



# e-Nable Italia

## Bike Adapter



*A bike adapter device for children with limb difference problems, configurable to be adapted to the user, can be entirely build with a 3d printer using a flexible filament*

*By Michele Praga – Alessandro Villa*



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Michele Praga - [pragamichele@gmail.com](mailto:pragamichele@gmail.com), Alessandro Villa - [filotto78@gmail.com](mailto:filotto78@gmail.com), e-Nable Italia - [info@e-nableitalia.it](mailto:info@e-nableitalia.it)

Check for further information, updates and information on this and other e-Nable Italia's projects on our website: <https://e-nableitalia.it/bikeadapter> & <https://e-nableitalia.it>

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# 1.Disclaimer

*The Bike Adapter design is being released under [Creative Commons - Attribution - Non-Commercial - Share Alike](#) 4.0 International (CC BY-NC-SA 4.0) open-source license to encourage further innovation in this field, and improve global access to assistive technology.*

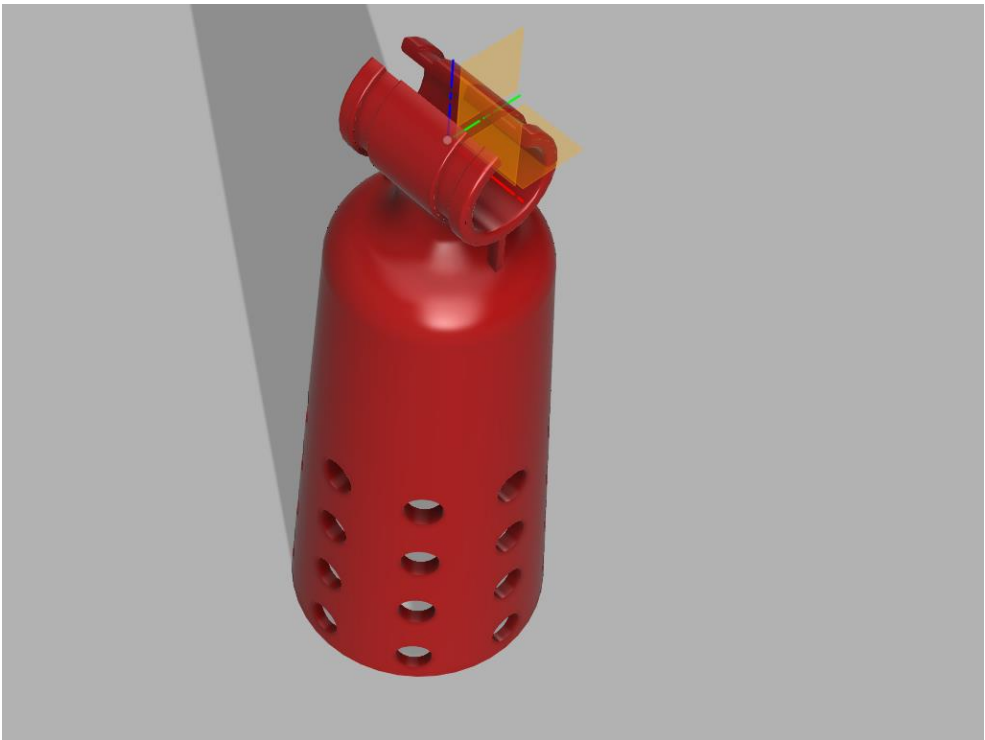
*This design is released for trial and evaluation purposes only, and it is intended to benefit certain individuals with specific arm differences and is not intended, and shall not be used, for commercial purposes.*

*The acceptance of this design by e-Nable Italia, and any such information provided by the design team is presented as is without representation or warranties of any kind, express or implied, and is intended to be a free gift to recipients for the sole purpose of evaluating various design iterations, ideas and modifications.*

*The Bike Adapter must be used for only light biking activities, and not for any severe tasks like off-road or competitive events. Any individual associated with e-Nable Italia and e-Nable Italia itself shall not be liable for any injuries or damages resulting from the use of any information or designs provided.*

**The Bike Adapter is experimental device, it is not classified as a medical device, and it is for evaluation purposes only.** *In some cases, these devices will not be appropriate for each individual, and consultation with medical professionals and occupational therapists must be sought and obtained before use.*

## 2.Basic Info



**Authors:** Michele Praga and Alessandro Villa

**Device type:** Arm

**Minimum user needs:** A functioning forearm

**Type of device:** Mechanical

Maturity	Cost of Materials	Popularity	Assembly difficulty	Grip Strength
				N/A

To learn about what each of the above icons represents, please refer to the [Device Ratings Guide](#).

**Development status:** In validation

### Basic data

- Number of parts: 1
- Assembly time (estimated): 0.5 hrs
- Store-bought parts: zip cable ties
- Number of known builds: 3

- *Grip type: none*
- *Actuation type: no actuation*
- *Scalability: STL or 3MF is generated by Autodesk Fusion360 using parameters*

**Basic description**

*This device is intended to be connected to the bike handlebar through zip ties. The elasticity of the joint ensures an adequate mobility for steering.*

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**Credit and Contributions:** *missing credit*

## 3.Links

**Main STL Files:** <https://www.thingiverse.com/thing:5422603>

**Git Hub:** <https://github.com/e-nableitalia/bikeadapter>

**Major Modifications:** ●

*You can request a modification in the comments below*

**Source Files:** *Fusion360 file in download area*

**Instructionals:** *An instructional document is available with in download area*

**Editors and Customizers:** *See details below for info on device customization*

## 4.Makers

*missing photo of made device* ●

### Bill of Materials

- *Cable zip ties*
- *TPU filament*

**Tools:** *cut plier*

### Recommended print settings:

*Rafts:*

*No*

*Supports:*

*No*

*Resolution:*

*0.2*

*Infill:*

*60%*

*Filament brand:*

*Ninjabflex*

*Filament color:*

*N/A*

*Filament material:*

*TPU, suggested shore 85a, higher shore gives more rigidity, use lower for additional flexibility for the device.*

**Device advantages:** *Simplicity*

## 5.Educational

*After several design iterations, the e-Nable Italia team released the first prototypes of what is simply called “Bike Adapter”.*

*The device is designed in Autodesk Fusion360 that is free for hobbyists, non-commercial use, and for qualifying startups.*

*In the parameter window, the user inputs some dimensions of unaffected and affected arm, and the software automatically generate the 3D model.*

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*The Bike Adapter has been designed using Autodesk Fusion 360.*

*No historical credits available.*

### **Further Information**

*Check for further information, updates and information on this and other e-Nable Italia's projects on our website: <https://e-nableitalia.it/bikeadapter> & <https://e-nableitalia.it>*



## 6.Engineering (Device Sizing)

*Only five parameters are needed to properly size the device.*

*A – unaffected forearm length (Figure 1)*

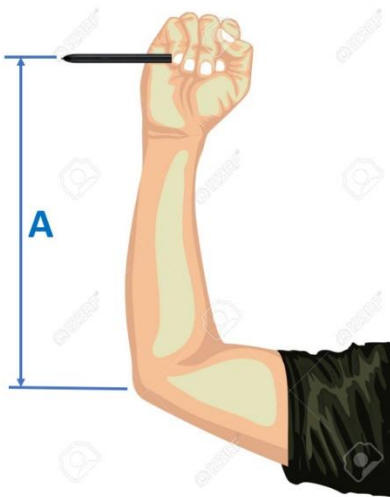
*B – affected forearm length (Figure 2)*

*C – tip stump diameter*

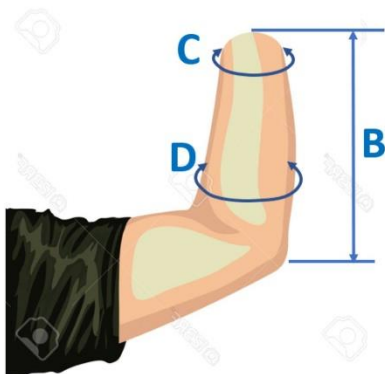
*D – root stump diameter*

*E – Handle diameter (Figure 3)*

*An additional parameter, the number of venting holes, could be modified according to the length of the stump wall.*



*Figure 1 - Measure of unaffected arm*



*Figure 2 - Measure of affected arm*

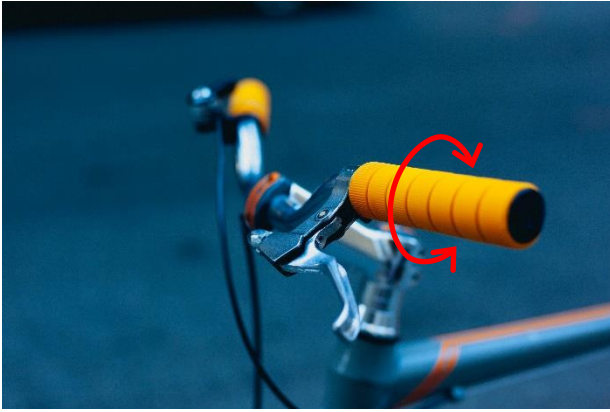


Figure 3 - Measure of handlebar

Dimensioning is done by setting appropriate values in parameters exposed in the Autodesk Fusion360 project (Figure 4). After opening the project in Autodesk Fusion360 go to "**Modify**" menu and select "**fx Change Parameters**" menu entry.

Insert the appropriate values in the parameters window.

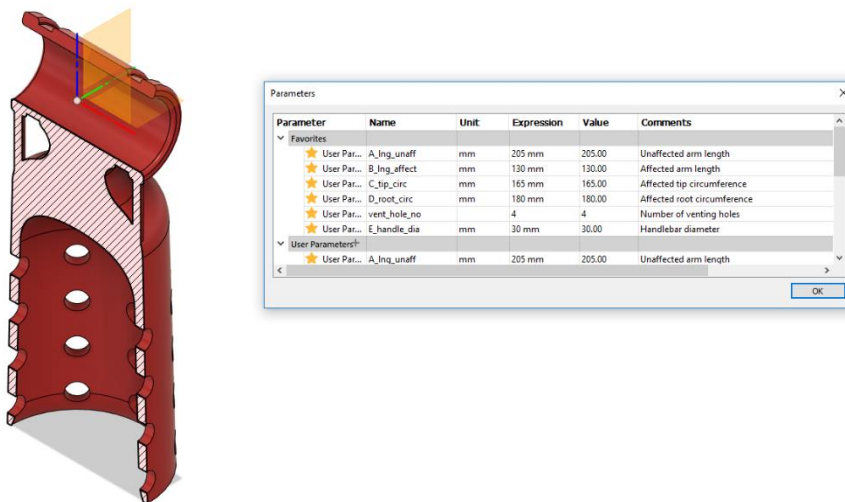


Figure 4 - Parameter window

The file is designed in a way in which the walls thickness is inversely proportional to the length of the affected arm, to provide necessary lateral stability.

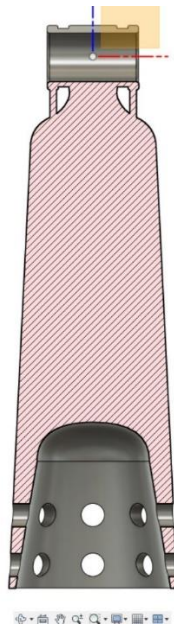


Figure 5 - Short stump configuration




Figure 6 - Long stump configuration

The grip on the bike handlebar is ensured by the frictions between TPU and rubber handles. The handle grip pillow has two slots to keep in position the two cable zip ties.

### Known issues and solutions

*no issues have been reported*

Do you know of an issue with this device? Do you have a solution for a common issue? Do you have a suggestion for an improvement? Please report it to the development team at the following address: [info@e-nableitalia.it](mailto:info@e-nableitalia.it) 

### Help resources

If you are not familiar with Fusion360, you can contact e-Nable Italia team at the following e-mail address: [info@e-nableitalia.it](mailto:info@e-nableitalia.it), asking to generate the STL or 3MF file for you, please provide the five mentioned dimensions/measures required to make a properly dimensioning of the device.

### Requested Modifications

*no modifications have been requested at this point*

## 7.Assembly

*Connect the Bike Adapter device to the bike handlebar, rotate the device accordingly to ensure a comfortable positioning of the arm into the device (usually an angle of approx. 30° with the ground plane is adequate).*



*Secure the device with the cable zip ties, cut the exceeding part of the zip ties and ensure the device is well connected to the handlebar: move the terminal part of the device (the part that connects to the arm) up and down to ensure there is no rotation of the device on the handlebar.*



# 8.Lists & Media

**Media links:** *no links available* ●