

# 3D printed adaptive gaming controller add-on for individuals with disabilities

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## 1. INTRODUCTION

The most common childhood movement disability is cerebral palsy (CP). In the United States, approximately 800,000 children have CP. When projected to the EU, this number is around 2,250,000 individuals. The integration of individuals with disabilities is important for both the community and for the well-being of those with disabilities. Gaming can offer a good solution for this problem. One of the main challenges for individuals with CP is the lack of fine motor coordination, weakness in certain muscle groups and muscle spasms, which often prevent them from using their fingers. Meanwhile video game consoles rely on the assumption that users navigate the buttons of a controller with ten fully functional fingers.

## 2. AIMS

The aim of this project is to develop, test, and distribute an adaptive gaming controller that allows individuals with cerebral palsy to play online games and help connect with peers. The goal is to create a personalizable device that is affordable and accessible to many.

## 3. METHODS AND MATERIALS

Three working versions of the controller have been developed so far, each of which addresses the limited hand function of individuals in slightly different ways. As per request of the testers, the second (Figure 1) and third versions (Figure 2) were adapted for a racing game called Forza. The project provides a non-destructive 3D printed shell around a standard Xbox controller that mechanically enlarges and links functions of the controller together, allowing control of video games with limited hand function. The add-on was tested by two people so far. The first tester was Levente, a 16-year-old student at the Hungarian Pető Institute (the leading national institution for children with movement disorders), who lives with CP and uses a wheelchair. Afterwards, the project was tested by Karcsi (32) who also has cerebral palsy.

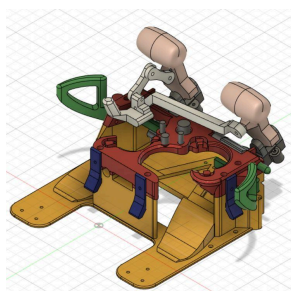


Figure 1: The second version of the add-on which was adapted for driving based games



Figure 2: The third version of the add-on which was extensively tested by Levente

## 4. RESULTS

With the help of the accessory, Levente achieved first place for the first time in a Forza race. After several hours of testing, he provided feedback for minor improvements that have been implemented. The following link shows a 40-second video of Levente using the accessory for the first time: <https://youtu.be/Va8VqJWzSCo>. Both Levente and Karcsi were able to play Forza without limitations with the help of the add-on.

## 5. CONCLUSIONS

An affordable and easily customizable 3D-printed adaptive gaming controller accessory was successfully developed, which allows children and adults with CP to participate in gaming. This accessory has the potential to reach a wide range of individuals and enable their engagement in gaming activities.

## 6. ACKNOWLEDGEMENTS

I would like to thank Levente, his father, and Karcsi for testing and giving feedback regarding the add-on.

## 7. REFERENCES

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