13 Portable Optogenetics Device for High School Neuroscience Outreach

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Need

User and Problem
High School students have minimal exposure to neuroscience due to curriculum constraints and cost barriers

Limitations in Existing
Previous optogenetics setups are bulky, expensive, and difficult for classroom settings

Objective

Develop an **accessible, portable,** and **cost-effective** optogenetics device to introduce neuroscience to high school students

Design Inputs

Constraints
Durability – Maintain rigid properties
- **Function** - Maintain previous design's function

Requirements
- WEIGHT <= **5.1 lbs**
- **360-degree** tether rotation
- Phone-to-fly focal distance **8-12cm**
- Assembly time < **8.3 minutes**
- Stability and durability for **repeated use**

Component Details

1. Magnetic Tether System
Allows for full 360°rotational freedom of fly when tethered and mounted to device
2. Double Locking Lever System
Stabilizes phone to device when in use to avoid sway or movement during video capture
3. Background
Eliminates unwanted objects in the background that distort visualization of fly by sitting behind fly & rod

Conclusion

The redesigned optogenetics is **portable, stable, and classroom-ready** which addresses prior issues of bulk, instability, and complexity. Key features like the magnetic tether, background, and double locking phone stand improve usability, visualization, and stability.

Impact
Enhances accessibility, reduces setup difficulty, and increases exposure to STEM careers.

Revisions
Rework magnetic tether system
Cleaner containment of wires

Verification

Test	Description	Results
Weight	Device remains under 5.1 lbs	PASS
Tether Rotation	Rotation of fly reaches full 360°range	FAIL
Focal Distance	Distance within 8-12 cm for clear video image	PASS
Multiuse of Tether	Mount withstands 240 repeated mountings	PASS
Set-up Time	Set-up fully completed in <8.3 minutes	PASS
Maintain Old Functions	Maintain all previous team's requirements	PASS
Phone Stand Mobility	No angular deviation after 3.59 N	PASS
Phone Stand Stability	No sway of phone nor loss of focus during use	PASS

Solution/Assembly