

Project challenge exercise: Design a brake lever adapter

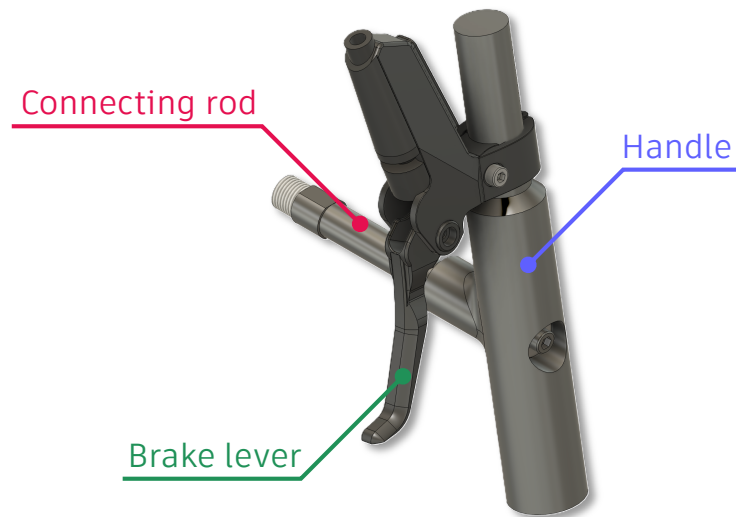
The challenge: modify the supplied brake lever design so that a rider with limited finger dexterity can operate the brake while riding the adaptive bike, without releasing their grip on the handlebar.

Before you start, watch both videos about Noel Joyce's story and the brake lever challenge which explains why riders with limited dexterity in their hand need a customized solution to press a brake lever. Note the needs and constraints Noel describes, because they define the approach you should take to solving this challenge.

Open the supplied dataset **Brake Lever - Challenge.f3d** (see Figure 1b). Read the rider brief and the design requirements below, then ideate and modify the design so the rider can operate the brake lever while riding the adaptive bike. This can be done by modifying the brake lever position, mounting method and the handle as required, alongside any additional components you create.



(a)



(b)

Figure 1. Starting break lever system (a) demonstrated on Project Mjolnir adaptive bike and (b) CAD assembly starting point

The rider:

The rider has a C6–C7 spinal cord injury, which means they have very limited active finger flexion: they cannot curl their fingers with enough force to work a conventional finger-pulled brake lever. What they can do reliably is hold a secure grip on the handlebar and move their wrist from neutral through approximately 30° of extension, bending the hand back, along with a small controlled sideways sweep (see *Figure 2*). Your brake adaptation should be driven by this reliable wrist motion so the rider can engage the brake without releasing their grip.

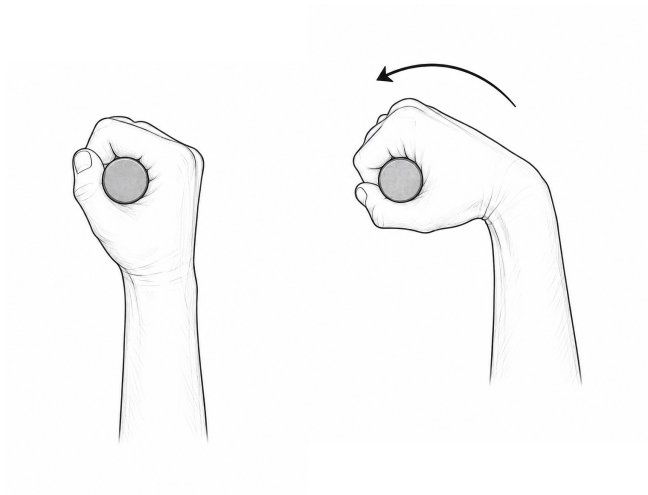


Figure 2. Range of motion for the rider

Design requirements

Your solution must:

- Let the rider engage the brake using wrist movement only - not by curling the fingers (see *Figure 2*)
- Allow the rider to keep a secure grip on the handlebar the whole time they are braking
- Fit the space available on the handlebar and work with the mounting points and hardware in the supplied assembly

There is no single correct answer – many different designs can meet these requirements. Check your idea against each point above before you start modelling.

To complete this challenge:

- Ideation: Sketch 2-3 solutions that meet the rider's requirements; choose one to take forward
- Modify **Brake Lever - Challenge.f3d** with your chosen solution
- Render (and/or animate) your design to demonstrate how your design works
- **Recommended:** 3D print a prototype of your design for demonstration