

“AI-BASED MULTI-DISEASE OPHTHALMIC SCREENING USING FUNDUS IMAGES”

AGENDA

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Problem Context: Vision Loss From Eye Diseases Such As Glaucoma, Diabetic Retinopathy (DR), Age-related Macular Degeneration (AMD), And Cataract Affects Millions Worldwide.

Current Challenges: Early Detection Is Difficult Due To Limited Access To Ophthalmologists, High-cost Diagnostic Tools, And Separate Tests For Each Disease.

Our Solution: A Single Ai-powered Framework That Screens Multiple Eye Diseases From Fundus Images, Providing Accurate, Explainable, And Low-cost Early Diagnosis.

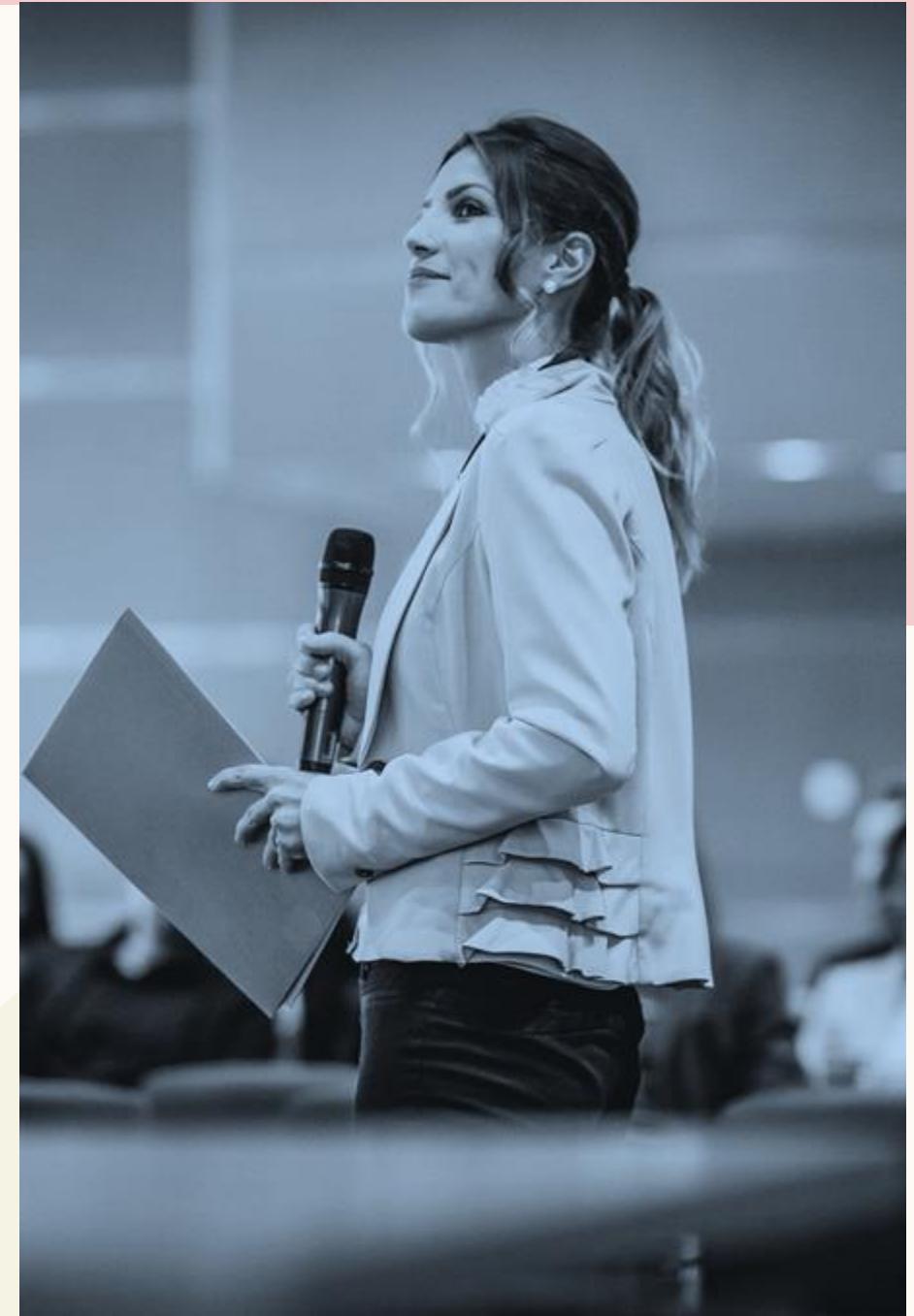
Goal: Enable Timely Referral, Reduce Preventable Blindness, And Improve Healthcare Access, Especially In Resource-limited Areas.

PROBLEM STATEMENT

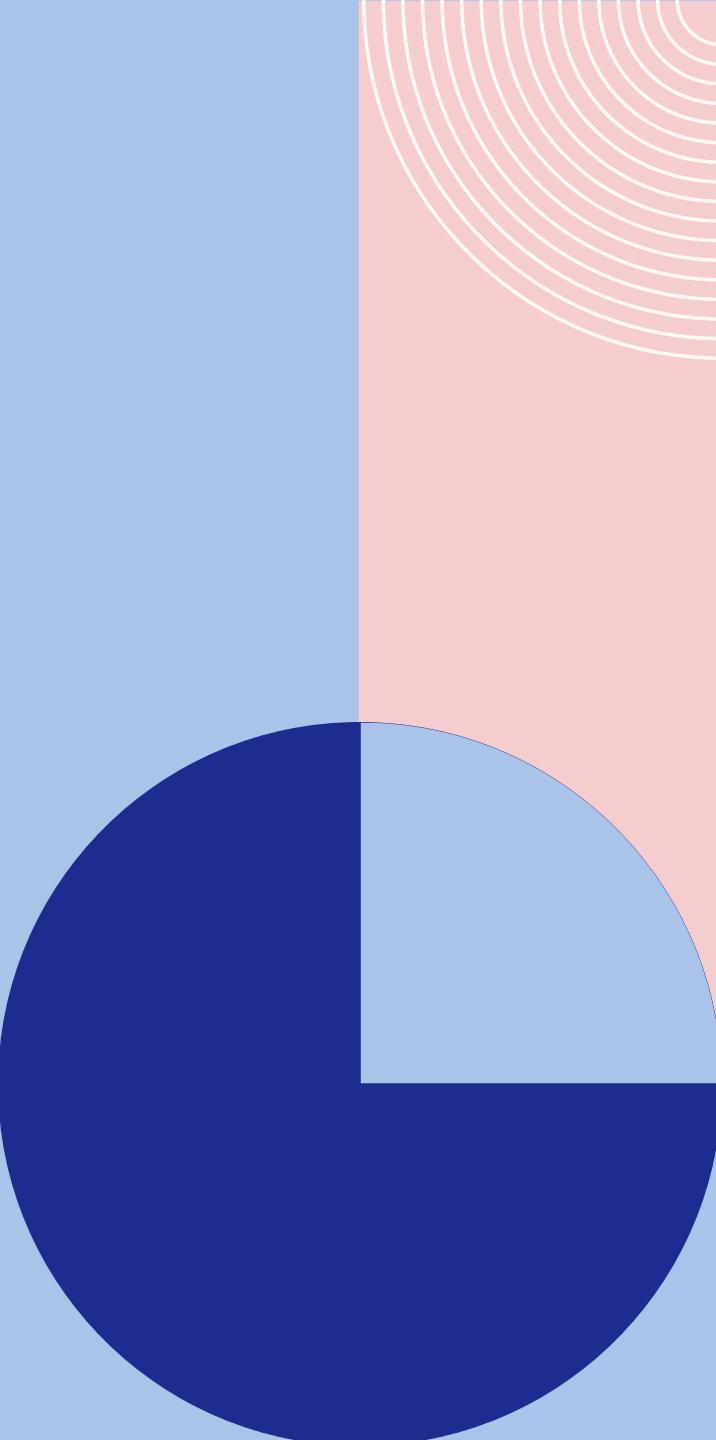
- ❖ Eye diseases like glaucoma, diabetic retinopathy (DR), age-related macular degeneration (AMD), and cataract often go undetected until advanced stages, causing preventable vision loss.
- ❖ Limited access to ophthalmologists and high-cost diagnostic equipment restrict early screening, especially in rural and resource-limited areas.
- ❖ Current screening requires multiple separate tests for different diseases, making it time-consuming, expensive, and inaccessible for many patients.
- ❖ There is a critical need for a scalable, affordable, and reliable solution that can screen multiple eye diseases early and assist in timely referral decisions.

PROPOSED SYSTEM

- ❖ **Ai-powered Multi-disease Screening:** Detects Glaucoma, Diabetic Retinopathy (DR), AMD, And Cataract From A Single Fundus Image.
- ❖ **Deep Learning Models:** Uses CNNs or Vision Transformers to extract key retinal features.
- ❖ **Explainable AI:** Generates heatmaps/attention maps to highlight affected regions for clinician trust.
- ❖ **Low-Cost & Scalable:** Compatible with standard fundus cameras and mobile/remote deployments.
- ❖ **End-to-End Workflow:** Image capture → Preprocessing → AI analysis → Multi-disease prediction → Explainable output.



DISEASES COVERED & TARGET USERS



Our AI system detects glaucoma, diabetic retinopathy, age-related macular degeneration (AMD), and cataract from a single fundus image. It provides accurate predictions along with explainable visual outputs that highlight affected regions, helping healthcare providers understand the results. This enables early detection and timely interventions, reducing the risk of permanent vision loss.

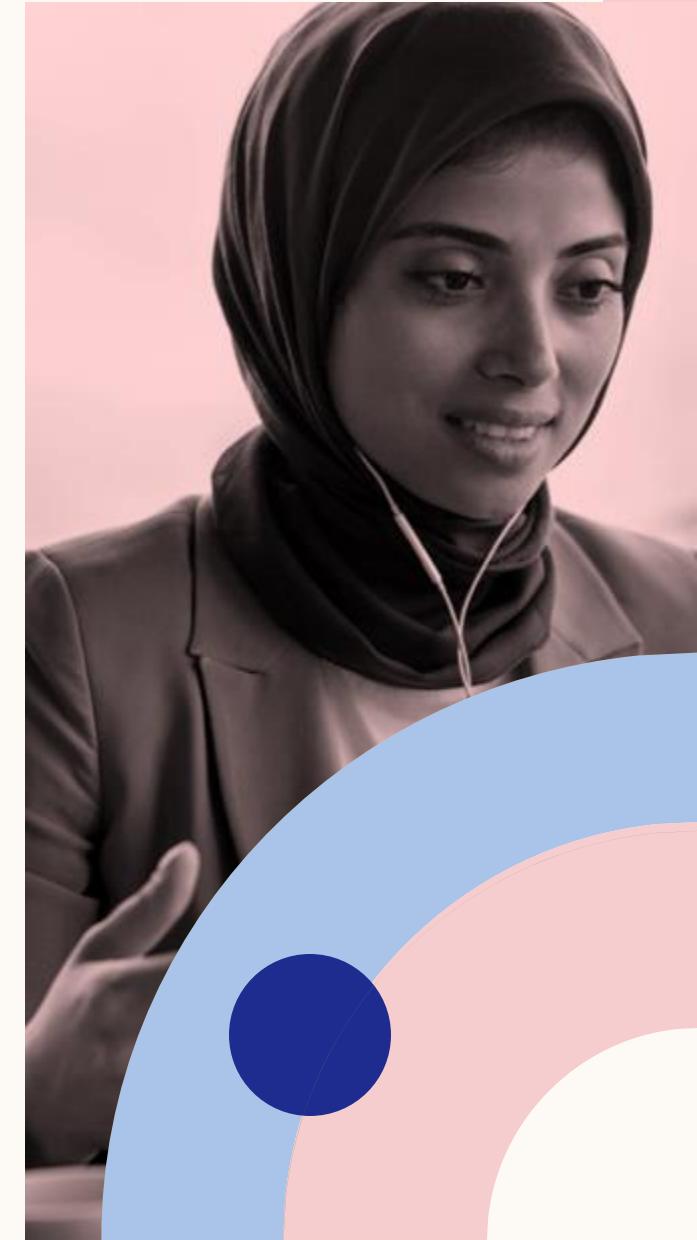
The solution is designed for hospitals, clinics, and telemedicine platforms, making screening more affordable and scalable. By supporting early referral decisions and functioning in resource-limited settings, it improves access to eye care and benefits larger populations at risk of preventable blindness.

INNOVATION & UNIQUE SELLING PROPOSITION (USP)

- ❖ **Multi-Disease Screening:** Detects glaucoma, DR, AMD, and cataract from a single fundus image, instead of separate tests.
- ❖ **Explainable AI:** Highlights affected regions with heatmaps/attention maps, making predictions transparent and trustworthy.
- ❖ **Low-Cost & Scalable:** Works with standard fundus cameras and mobile setups, suitable for remote or resource-limited areas.
- ❖ **Early Referral Support:** Assists healthcare providers in timely decision-making, preventing vision loss.
- ❖ **All-in-One Solution:** Combines accuracy, explainability, and accessibility, making it a unique tool for widespread eye care screening.

TECHNOLOGY & METHODOLOGY

- 1. Artificial Intelligence (AI) & Deep Learning
 - 2. Retinal Fundus Image Analysis
 - 3. CNN / Vision Transformer Models
 - 4. Multi-Disease Detection Framework
 - 5. Explainable AI
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- 1. Fundus Image Acquisition
 - 2. Image Preprocessing
 - 3. Feature Extraction
 - 4. Multi-Disease Classification
 - 5. Prediction Output
 - 6. Referral Decision Support



REVENUE MODEL & SUSTAINABILITY

- ❖ **Subscription-Based Model:** Hospitals and clinics pay a monthly or annual fee to use the screening platform.
- ❖ **Pay-Per-Screening:** Low-cost fee per fundus image analyzed, suitable for mass screening programs.
- ❖ **Enterprise & Government Partnerships:** Licensing the system to NGOs, public health programs, and insurance providers.
- ❖ **Tele-ophthalmology Integration:** Revenue through API access for telemedicine platforms.
- ❖ **Sustainable Impact:** Low operational cost, scalable deployment, and preventive care focus ensure long-term adoption and social impact.



IMPACT & FUTURE SCOPE

- ❖ Early Disease Detection
 - ❖ Prevention of avoidable blindness
- ❖ Improved access to eye care
 - ❖ Reduced workload for ophthalmologists
- ❖ Cost-effective mass screening
 - ❖ Faster diagnosis and referral decisions
- ❖ Increased clinical trust
 - ❖ Scalable public health impact
- ❖ Addition of more eye diseases
 - ❖ Integration with OCT imaging
- ❖ Mobile and smartphone-based deployment
 - ❖ Real-time screening capability
- ❖ Personalized risk prediction
 - ❖ Continuous model improvement
- ❖ Integration with electronic health records
 - ❖ Global deployment

CONCLUSION

Our AI-powered ophthalmic screening system offers a scalable, low-cost, and explainable solution for early detection of multiple eye diseases including glaucoma, diabetic retinopathy, AMD, and cataract. By providing accurate predictions and visual explanations, it supports timely referrals, reduces preventable vision loss, and improves access to eye care in both urban and resource-limited settings.

The solution combines innovation, multi-disease detection, and clinical usability, making it suitable for hospitals, clinics, telemedicine platforms, and community screening programs. With further expansion and real-world deployment, it has the potential to transform eye healthcare and prevent blindness on a large scale.

THANK YOU