

MODULAR CAMERA

PERSONAL EXPLORATION PROJECT

SOUTH BEND, IN / NOVEMBER 2019 - APRIL 2020

CHALLENGE

Photography and videography are my most enjoyed hobbies. However, they can also be the most frustrating ones, ironically due to the cameras themselves. I set myself a personal objective to investigate the problem and *to explore how cameras can be improved by using a modular system*. (Special thanks to industrial designer Hector Silva for providing amazing mentorship for this project!)

ROLE: PRODUCT DESIGNER

- Researched user needs, designed conceptual camera models, conducted A/B testing for camera users.
- Constructed CAD models as well as 3D prototypes.

WHAT CAUSES THE FRUSTRATION?

Different Cameras for Different Occasions

There are many different types of cameras available ranging from point-and-shoot to mirrorless and DSLR to action. Each have different range of functionality, performance, and ease of carry. Bringing around lots of equipment and gear can be annoying and expensive, especially for those who prefer to invest in just one camera that can do everything.

Lack of Upgradability

It is natural for technology to advance and bring new features to products such as cameras. However, it is frustrating when you have to buy an entirely new camera just to get one simple feature that you have been waiting for.

It would be convenient if one could simply swap out components or add on new features on to the camera body. This would allow users to adapt their cameras to their needs and convenience.

The answer to this problem was modularity.

I first looked into how cameras could be broken down into various components and functionalities.

Figure 2a: Camera Components

I analyzed how cameras can be broken down and how different parts can be turned into modules. I looked at Google's Project Ara for inspiration.

Connectivity

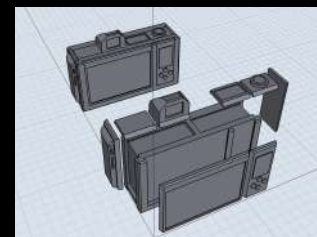
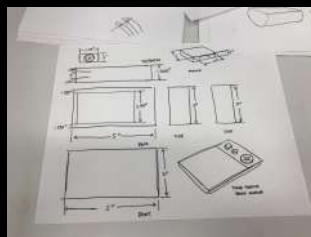
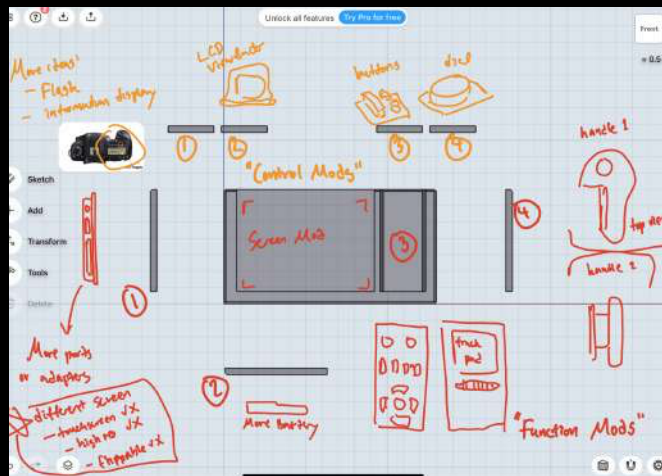
- Bluetooth
- Wi-Fi
- (Cellular ?)
- Ports (USB-C, HDMI, etc)
- Additional storage

Camera Control

- Shutter button
- Mode/command dials and buttons
- Viewfinder

Device Navigation

- Screen
- D-Pad, Selector/Function buttons



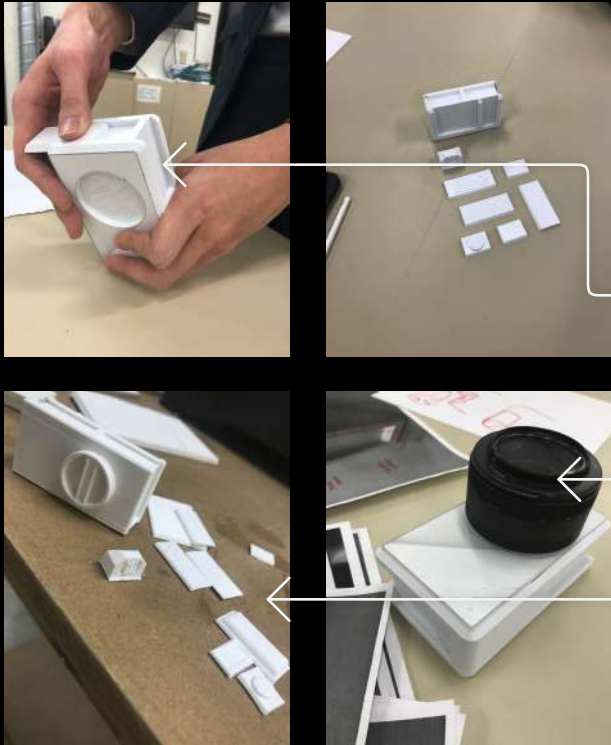


Figure 2b: Testing the Form Factor

I created a CAD model of how a modular camera would be like, and I also 3D printed it so that I could double check how it would feel in person and how a user would interact with it.

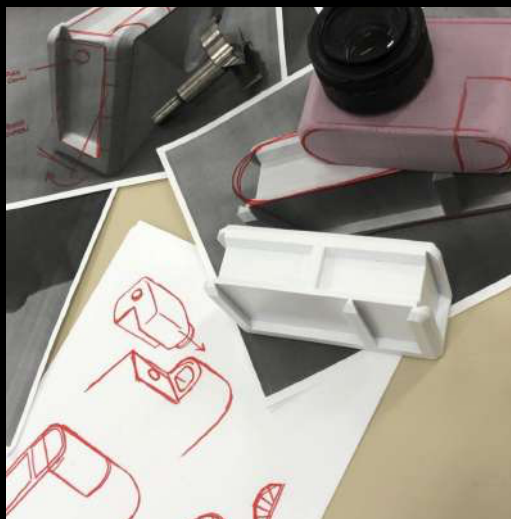
Slots where various modules can be fitted into. This would allow users to customize their cameras to their needs. The original plan was to design these slots in a concave joinery (complemented by magnets) to keep them fixed firmly.

Tested with real camera lens to simulate usability.

Modules can come in two different sizes: a single tile and a long tile (which has the size of two single tiles). Modules can have different functionalities and can be upgraded easily when new technologies are formed.

Figure 2c: Redesign Process

The original design looked too bare and was boxy for comfort and aesthetics. I took design cues from cameras such as Fujifilm X-T200 and Sony Alpha a7 to provide a more timeless design. More rounded sides not only made it look sleeker, but made it more comfortable for grip.



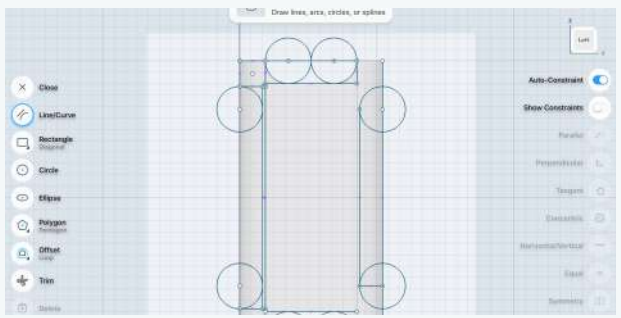


Figure 2d: Engineering Behind the Scene

(Above) Blueprint into the geometry and design created to provide a smoother experience. (Some design cues were taken from Apple.)

(Below) Side view of how mechanical teeth with springs would firmly secure modules once placements of modules are aligned by magnets on the camera body. In order to release, metal wire would be electrified to contract, thus pulling back on the teeth (inspired by Surface Book docking system).



OUTCOME

It was quite a new experience working on a physical product project after being accustomed to digital design. Regardless, it was very fun getting to be hands-on with my project and going through the design process in person. I also learned more about human-centered design from an industrial design perspective.

Although the end result is not a complete functional product, it was a successful conceptual model. Out of 53 people interviewed throughout this project, 77% said they would love to see this product on the market, and 62% said they would buy the product if it is available.

Given more time, I would love to explore the potential of the modular camera and see how it could help reduce electronic waste, which is a growing problem globally. Ideally, people would be able to hold on to their cameras for a longer time and recycle different parts when upgrading or fixing broken parts.

⚠️ "Google's Project Ara failed, why would this succeed?" The answer is simple; mobile phone were not meant to be modular. On the other hand, cameras by nature are already pseudo-modular as lens are removable and attachments can be put on (like computers).

Users have the option to swap displays (high resolution/touch screen/color accuracy) to their needs.



Figure 2d: Final Result

There are many different ways users can style their camera.

Additional accessories like an extended control grip can take advantage of a modular system and provide users with more control and features.

