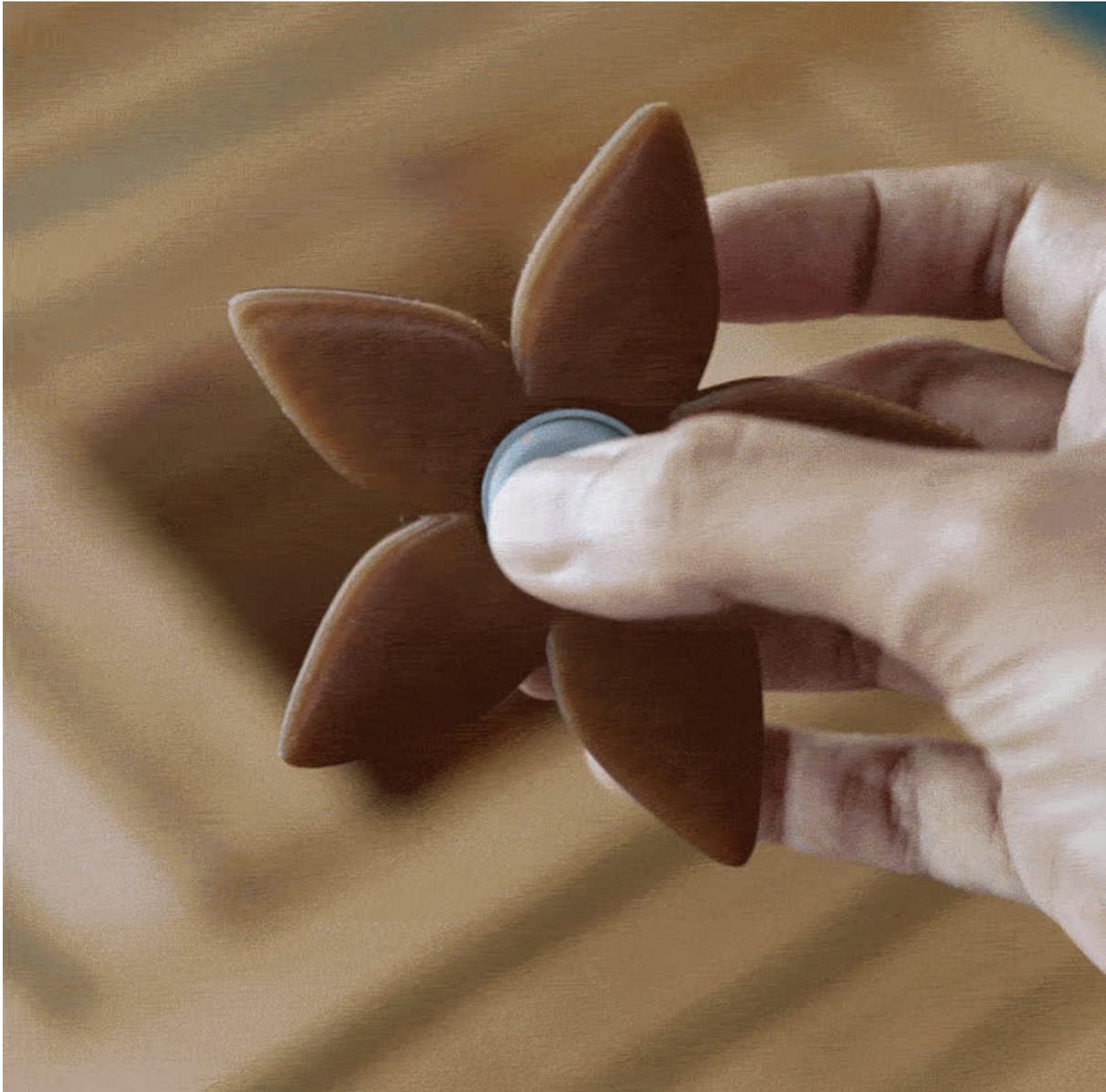




# 3D Printed Fidget Spinner

Created by Ruiz Brothers



<https://learn.adafruit.com/3d-printed-fidget-spinner>

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# Overview

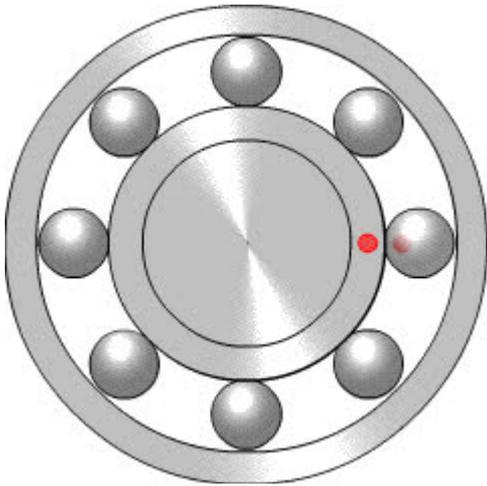
## DIY Spinner Toys

A fidget spinner is a simple and basic handheld toy meant for mindless fidgeting. These toys are one of those "I don't get it" things, until you play with one. Fidgeting is actually very helpful for people with ADD/ADHD and even anxiety, but you don't have to have a disorder to appreciate them.



## The Trend & Hype

There's been a sudden explosion of fidget spinner designs on sites like [Thingiverse.com \(https://adafru.it/tBZ\)](https://adafru.it/tBZ). Most of them use a standard 608ZZ ball bearing to spin freely. They can be purchased online and cost anywhere from \$1 – \$20, but you could easily 3D print and make your own for a few cents! The recent trend of fabricating your own seems to vibe nicely with the maker community and even more so with 3D printing.



## How They Work

In the center of the spinner, is a radial 608ZZ ball bearing. Two fingers (typically the thumb and middle) grasp onto the center of the ball bearing while a third finger flicks the spinner. They came in many different shapes and sizes but all work in the same manner.

## What's a Ball Bearing?

From wikipedia:

A ball bearing is a type of rolling-element bearing that uses balls to maintain the separation between the bearing races. The purpose of a ball bearing is to reduce rotational friction and support radial and axial loads. It achieves this by using at least two races to contain the balls and transmit the loads through the balls.



## Parts & Supplies

You'll need the following parts to build this project.

- [Radial Ball Bearing 608ZZ \(http://adafru.it/1178\)](http://adafru.it/1178)
- [Reel Butter – Bearing Lubrication \(https://adafru.it/tCO\)](https://adafru.it/tCO)

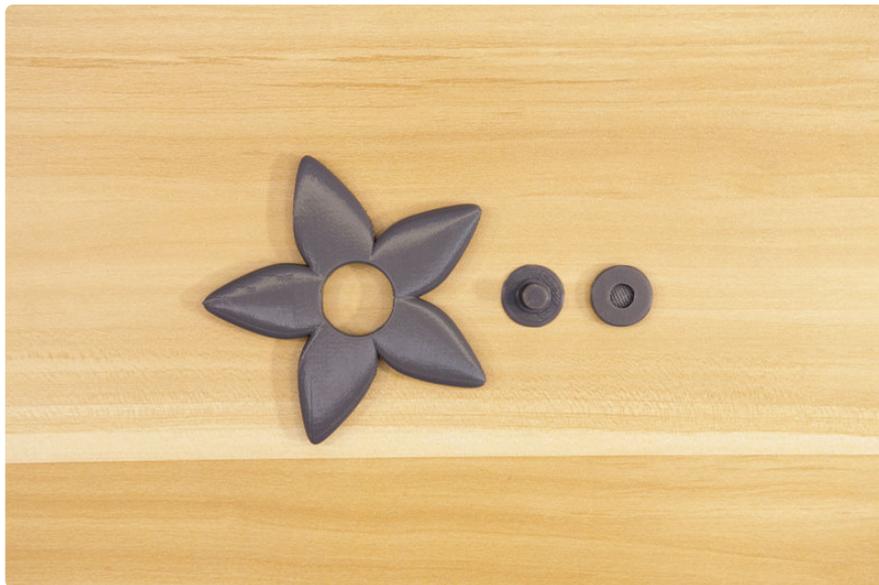
- Alcohol
- Paper Towels

## Tools

The following tool will assist you in building this project.

- [3D Printer \(https://adafru.it/diH\)](https://adafru.it/diH) & [Filament \(http://adafru.it/2080\)](http://adafru.it/2080)
  - [Flush diagonal cutters \(http://adafru.it/152\)](http://adafru.it/152)
  - Hobby Knife
- 

## 3D Printing



## The Design

This spinner was designed to resemble the Adafruit logo. It's symmetrical and contains zero flat surfaces. The curvatures in the geometry gives the part a very smooth surface. Two additional pieces mount to the ball bearing, essentially forming a finger "rest" for easily holding the center.

## Organic T-Splines

The shape was 3D modeled in Autodesk Fusion 360. It was created using t-splines, which is apart of the sculpting environment and toolset. The design is free to download and modify.

Download Source File

<https://adafru.it/tDg>

Download STLs on Pinshape

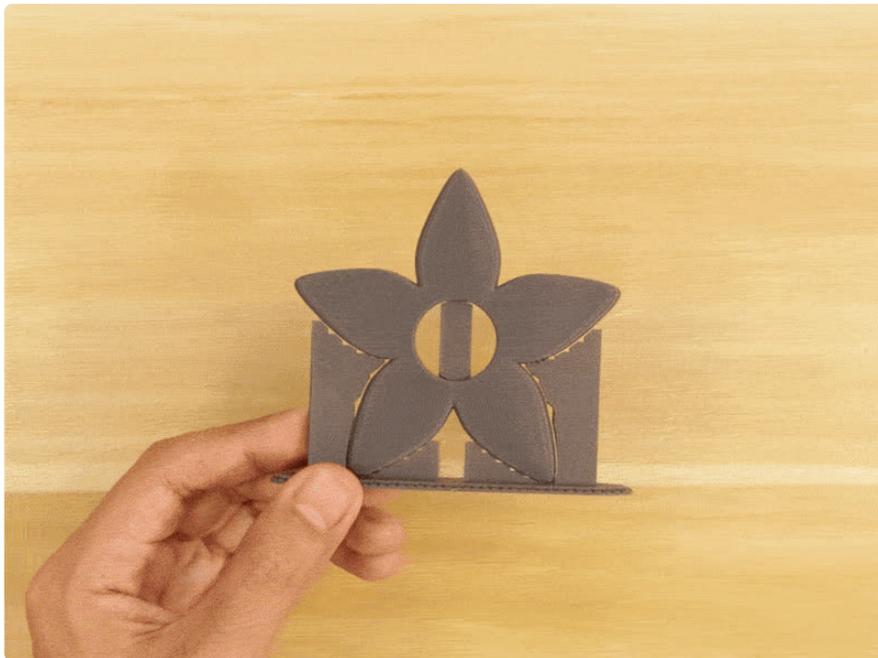
<https://adafru.it/tC3>

Download STLs on Youmagine

<https://adafru.it/tC5>

Download STLs on Thingiverse

<https://adafru.it/tC4>



## 3D Printing

Because this part features no flat edges, it will require support material to 3D print properly. It is positioned vertically to produce the best quality and surface finish. Most slicing software for 3D printers are capable of producing support material. A raft is also necessary for properly adhering the part to the bed.

If you don't have access to a 3D printer, can you upload the STL file to [3D Hubs](https://adafru.it/tC1) (<https://adafru.it/tC1>) and have a local hub 3D print and send the parts to you.

## Slice Settings

Below are some recommended slice settings.

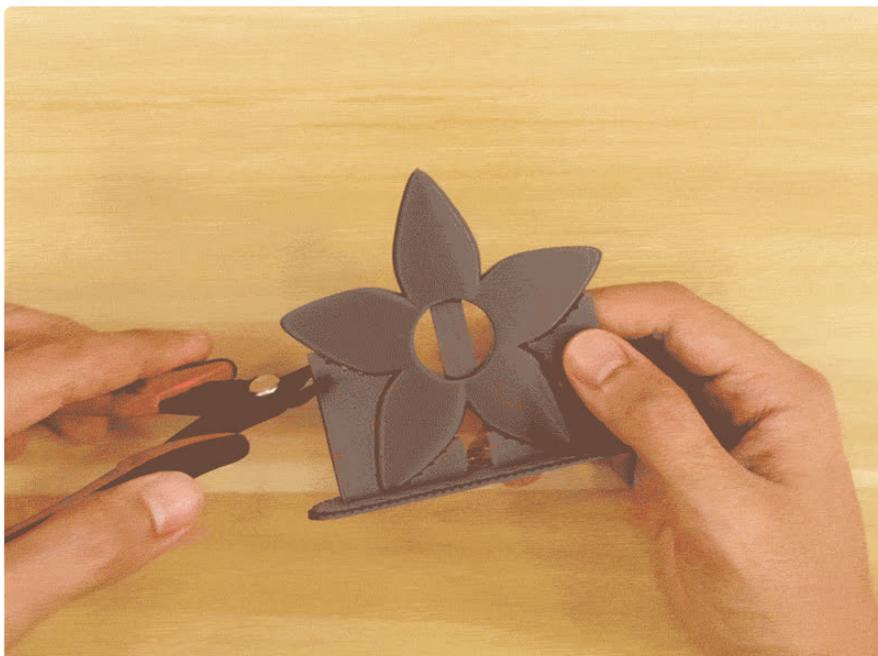
- PLA @ 220C extruder / 65C bed
- Bluetape on non-heated beds
- Support and Raft required
- 20% Infill
- 2 shells/perimeters
- 60mm/s printing speed

## Support Settings

- support type: everywhere
- 45 degree overhangs
- support infill density 15%
- horizontal offset from part 0.30mm

## Raft Settings

- 3 surface layers
- offset from part 3.00mm
- separation distance 0.14mm
- raft infill 50%



## Removing Support Material

A pair of flush diagonal cutters can help remove support material from the part. It can also be removed by hand if it's of high quality.



## Vertical VS Flat

If you're having issues 3D printing the part vertically, you can optionally 3D print it flat on the bed using the [ada-spinner-flat.stl](#) file. I recommend setting the **External Fill Pattern** option to **Concentric** (if your slicer has this feature) – This will generate interesting patterns on the surface of the part. There is no support or raft required for printing it flat, nice!

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## Assembly



### Remove Cover

These radial bearings have "non-removable" covers that keep the balls free from dirt and debris. In order to produce more spin, we'll need to remove them and clean out the grease from the balls. You can remove the covers from the bearings with a hobby knife. Press the tip of the blade into the inner side of the cover until it's punctured.

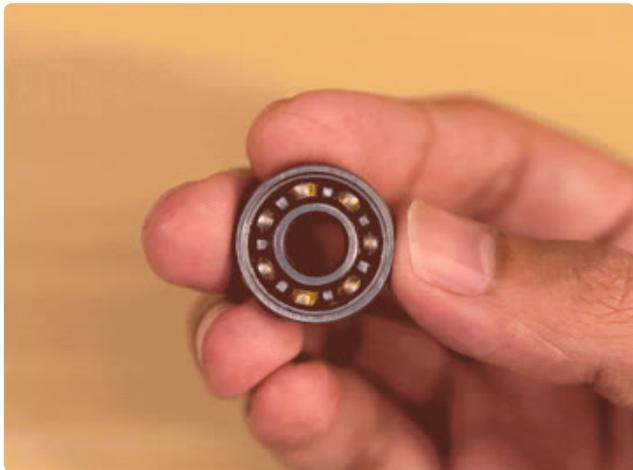


## Covers Removed

Then, use the tip of the blade to get underneath the indentation and lift it away from the bearing. It should then easily pop off.

Use one of your old pocket knives or a precision screwdriver you don't care about for this task!

Be extremely care not to cut yourself while doing this! Parental guidance is advised for younger makers.



## Remove Grease

Inside the bearing you'll find 7 balls. Although they're pre-greased, the bearings don't spin as much as they could. Instead, we'll use a special bearing lubrication mean for high performance. But first, we'll need to remove the grease. I recommend using a needle to scrape off chunks and a paper towel.



## Clean Bearings

Once you've removed as much grease as you can, it's a good idea to apply some alcohol to the bearings. Alcohol helps break down the grease and them cleans out. Use a paper towel to soak up any excess alochol and rub them down.



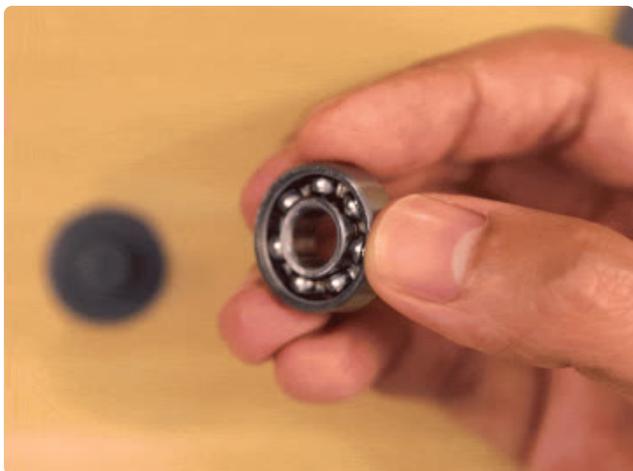
## Bearing Lubrication

Synthetic lubrication feature ultra-low viscosity which allows it to penetrate bearings to provide silky smooth performance. I used "Reel Butter" in this project, but any brand of bearing lube will provide good results.



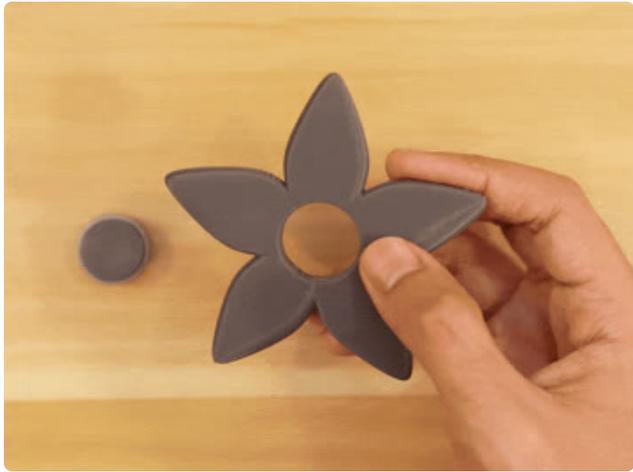
## Apply Lube

It only takes 2-3 drops of lubrication to loosen up the bearings. Once applied, spin the rings several times to work the solution into the balls.



## Install Finger Rests

Finger rests will make it easier to gasp onto the center of the spinner and provides a guard. Start by inserting the cover with the nub into the center of the bearing. It's a tight fit, so you'll need to apply pressure. Press the nub until it's all the way through the bearing. Then, flip the bearing over and place the cover over the protruding nub. Squeeze them tightly until they snap together.



## Install Bearing Set

Now you can install the ball bearing into the spinner. It should have a pretty tight fit, so you'll need to apply some pressure to fit the bearing into the center of the spinner. Any that's it! Now you have a sweet little toy :-)