CLIC

Capturing Light Intensity via Camera

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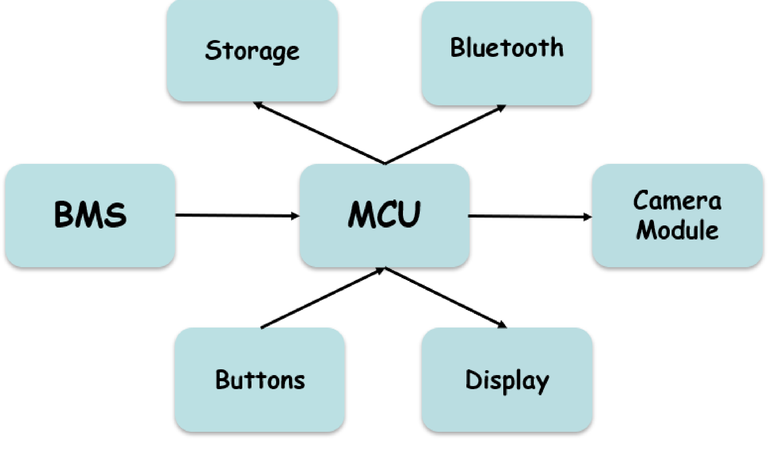
Purpose and Objectives

Our goal was to build a portable and rechargeable digital camera which could be used to take indoor photos. The making of this camera included working with embedded systems, PCB design, and signal processing; topics that were at the intersection of all our interests!

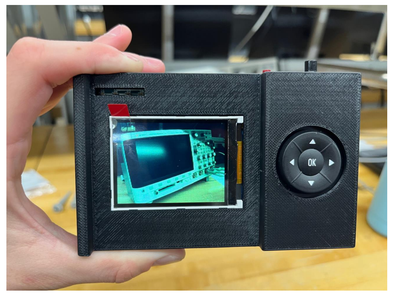
Design Overview

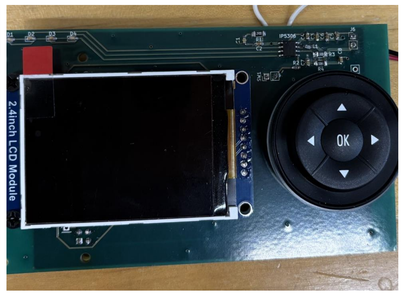
Made with:

- MCU: Raspberry Pi Zero 2
- Camera Module: IMX219 8MP (4k)
- Display: Waveshare 240×320 2.4” LCD
- Storage: External SD card
- Battery: 2.2 Ah Li-Ion 3.7V



The Team & The Camera

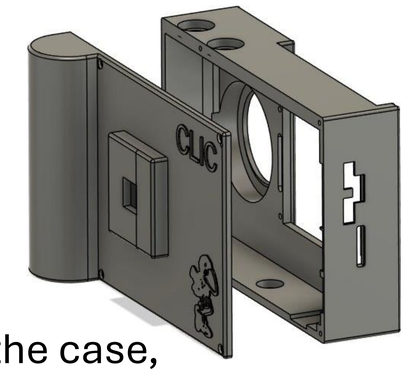




Software Design

The camera firmware integrates the image sensor, display, buttons, and file functionalities. Written in C, it uses the GLFW, libgpiod, V4L2, libpng, and libjpeg libraries. The debayering algorithms and UI logic are custom implementations. Altogether, the user can control features including the exposure, capture delay duration, and JPEG compression quality.

Case Design



The case provides structure and protects the hardware inside. Even though the components are secured directly to the case, different visual effects can be produced by manually adjusting the focus, and interchanging camera lenses.

PCB Design

We designed and printed a 4-layer PCB to compactly package and interconnect the various parts of the camera to fit in the 3d-printed case.