JACOBS INSTITUTE FOR DESIGN INNOVATION
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Snowboard Helmet Phone Mount

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Problem

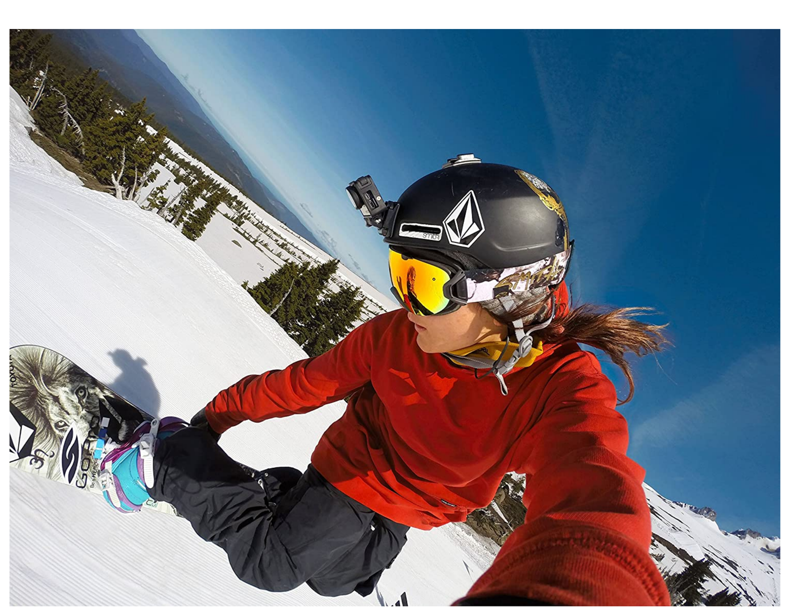
It is unsafe to use a phone to record video while snowboarding. Most action cameras on the market cost hundreds of dollars.

Market Need

The potential users include the 125 million recreational and advanced snowboarders and skiers across the globe.

Differentiation

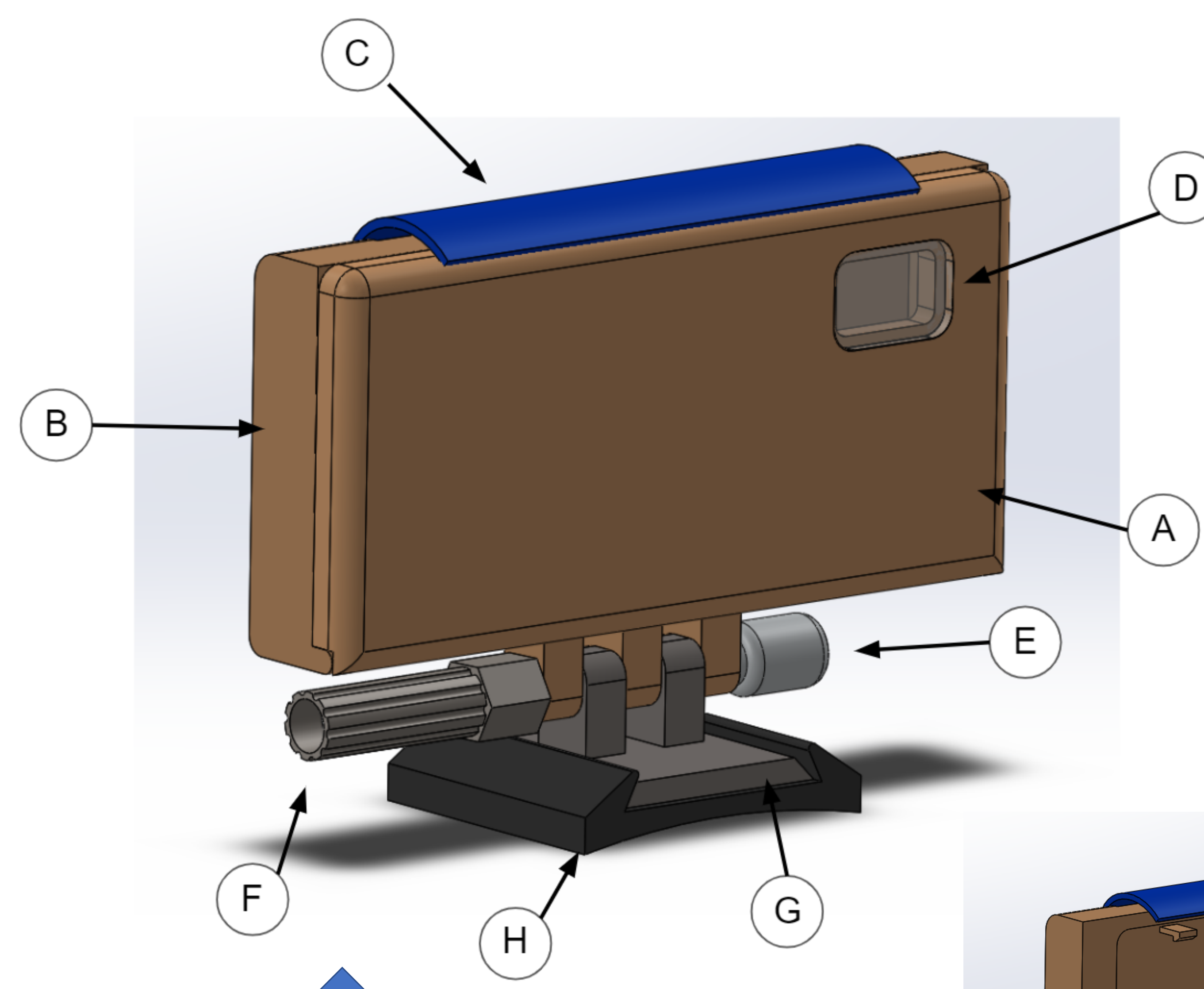
Not everyone can afford a professional action camera, though most people have a smartphone with a sufficient video camera. Thus, we see the opportunity for snowboarders to use their very own smartphone as an action camera. Currently the problem is solved with the GoPro, which will easily cost more than $200 without the multiple accessories needed to operate in action. Our solution will be much more cost efficient by utilizing the rider's smartphone camera as an action cam. Hundreds of dollars worth of gear and accessories will be saved with our action helmet mount.



DESIGN

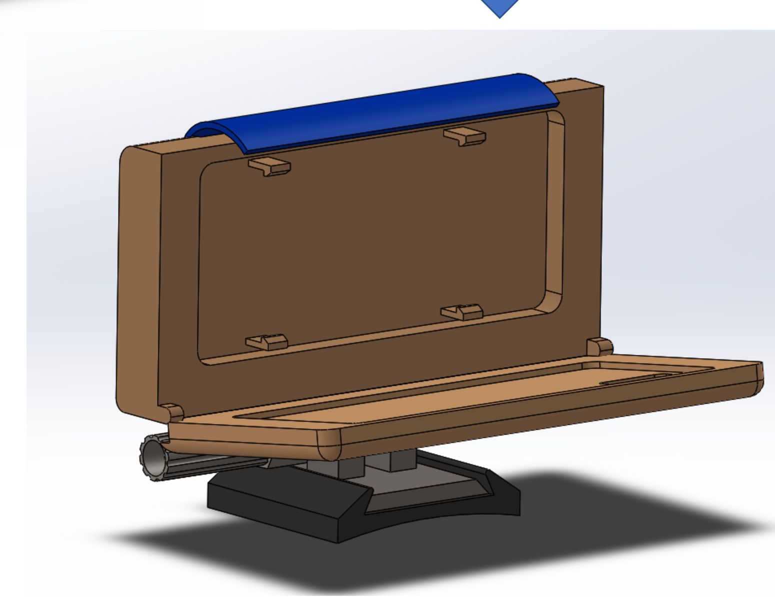
Parts

- A: Front Phone Housing
- B: Back Phone Housing
- C: Housing Clamp
- D: Frontal Lens
- E: Twisting Clamp Rod
- F: Handle Nut
- G: Rotating/Sliding Mount
- H: Helmet Mount

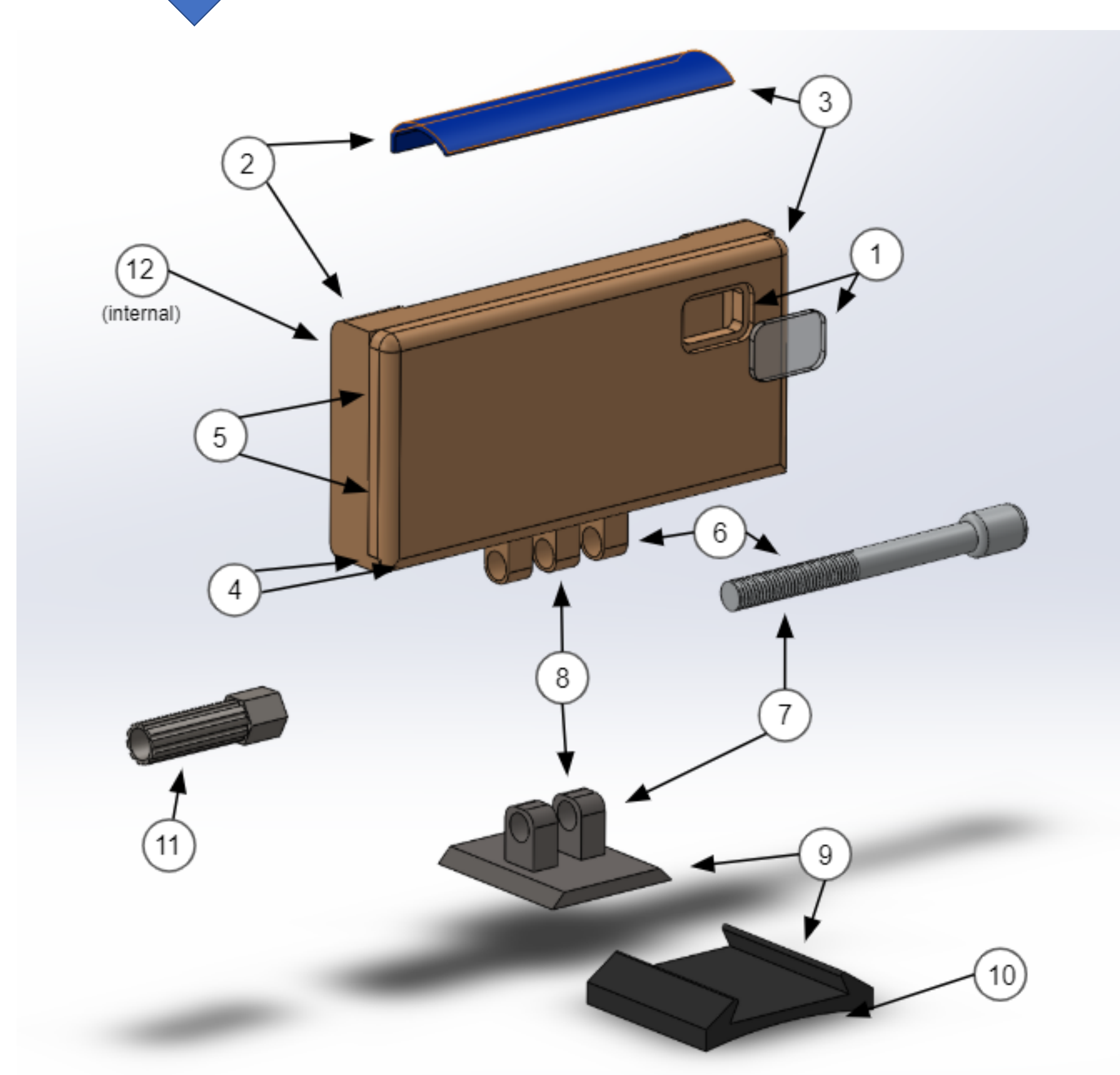


Closed

Open



Exploded



Fits and Tolerances

- 1: RC9 | **D:** -0.008/-0.012 **A:** 0/0.006 | allow easy assembly and adhesion
- 2. Snap Fit (annular) | **C** snaps into **B** | secured clamp, allows rotation
- 3: Snap Fit (cantilever) | **C** snaps into **A** | locks case shut, can be snapped open
- 4: Snap Fit (annular) | **A** snaps into **B** | easy assembly, secured rotation
- 5: RC4 | **A:** -0.0005/-0.0011 **B:** 0/0.0012 | full seal, allows temp. changes
- 6: LT2 | **B:** 0/0.0009 **E:** 0.0003/-0.0003 | stays still, allow disassembly
- 7: LT2 | **G:** 0/0.0009 **E:** 0.0003/-0.0003 | stays still, allow disassembly
- 8: RC4 | **B:** 0/0.0009 **G:** -0.00055/-0.0011 | removable but clamps w/ force
- 9: Snap fit (annular) | **G** snaps into **H** | stays still but can be removed
- 10: RC7 | **H:** -0.004/-0.0058, from helmet | clearance for adhesive
- 11: RC7 | **F:** -0.0016/-0.0025 **E:** 0/0.0014 | unthreaded handle slides easy
- 12: Snap fit (cantilever) | phone snaps into **B** | easily secured phone

Prototype Cost

PLA Filament: $0.00
Clear Acrylic: $0.00 (our piece is small, so it is easy to find scrap material)
1/2" Solid Round Bar, Cold Rolled Steel: $1.50
Total Cost: $1.50
Note: this does not include machine and machine use costs and PLA filament costs, since the university provides many of these resources for free

Material and Process Selection

Processes: 3D Printer, Laser Cutter, Lathe
Materials: PLA Filament, Clear Acrylic, Steel bar

- Type A 3D printing provides the tolerances and sturdiness that we needed while being cheap, easy, and minimizes material wastage that an injection molding would produce.
- For the frontal lens, a laser cutter and acrylic are easily accessible and quick to manufacture.
- For the clamp rod and nut, lathing from a solid metal bar would provide the tolerance and sturdiness needed due to their importance in the overall product.

Scale-up Production Plan

For the front phone housing, back phone housing, housing clamp and helmet mount we chose 3D printing as our manufacturing process rather than injection molding since it is too expensive for a single part. However, for mass production, injection molding is preferable since 3D printing takes too much time to manufacture each part. In addition, injection molding allows us to produce stronger parts than if the parts were 3D printed, which is an important benefit for our product. Parts like the handle nut and clamp rod may also be substituted for available purchased parts and the acrylic can be switched to a clearer material like tempered glass.

Reflection

Throughout the project, we learned the importance of keeping tolerancing in mind when designing and manufacturing. We learned that the tolerances selected must be achievable with the available processes. Also, we learned the importance of integrating store-bought parts to allow us to feasibly build complex products. Through our group work, we were able to come to unanimous decisions through constructive meetings, which maintained enthusiasm and collaboration.

If we were to do the project again, we would consider more ergonomic designs and keep the user in mind, while working to minimize size and cost. Also, when working together virtually, we would look to work more collaboratively and receive feedback from teammates consistently.

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