# 3D PRINTED ASTROPHOTOGRAPHY CELLPHONE MOUNT

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# ABSTRACT

With rapid advances in technology, smart phones have become more accessible to average individuals, replacing and sometimes even exceeding the performance of other single-purpose tech gadgets. One such example is the camera. In today's day and age, people are more inclined to take pictures with their smart phone due to their portability and convenience. As such, amateur stargazers may benefit from an apparatus that allows them to take photographs of the night sky with their smart phones. While products exist on the market today intended to mount cellphones to telescopes, their high prices make them undesirable to most amateur astro-photographers.

To address this problem, our group has designed a simple, adjustable phone mount intended to work with most smart phones. The mount can be easily printed by a 3-D printer for a fraction of the cost compared to the commercial mounts sold today. After several iterations, the final design comprises two parts made from thermoplastic that not only ensure safe attachment of the user's phone but sturdy mounting to a 1.25 inch telescope eyepiece. Additional supplies needed to secure the two parts together are available in any retailer that offers home improvement or hardware supplies. In total, the phone mount costs approximately $2 to print and assemble. Tests are currently underway to evaluate stability and durability.

# VERSION 1

Inspiration
- Commercial phone mounts (Orion Telescopes, n.d.)
- Selfie sticks (Amazon.com, n.d.)

Pros
- Had so many cons it lead the team to a better direction

Cons
- Extremely large
- Longer printing time
- Unwieldy and awkward to operate
- Higher cost of materials
- Did not accommodate larger phones or phones with side cameras
- Did not grip the telescope eyepiece securely
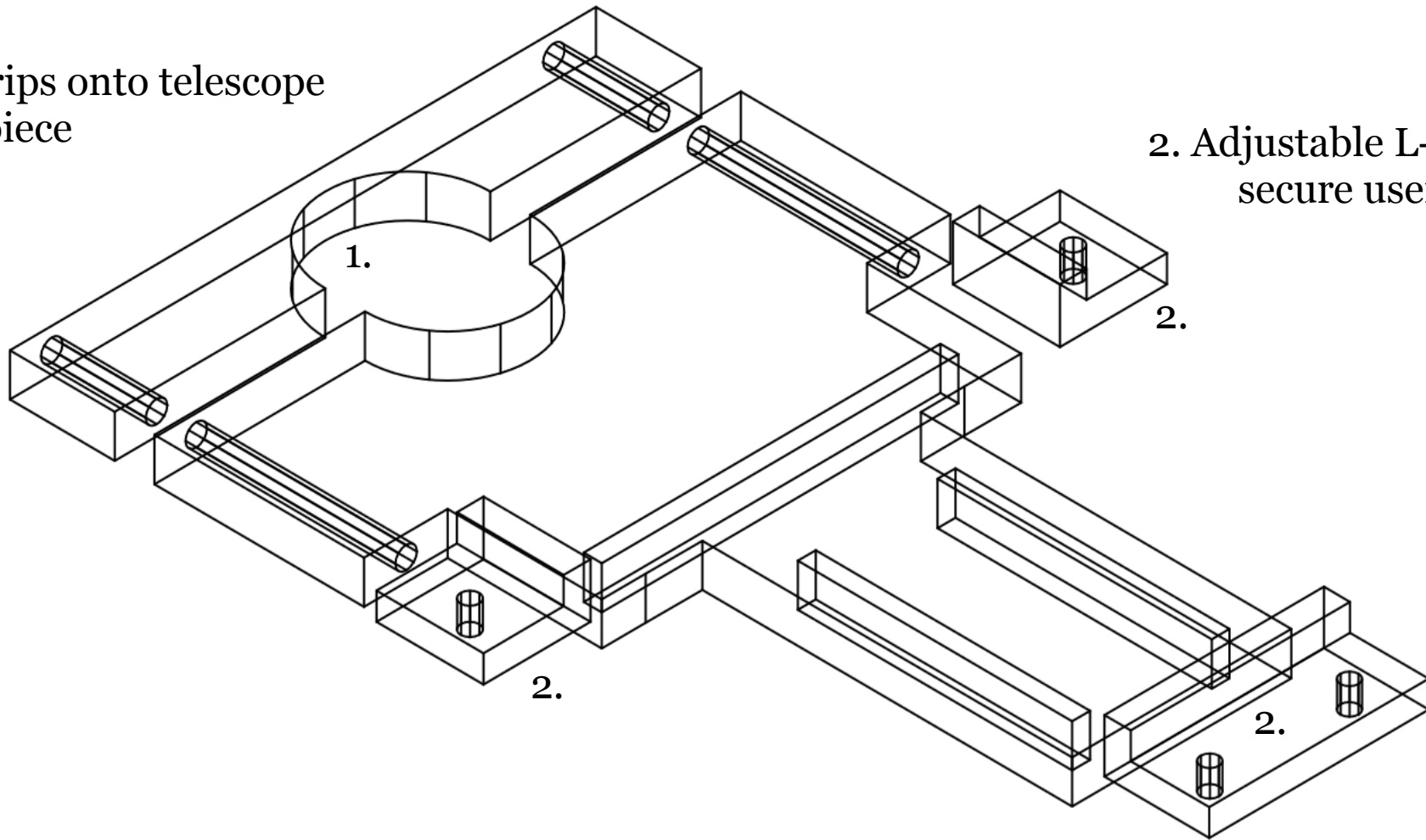


(Amazon.com, n.d.)



(Orion Telescopes, n.d.)

# VERSION 1



1. Grips onto telescope eyepiece

1.

2. Adjustable L-pieces to secure user's phone

2.

2.

2.

A total of five parts, excluding hardware for assembly.

# VERSION 2
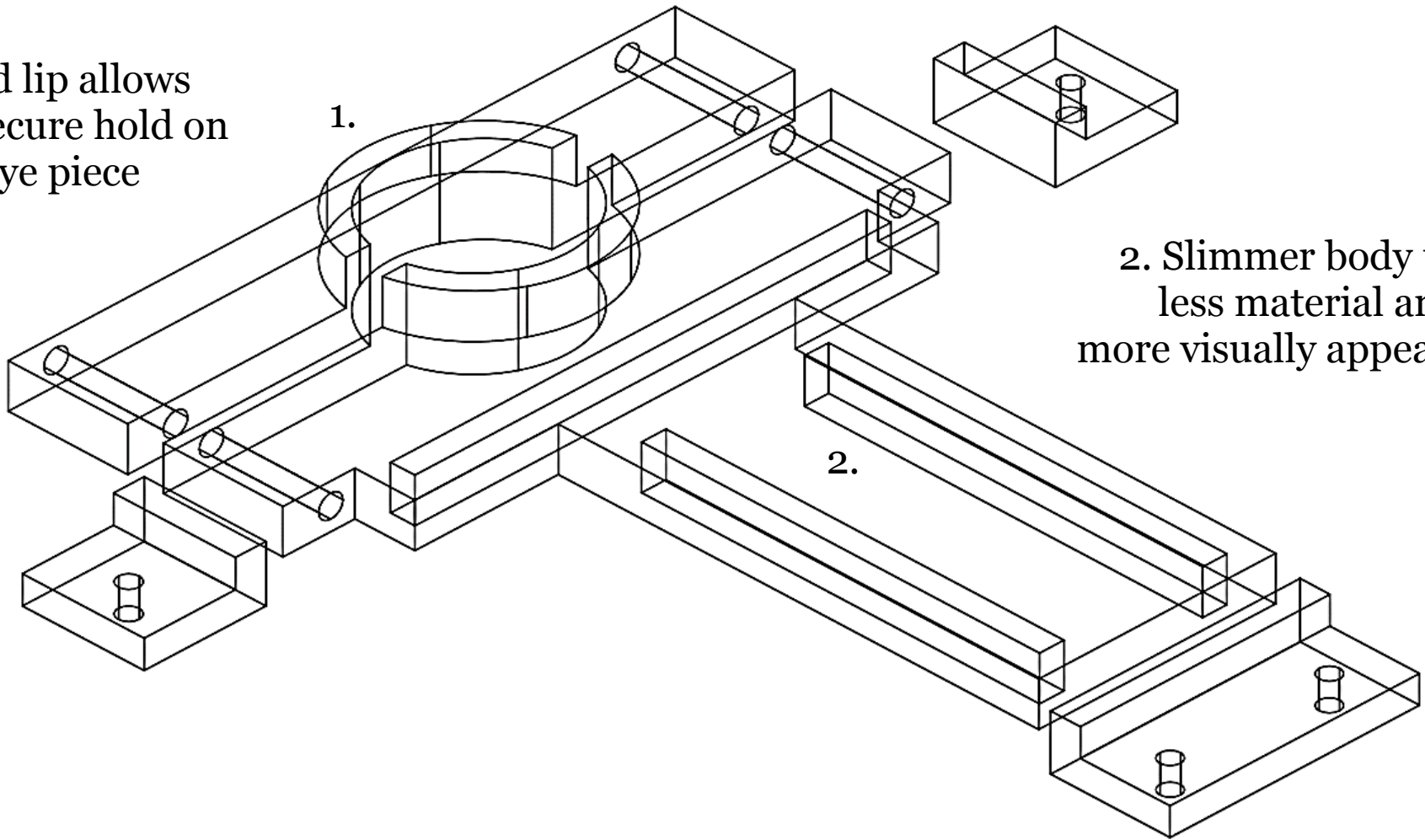
Fixed many issues with Version 1

Pros
- Much slimmer in design
- More aesthetically pleasing
- Shorter print time
- More secure grip on eyepiece with extended lip

Cons
- Does not allow larger phones much adjustment in x-direction
- Still does not accommodate phones with side cameras

# VERSION 2

1. Extended lip allows for more secure hold on telescope eye piece

1.

2. Slimmer body uses less material and is more visually appealing

2.

A total of five parts, excluding hardware for assembly.
Print time: 7 hours and 30 minutes
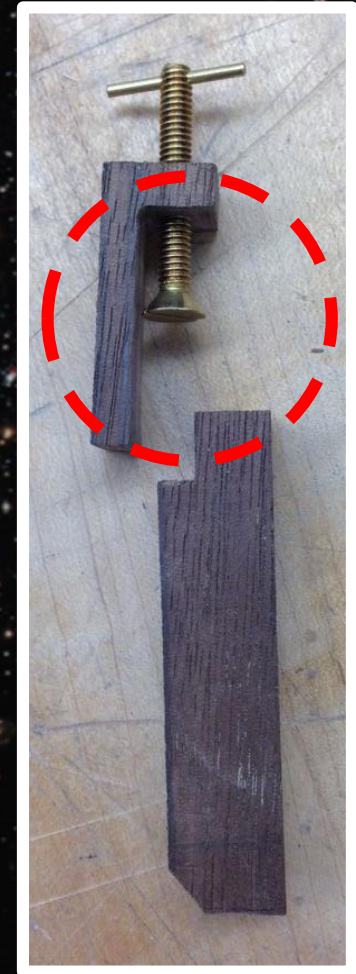
# VERSION 3

Inspiration

- C-Clamp iPhone Stand by Nick Nawa (Nawa, 2015)

Pros

- Accommodates larger phones and allows for more adjustment in x-direction
- Generally more compact design than previous iterations
- Only two printed parts
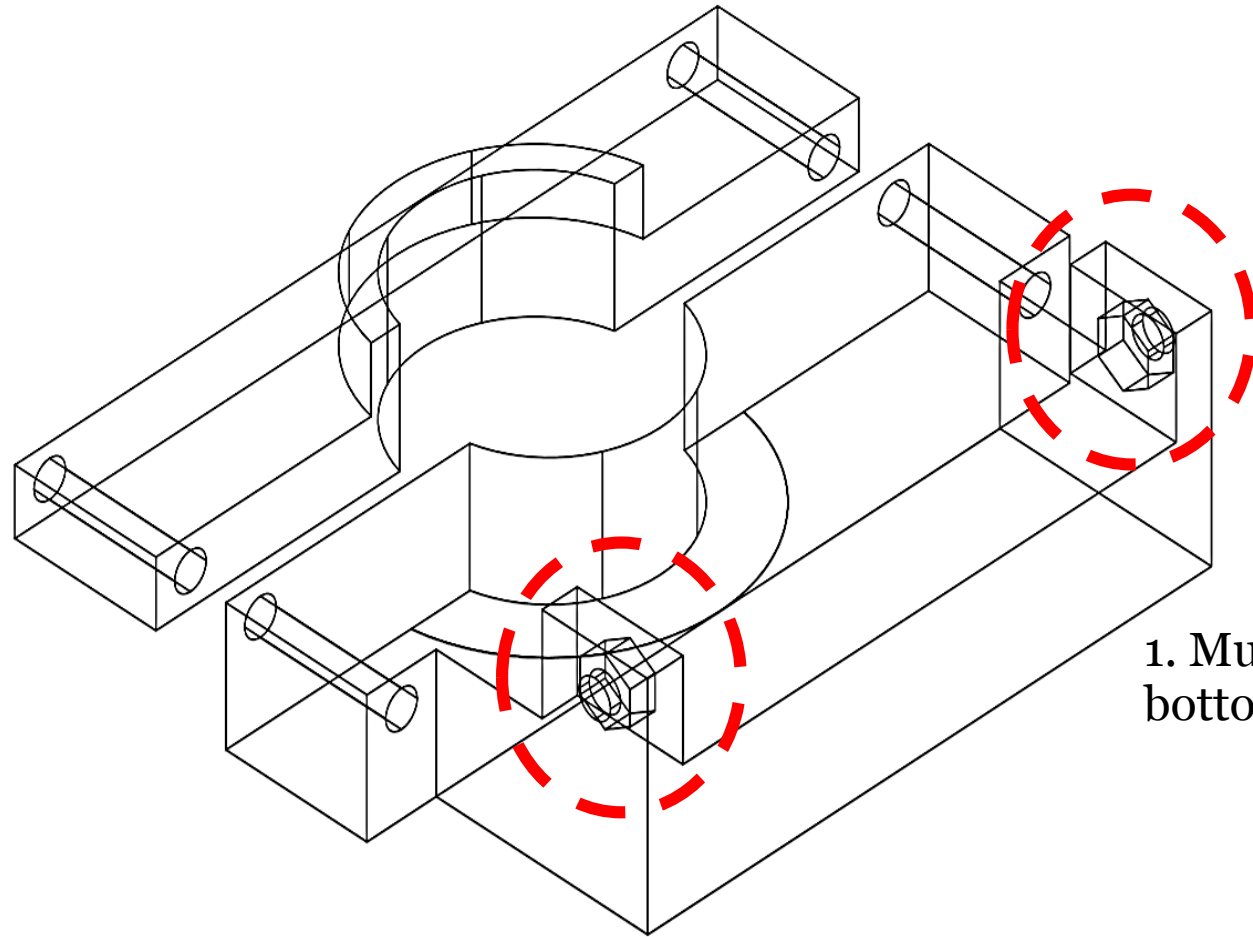- Fewer pieces of hardware needed to assemble

Cons

- Bottom pieces thicker than Version 2 due to the 3D printer's limitations
- Still does not accommodate cameras with side cameras



(Nawa, 2015)

# VERSION 3



The mount in action:

1. Much shorter bottom piece

A total of two parts, excluding hardware for assembly.
Print time: 5 hours and 18 minutes

# FUTURE VERSIONS

## Version 3
- Testing for safety and stability underway
- Possible exploration in using a different type of 3D printing material

## Version 4
- More compact
- Accommodation for side-camera phones
- Alternative method of attaching to eyepiece

References

[1] Nawa, N. (n.d.). C-Clamp iPhone Stand. Retrieved February 5, 2015, from http://www.instructables.com/id/C-Clamp-iPhone-Stand/

[2] Orion SteadyPix Pro Universal Camera/Smartphone Mount, 1.25"t | Orion Telescopes. (n.d.). Retrieved January 1, 2015, from http://www.telescope.com/Orion-SteadyPix-Pro-Universal-CameraSmartphone-Mount-125/p/103503.uts

[3] Selfie Stick, Flexion™ QuickSnap Pro 3-In-1 Self-portrait Monopod Extendable Wireless Bluetooth Selfie Stick with built-in Bluetooth Remote Shutter With Adjustable Phone Holder for iPhone 6, iPhone 6 Plus, iPhone 5 5s 5c, Android. (n.d.). Retrieved March 25, 2015, from http://www.amazon.com/Flexion-QuickSnap-Self-portrait-Extendable-Adjustable/dp/B00THQZ53A/ref=sr_1_1?s=wireless&ie=UTF8&qid=1427319035&sr=1-1&keywords=selfie stick