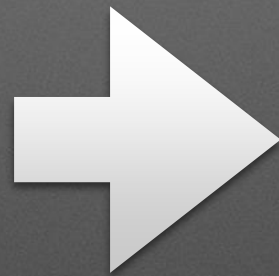# iShadow
## the computational eyeglass platform

**Addison Mayberry**, Yamin Tun, Pan Hu, Duncan Smith-Freedman, Deepak Ganesan, Benjamin M. Marlin, Christopher Salthouse

University of Massachusetts Amherst

# Computational eyeglass

# Why care about eye tracking?



Computational eyeglasses enable us to observe the user's cognitive activity

Parkinsons   Fatigue   Social interaction   Attention

# Existing systems

## Google Glass



Compact, unobtrusive

No eye tracking

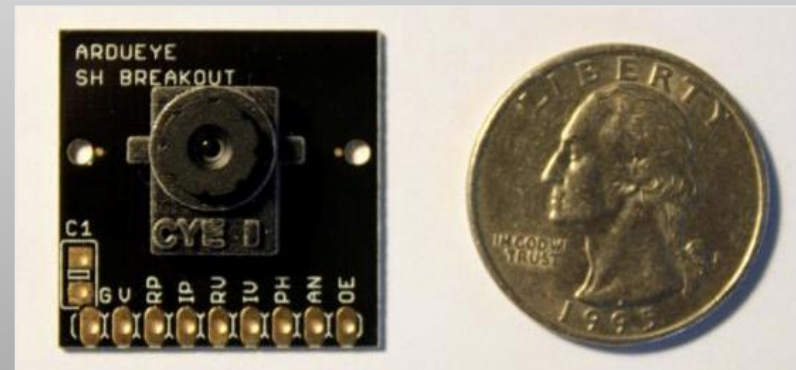Lifetime: 1 hour

## Tobii



Large external battery

Does eye tracking

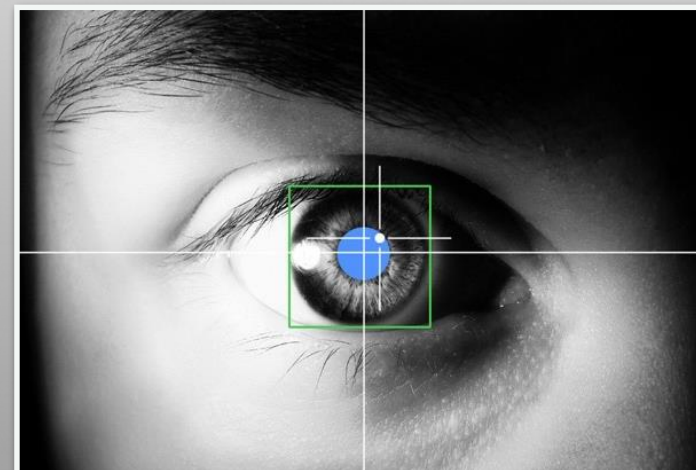Lifetime: 2-4 hours

# Power use in eye tracking pipeline

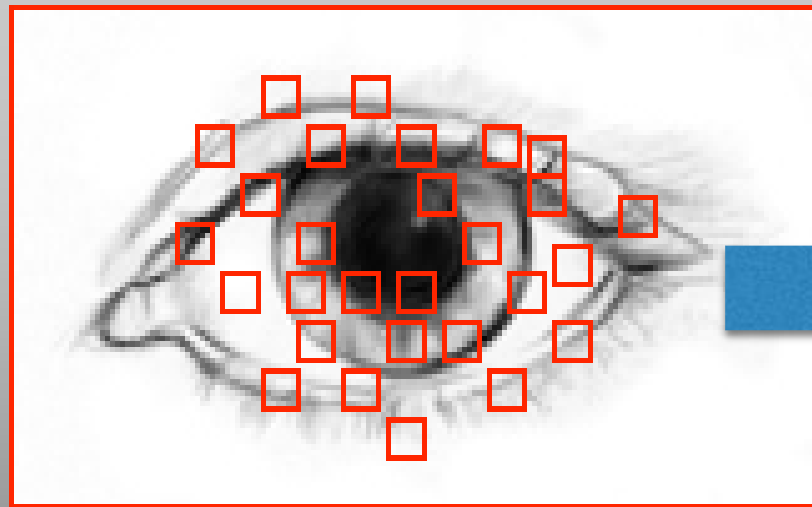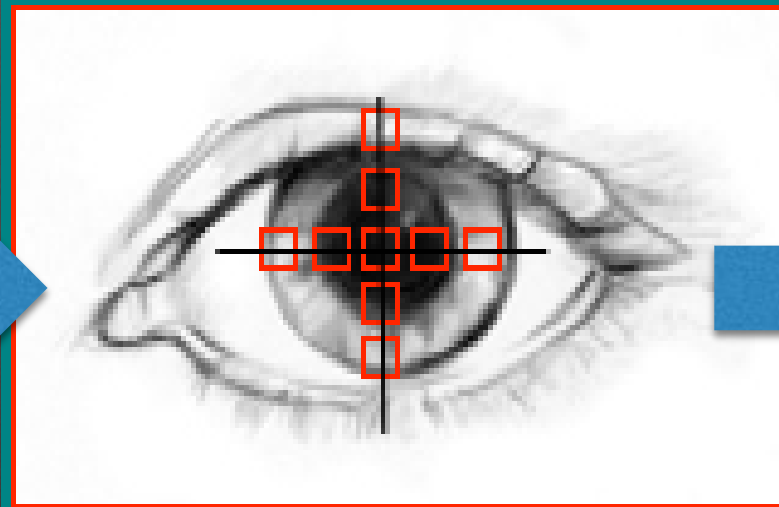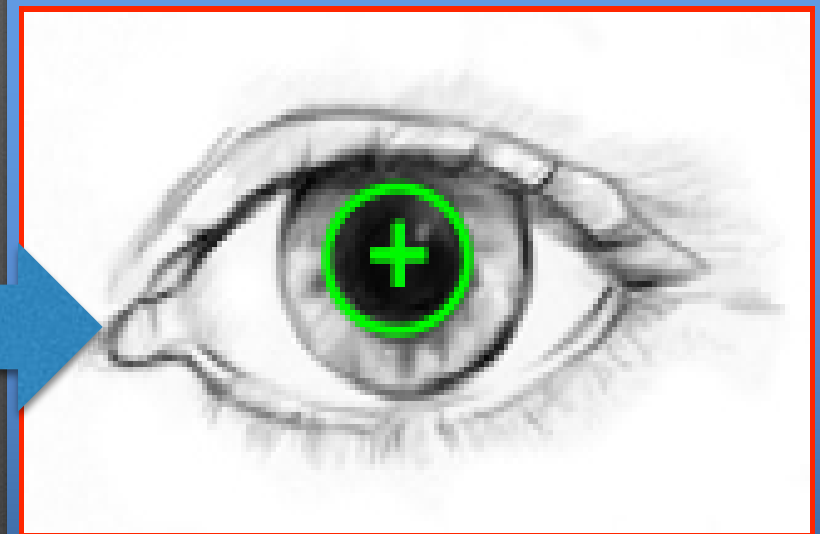| | | |
|---|---|---|
| 10% | Camera Module |  |
| 65% | Pixel Acquisition |  |
| 25% | Tracking Algorithm |  |

# Eye tracking with minimal pixels
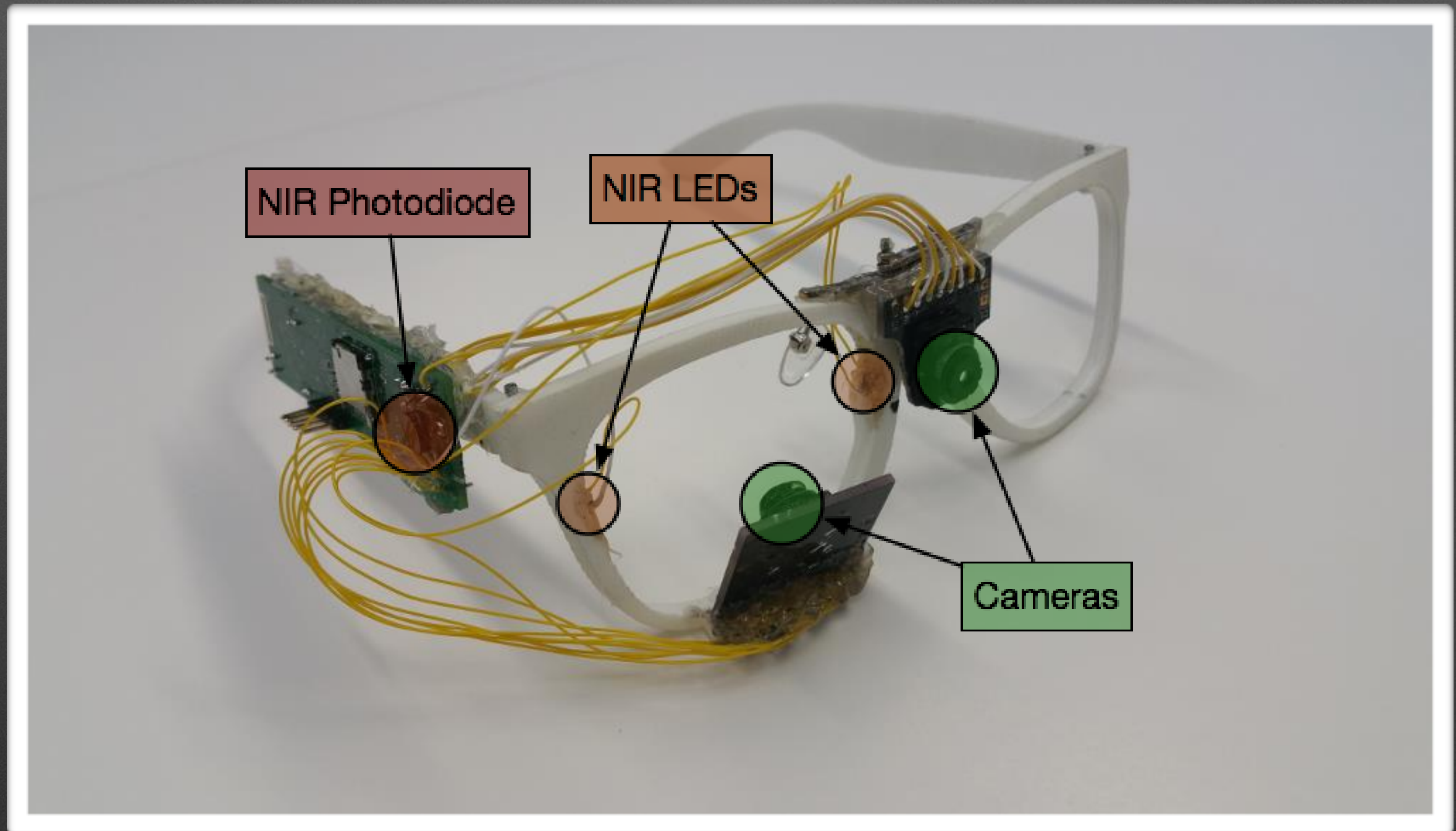


Search stage
(neural network)

Refine stage
(cross model)

Calculate center
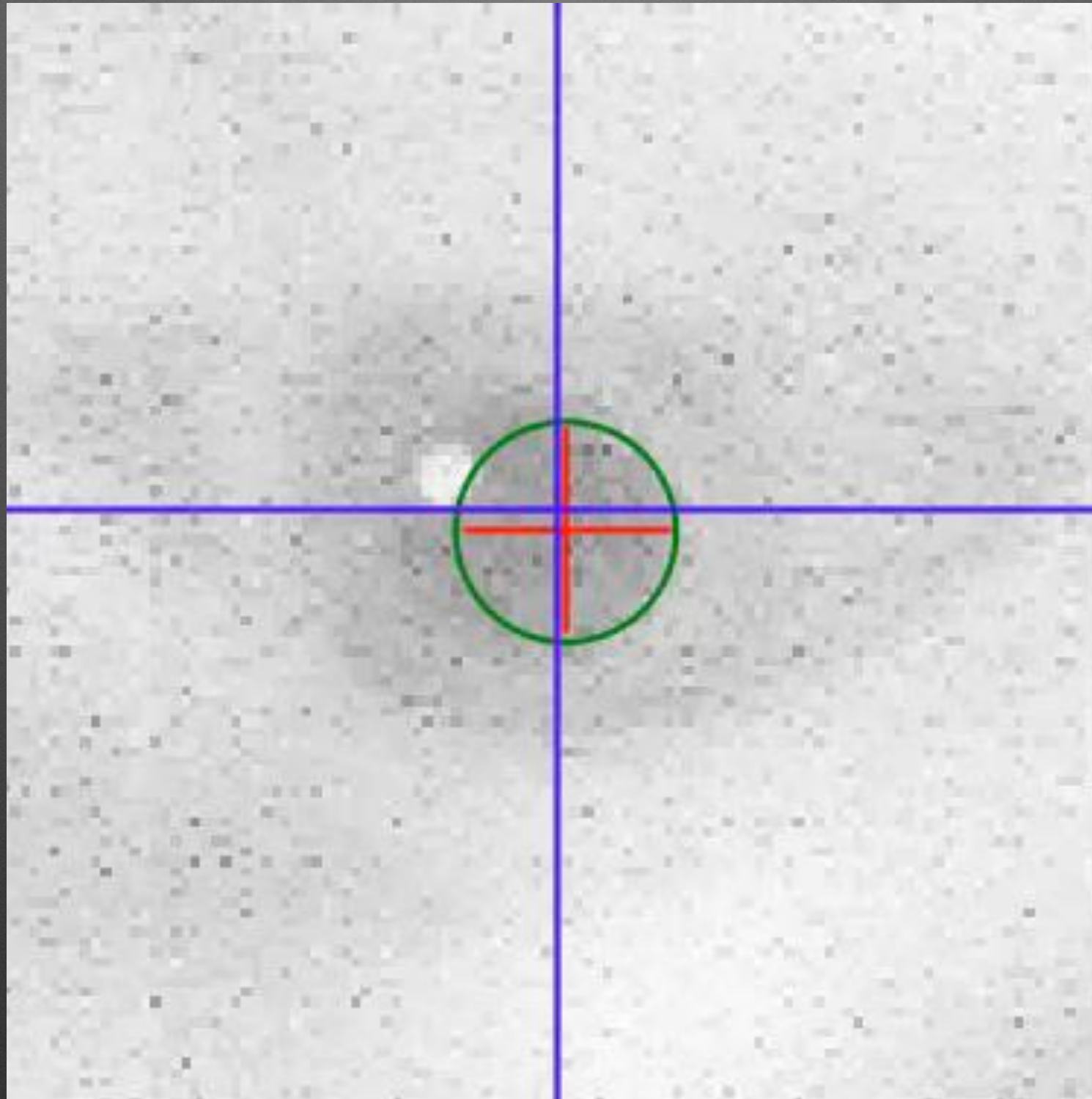and dilation

# CIDER platform



NIR Photodiode

NIR LEDs

Cameras

# Evaluation: Rate vs Power
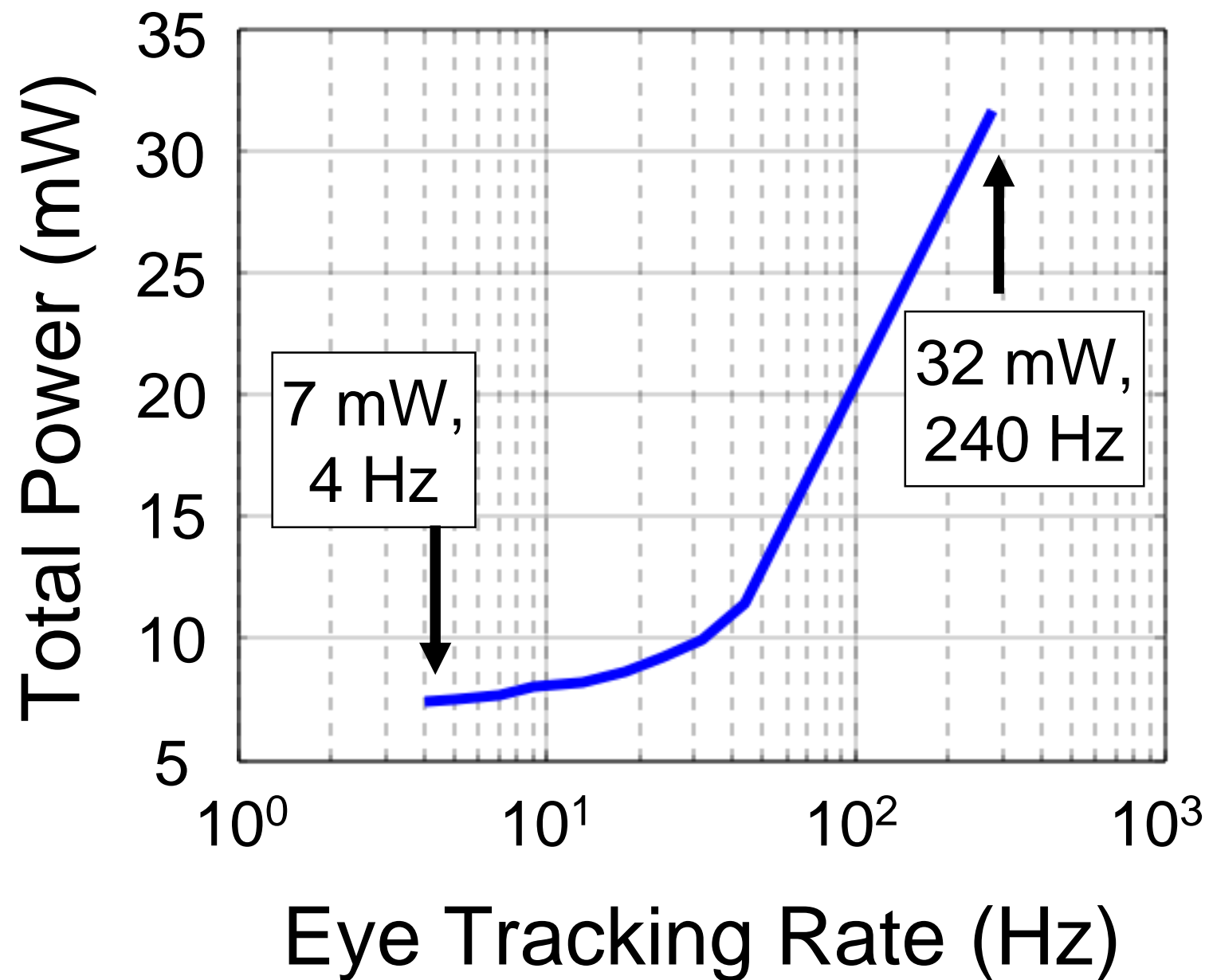
# Demo Video

# Conclusions

- iShadow: an accurate, unobtrusive eye tracking platform

- Requires as little as 7 mW with 1º of tracking error

- Can achieve rates up to 240 Hz at ~30 mW

- Want one? Contact us!