

# APERTURE CAMERA

## Project

- Digital cameras are commonplace in the world, thanks to the smartphone, so we decided to build one to learn how they work.
- We built a digital camera from off the shelf components that captures high resolution images in RAW and PNG formats and shares the image over a wireless connection.
- We created a project website that contains all the information needed for any individual to build their own Aperture Camera.

## Methods

- We selected readily available, off the shelf components to be used in the camera module, including:
  - A Raspberry Pi Zero 2W single board computer,
  - A Sony IMX477 12 Megapixel image sensor,
  - A viewfinder display,
  - And a lithium-ion battery.
- We applied modern open-source C/C++ libraries to write the camera software, including libcamera, WiringPi, opencv, and libpng.
- We developed the project webpage using mdBook and hosted it on GitHub (link available at our table).

## Conclusion

- We created a digital camera that captures high resolution photos and is extensible for more features in the future.
- Creating an open-source educational resource encourages projects to focus on long-term maintainability rather than short-term success.
- A lot of this project involved working with parts of the Linux operating system and software libraries that were not well documented. We successfully learned how to use these tools and created a resource for others who are interested in learning them as well.

## System Overview

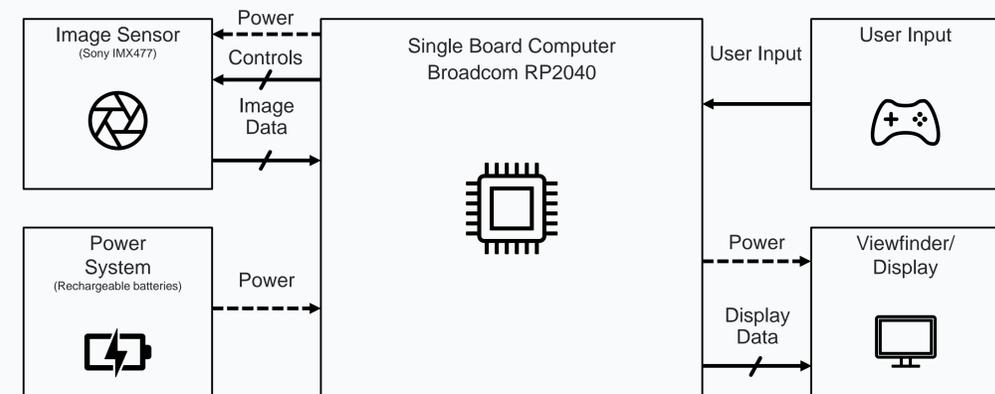


Figure 1. Electrical System Diagram

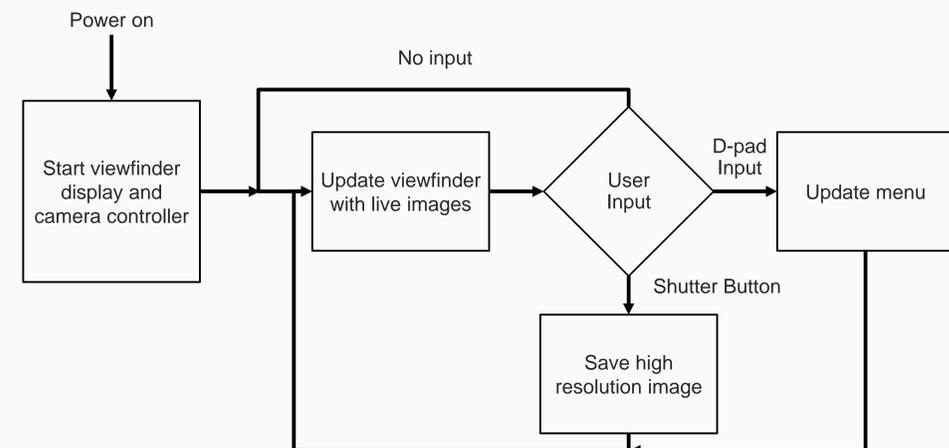


Figure 2. Software System Diagram

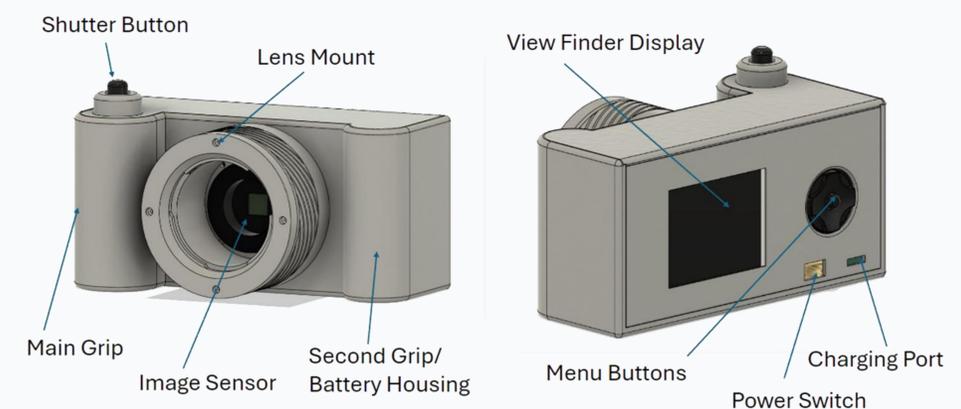


Figure 3. Camera Design