pros: A Gaming Prosthesis to Enable Para-Esports for Persons with Upper Limb Deficiencies. *IEEE Access*, 10, 18933-18943.

Hickman, Robbin & Popescu, Lisa & Manzanares, Robert & Morris, Brendan & Lee, Szu-Ping & Dufek, Janet. (2017). Use of active video gaming in children with neuromotor dysfunction: a systematic review. *Developmental medicine and child neurology*. 59. 10.1111/dmcn.13464.

Mensley, M. (2018, May 17). Microsoft debuts Xbox Adaptive Controller for limited-mobility gamers. All3DP. Retrieved August 26, 2022, from <https://all3dp.com/microsoft-debuts-xbox-adaptive-controller-for-limited-mobility-gamers/>

Morris, B. (2021, September 1). 12 adaptive gaming controllers for disabled people. LifeZest. Retrieved August 26, 2022, from <https://lifezest.co/adaptive-gaming-controllers>

Next-Gen VR on PS5: The new controller. PlayStation.Blog. Retrieved August 31, 2022, from <https://blog.playstation.com/2021/03/18/next-gen-vr-on-ps5-the-new-controller/>

The fascinating history of the video game controller: 50 Years of innovation. Shortlist. (2022, August 3). Retrieved August 31, 2022, from <https://www.shortlist.com/lists/history-of-the-video-game-controller>

Wikimedia Foundation. (2022, August 12). Magnavox Odyssey. Wikipedia. Retrieved August 28, 2022, from [https://en.wikipedia.org/wiki/Magnavox\\_Odyssey](https://en.wikipedia.org/wiki/Magnavox_Odyssey)

Wikimedia Foundation. (2022, August 30). Nintendo Entertainment System. Wikipedia. Retrieved August 29, 2022, from [https://en.wikipedia.org/wiki/Nintendo\\_Entertainment\\_System](https://en.wikipedia.org/wiki/Nintendo_Entertainment_System)

Xbox Adaptive Controller: Xbox. Xbox.com. (n.d.). Retrieved August 29, 2022, from <https://www.xbox.com/en-US/accessories/controllers/xbox-adaptive-controller>

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