



## LESSON GUIDE

# CAMERA AND PHONE-ACCESSORY CHALLENGE



<b>Level</b>	Beginner
<b>Academic Connections</b>	Engineering, Prototyping, Design Thinking, Design for Manufacturability
<b>Core Concepts</b>	Design, Design Optimization, Engineering Design, Print Optimization, Assembly, Computer Aided Design (CAD)
<b>Duration</b>	2- 3 weeks

In this project, students will design gadgets that can help take photos or videos. These can be added to conventional cameras, cellphones and action cameras.

### LEARNING OBJECTIVES

By the end of this workshop, the student will be able to:

- Design a new camera or video accessory that provides a unique benefit for the user.
- Prototype and test concept designs with 3D printed parts.
- Produce a final part that interfaces with a camera or video accessory that improves user experience.

### ESSENTIAL QUESTIONS

1. How did you personalize your camera and improve the user experience?
2. What aspects did you modify?

- a. Protection from mechanical damages and moisture
  - b. Stabilization – easier to hold steady for better shots
  - c. Attachments to enable self-shots and action shots
  - d. Ergonomics for easier handling and personalization
  - e. Customized appearance
3. How did 3D printing technology allow you to create custom components that suit your needs and preferences?

### DESIGN TIPS

1. The minimal wall thickness that can be reliably printed is 0.6 mm. For load bearing parts wall thickness should preferably be over 1.5 mm and column diameter over 2.5 mm.
2. When designing moving parts that are printed as one piece leave a clearance of ~0.1-0.3 mm (PolyJet™) or ~0.5 mm (FDM®) between parts. When designing parts that are assembled after printing, leave ~0.1 mm clearance for both systems.
3. Consider the material you use in your printing. For example, you can use:
  - a. ABS-M30™ or Digital ABS™ for higher mechanical properties in load-bearing parts
  - b. PolyJet rubber-like materials for protection, vibration absorption or as a soft-feel coating
  - c. Colored materials for a customized appearance
4. Print prototypes of your design, test them and improve them accordingly.

### REQUIREMENTS

- Educator PC with access to:
  - Microsoft PowerPoint
  - QuickTime
  - Internet connection
- Projector
- 3D printers
- CAD design tool

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## SUGGESTED NEXT LESSONS

### CREATURE

Design the head of an original creature. Post-finish your model with paint of your choice.



### COMPUTER MOUSE

Keeping the users of your product in mind, design a wireless mouse that will provide optimum comfort and performance.



### CHESS SET

Design a chess set that includes six unique game pieces: pawn, rook, knight, bishop, queen and king.



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### HEADQUARTERS

7665 Commerce Way,  
Eden Prairie, MN 55344  
+1 800 801 6491 (US Toll Free)  
+1 952 937-3000 (Intl)  
+1 952 937-0070 (Fax)

2 Holtzman St., Science Park,  
PO Box 2496  
Rehovot 76124, Israel  
+972 74 745 4000  
+972 74 745 5000 (Fax)

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