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Need

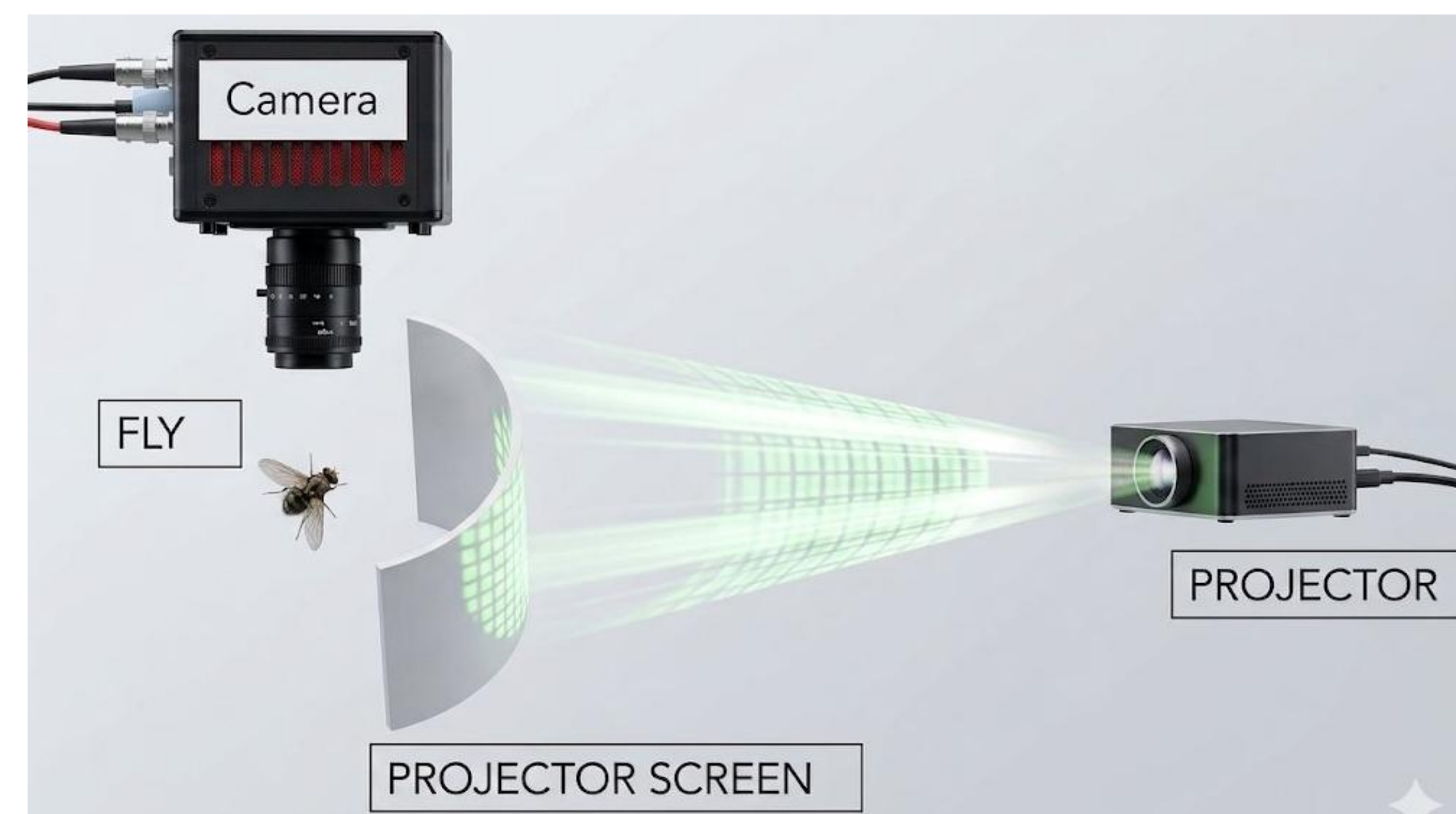
User and Problem

Researchers in the Neural Circuit Lab utilize flies as a model for retinal and motor degeneration in human diseases such as ALS.

They need a reliable visual display system for studying how flies respond to motion.

Impact

Advances research in vision, neural circuits, and brain disorder modeling.



Limitations in Existing Solutions

Current setup relies on projection onto a curved screen, which cannot deliver the high-speed and high-resolutions stimuli needed for advancing neuroscience experiments.



- Brightness instability
- Lengthy calibration set up
- High latency
- Distorted image

Objective

Build a curved display for *Drosophila* flight tests that can deliver stable and high-resolution stimulus for increased immersion.

Design Inputs

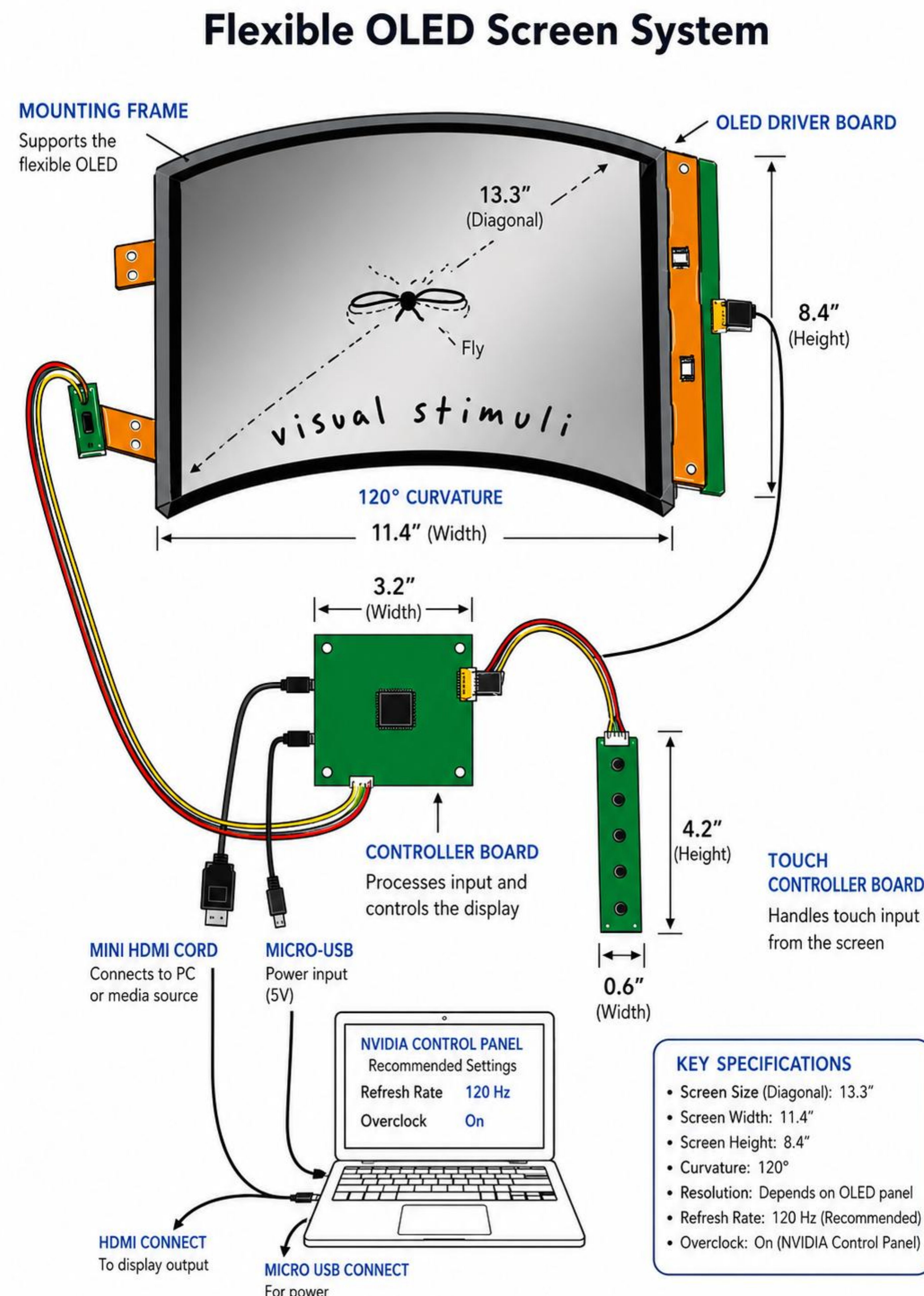
Constraints

- C1: Budget: \$2000 as provided by Dr Catherine Von Reyn
- C2: Screen Resolution: Resolution \geq 1080p
- C3: Screen Curvature: Visual Screen Curve \geq 120 degrees

Requirements

- R1: Refresh Rate: 120Hz minimum
- R2: Operating Time: >12 Hours
- R3: Fly Welfare: Fly Temperature is $<26^{\circ}\text{C}$

Assembly/Intended Use



Component Details



- 13.3" Flexible OLED Screen
- Controller board
- Mini HDMI cable
- Laptop with NVIDIA Control Panel
- Mounting Frame (Grey in Drawing)

Verification

Refresh-Rate

Goal: 120 Hz \pm 5 Hz

- Method: Photodiode + 2hr stability test
- Result: ⚠ Reached 120 Hz, unstable \rightarrow FAIL

Thermal Safety & Operating Time

Goal: Fly Temp $< 26^{\circ}\text{C}$ + 12hr operation

- Method: Thermal camera monitoring (12 hrs)
- Result: ✅ Fly: $21.9 \pm 0.7^{\circ}\text{C}$, Runtime: 12 hrs \rightarrow PASS

Conclusion

Summary

- Our OLED screen met 2 out of the 3 requirements
- Stable 12-hour operation
- Maintained safe fly-position temperature ($<26^{\circ}\text{C}$)

Innovations

First use of flexible, curved OLED technology to create an immersive, high-contrast fly-vision arena

Impact

- **For users:** Faster setup, more reliable stimuli, higher quality behavioral data.
- **For society:** Advances research in vision, neural circuits, and brain-disorder modeling.

Acknowledgements

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References

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