

Context

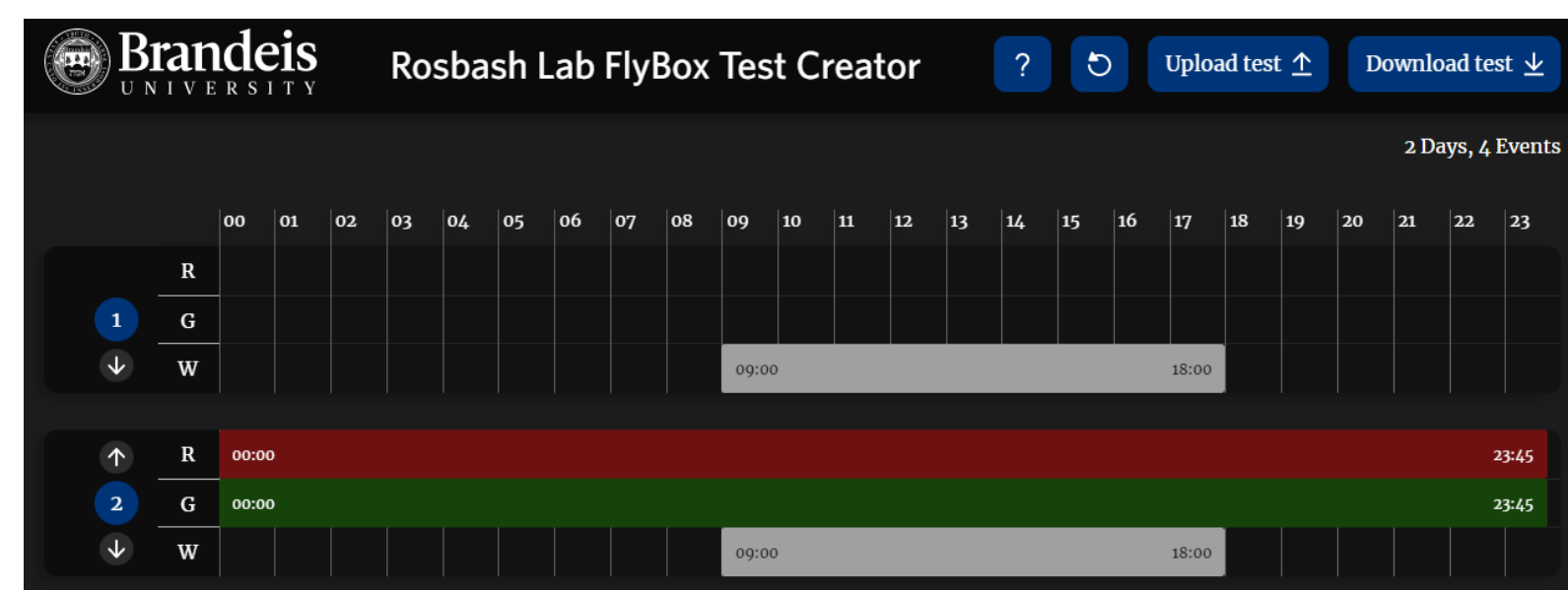
Brandeis's Rosbash Lab does groundbreaking research on circadian rhythms and neuroscience. This research relies upon data collected by the FlyBox, a box designed to house 96 fruit flies in a stable and replicable environment with means for providing video footage of the flies. The improved FlyBox provides a better working experience for researchers at Brandeis and other labs around the world.

Design Requirements

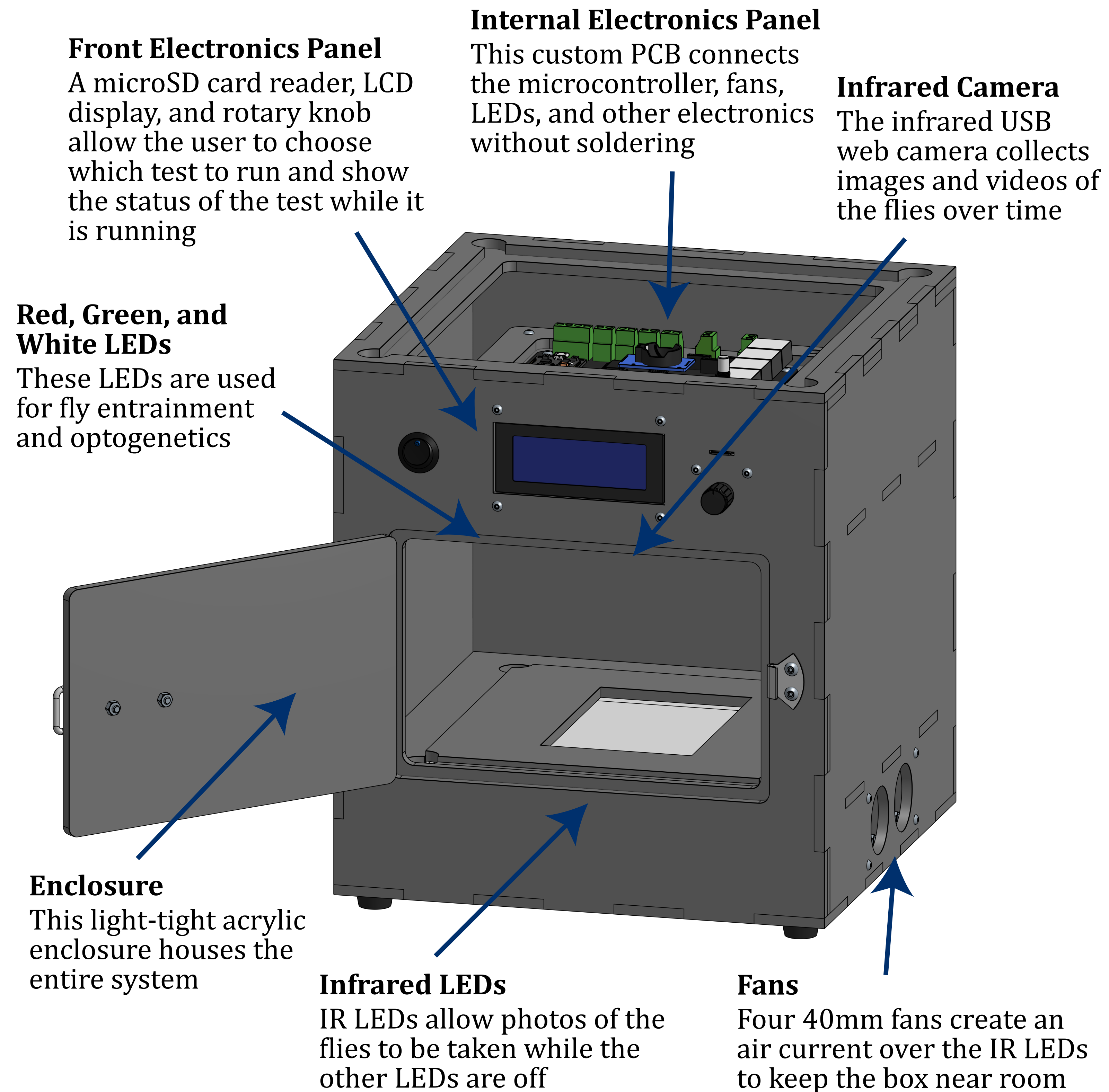
- Light-tight enclosure
- Controllable white, red, and green lights that are diffused across the box
- Controllable IR LEDs that light flies from below
- Active cooling to keep box temperature near room temperature
- Infrared camera capable of taking high-quality photos of flies
- Graphical user interface (GUI) to create and edit FlyBox tests
- Detailed assembly instructions
- Bill of materials (BOM)

FlyBox Test Creator

On the FlyBox Test Creator website, users can easily generate test files and export them onto microSD cards. Test files contain information on when specific lights should turn on and off over the course of several days.



Our FlyBox



Front Electronics Panel
A microSD card reader, LCD display, and rotary knob allow the user to choose which test to run and show the status of the test while it is running

Internal Electronics Panel
This custom PCB connects the microcontroller, fans, LEDs, and other electronics without soldering

Infrared Camera
The infrared USB web camera collects images and videos of the flies over time

Red, Green, and White LEDs
These LEDs are used for fly entrainment and optogenetics

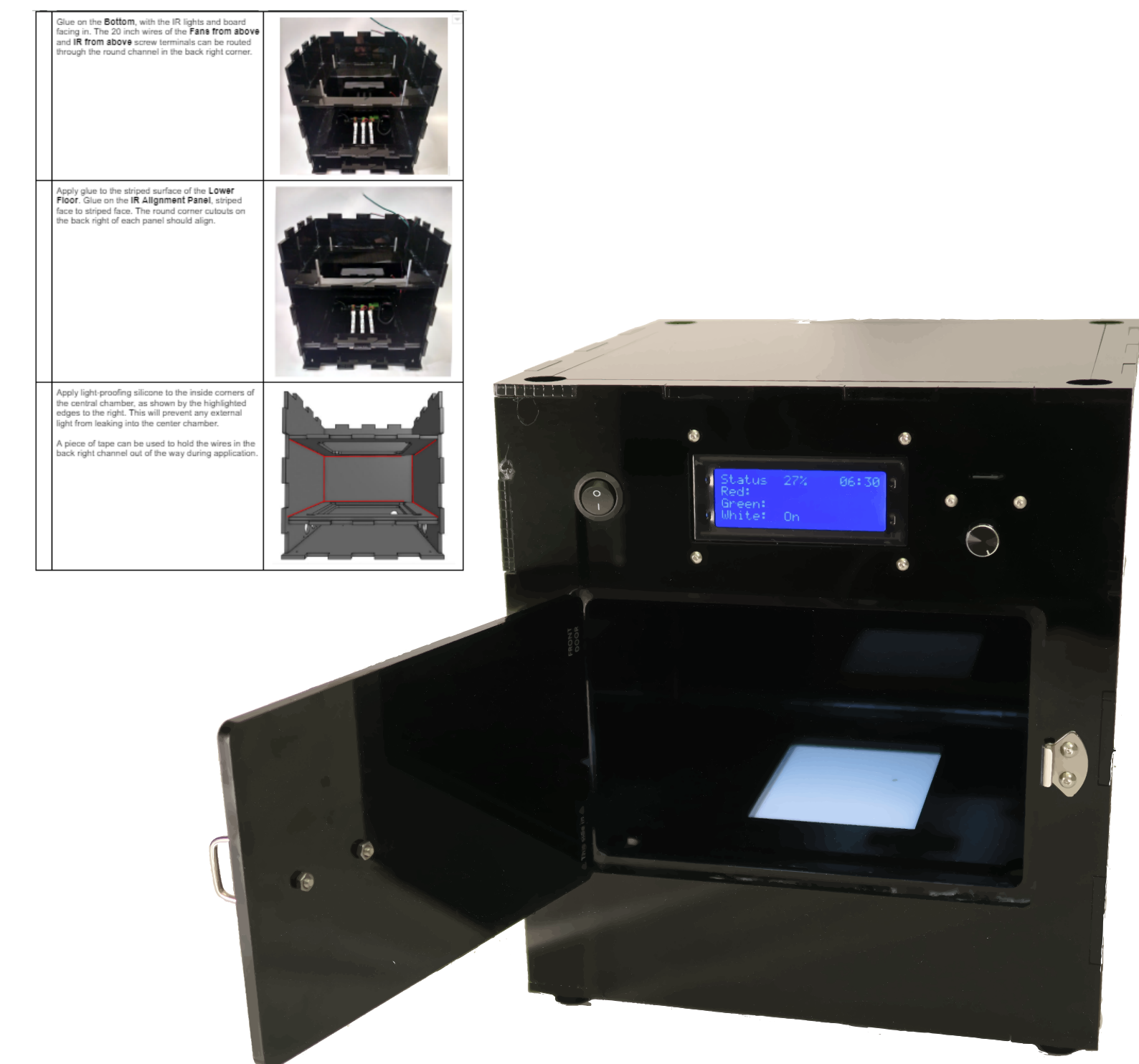
Enclosure
This light-tight acrylic enclosure houses the entire system

Infrared LEDs
IR LEDs allow photos of the flies to be taken while the other LEDs are off

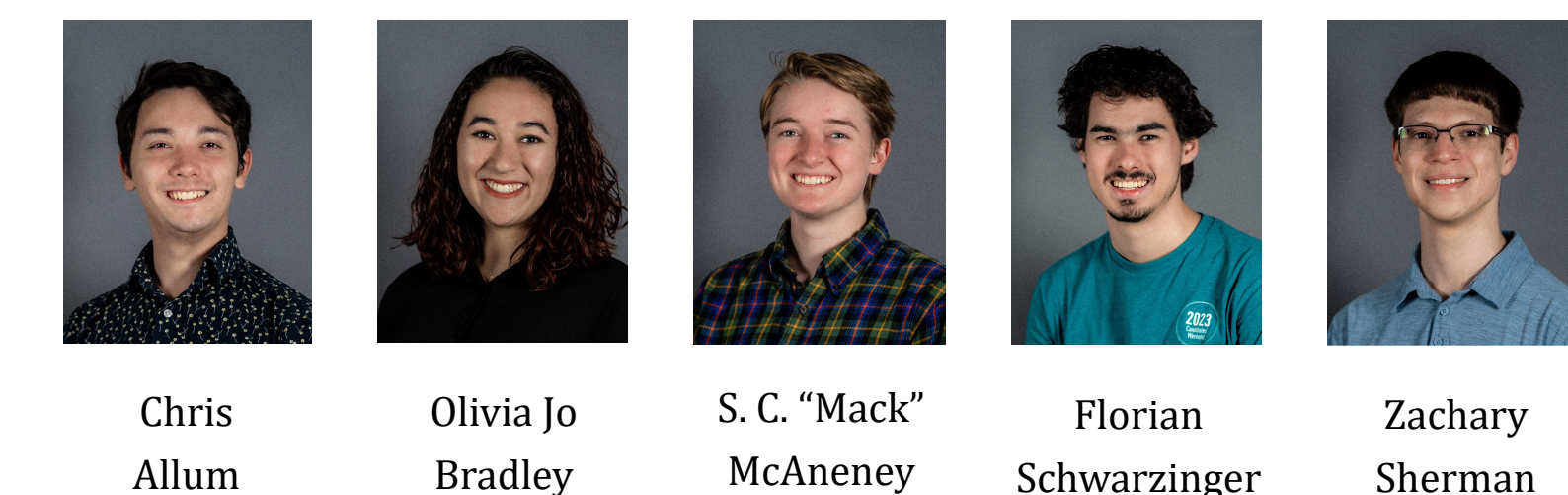
Fans
Four 40mm fans create an air current over the IR LEDs to keep the box near room temperature

Design For Manufacturing

The FlyBox was designed to be easily assembled in a lab with basic tools. Components are either laser cut, 3D printed, or sourced "off the shelf". Step-by-step instructions with pictures lead the user through the assembly process.



The Team



Special Thanks

- Lawrence Neeley - Advisor
- Xihuimin Dai - Liason
- Dr. Michael Rosbash - Liason
- Jasmine Quynh Le - Liason
- Dingbang (Dylan) Ma - Liason
- Albert Yu - Liason
- Rebecca Flach - Student Worker