Enabling At-Home Glaucoma Monitoring in Low-Resource Settings

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JOHNS HOPKINS BIOMEDICAL ENGINEERING

THE "SILENT BLINDER"

Glaucoma is a chronic eye disease characterized by elevated intraocular pressure (IOP), resulting in optic nerve damage and permanent vision loss[1].

Constant IOP Fluctuations
High IOP → Optic nerve damage → Irreversible blindness

Infrequent Follow-Up Appointments
Static IOP measurements → Lack of informed decision-making

90% of vision impairment globally reside in low- and middle-income countries

<10% of glaucoma patients follow up beyond six months after glaucoma surgery

Glaucoma patients in Southern India need an at-home IOP monitoring device in order to prevent permanent glaucomatous vision loss

GLOBAL IMPACT

$112 M
Glaucoma patients in 2040[2] (Allison, 2020)

5%
Progress to permanent vision less annually[3] (Oltramari, 2024)

>$100
Average revenue per paying user/product sold

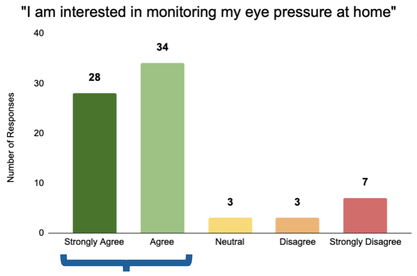
$ 560 M
Total available market with Ocusound's device

REFERENCES

1. Glaucoma. National Eye Institute. Accessed April 22, 2024. https://www.nei.nih.gov/learn-about-eye-health/eye-conditions-and-diseases/glaucoma#:~:text=What%20is%20glaucoma%3F,a%20comprehensive%20dilated%20eye%20exam.
2. Allison, K., Patel, D., & Alabi, O. (2020, November 24). Epidemiology of glaucoma: The past, present, and predictions for the future. Cureus. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7769798/
3. Oltramari, L., Mansberger, S. L., Souza, J. M. P., de Souza, L. B., de Azevedo, S. F. M., & Abe, R. Y. (2024, January 25). The association between glaucoma treatment adherence with disease progression and loss to follow-up. Nature News. https://www.nature.com/articles/s41598-024-52800-2

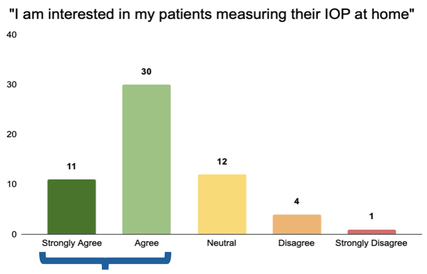
NEED VALIDATION

Glaucoma Patients (n=75)



83%

Glaucoma Providers (n=58)



71%

A survey was conducted among 75 glaucoma patients from the Aravind Eye Hospital and 58 glaucoma providers across India

Majority of patients and providers are interested in an at-home tonometer for disease monitoring

SOLUTION: ACOUSTIC TONOMETER

<$50 USD

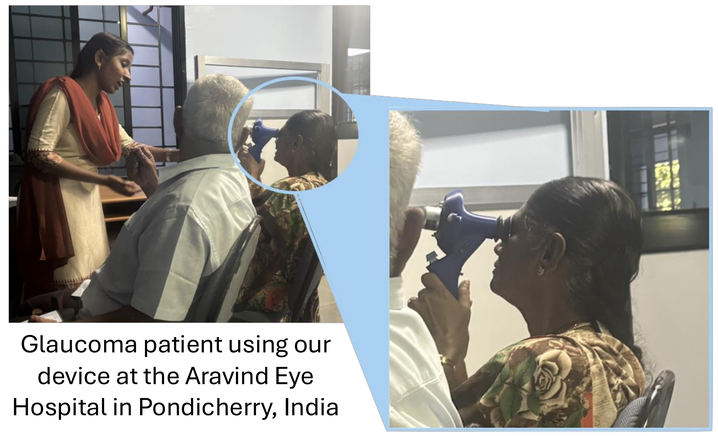
Low-Cost
Hardware and software innovations are inexpensive to manufacture

Non-Contact
The use of simple sound waves allow for noncontact IOP evaluation

Accurate
Offers an accurate method of performing daily IOP calculation

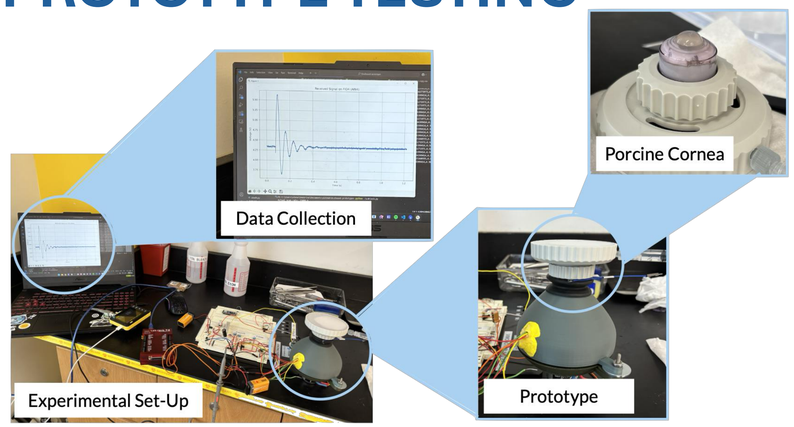
Intuitive
Efficient algorithm records measurements in <5 seconds and outputs an intuitive result

DESIGN VALIDATION



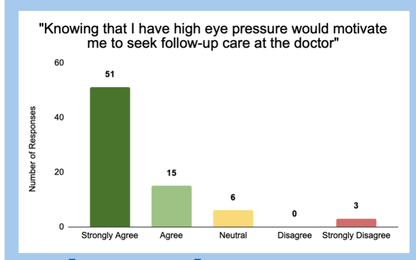
Glaucoma patient using our device at the Aravind Eye Hospital in Pondicherry, India

PROTOTYPE TESTING



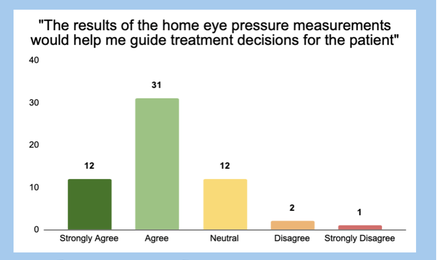
FUTURE IMPACT

Patients (n=75)



88%

Providers (n=58)



74%

Majority of patients and providers believe that our innovation would greatly benefit eye care in Southern India and beyond

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