OptiVision: Advanced Screening for Early Detection of Eye Health Issues

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Problem

Globally, over 2.2 billion people suffer from vision impairment, many of which are preventable with early detection, yet access to vision testing remains limited and expensive.

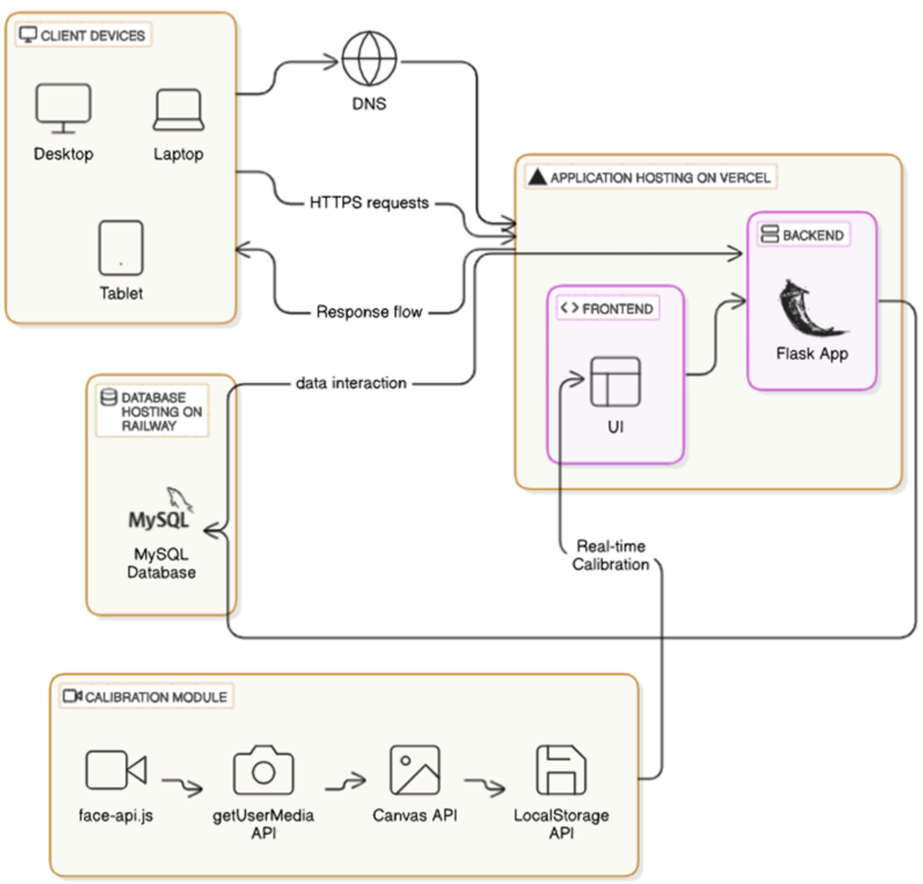
Approach

We developed an interactive system combining advanced vision testing algorithms, adaptive calibration tools, and real-time user feedback to provide accurate and accessible results.

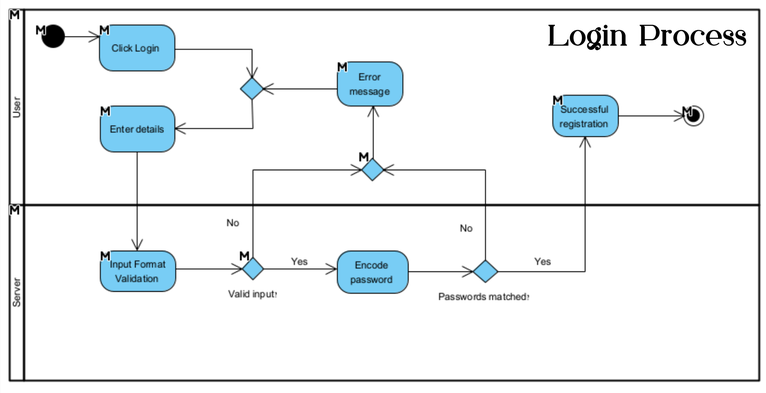
Solution

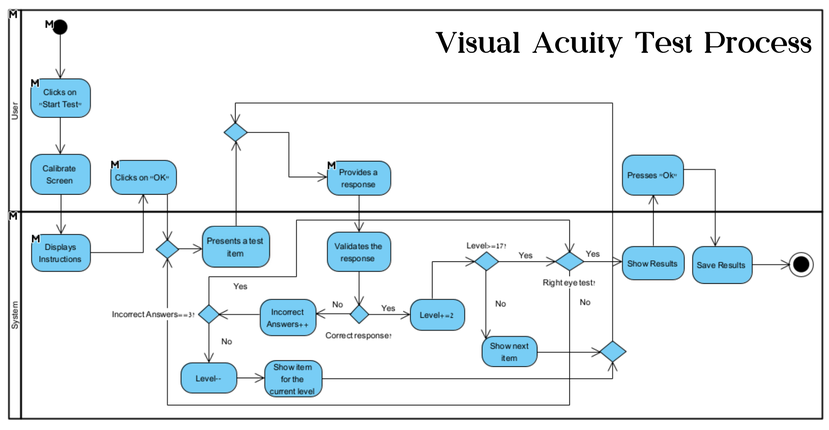
OptiVision is a web application offering scientifically validated vision tests for early detection of eye health issues, accessible to anyone from the comfort of their home.

Architecture Diagram



Activity Diagram





Algorithm

- Calibration – The user scales the screen with a ruler, while a webcam check ensures a 30-35 cm viewing distance before the test.
- Test Execution – The user identifies the gap in a rotating C-shaped symbol (Landolt C), with adaptive difficulty increasing or decreasing based on responses.
- Result Analysis – The system evaluates highest level reached, provides personalized feedback, and generates a PDF report for tracking vision health.

Testing & Accuracy

To ensure reliability and precision, OptiVision underwent extensive testing:

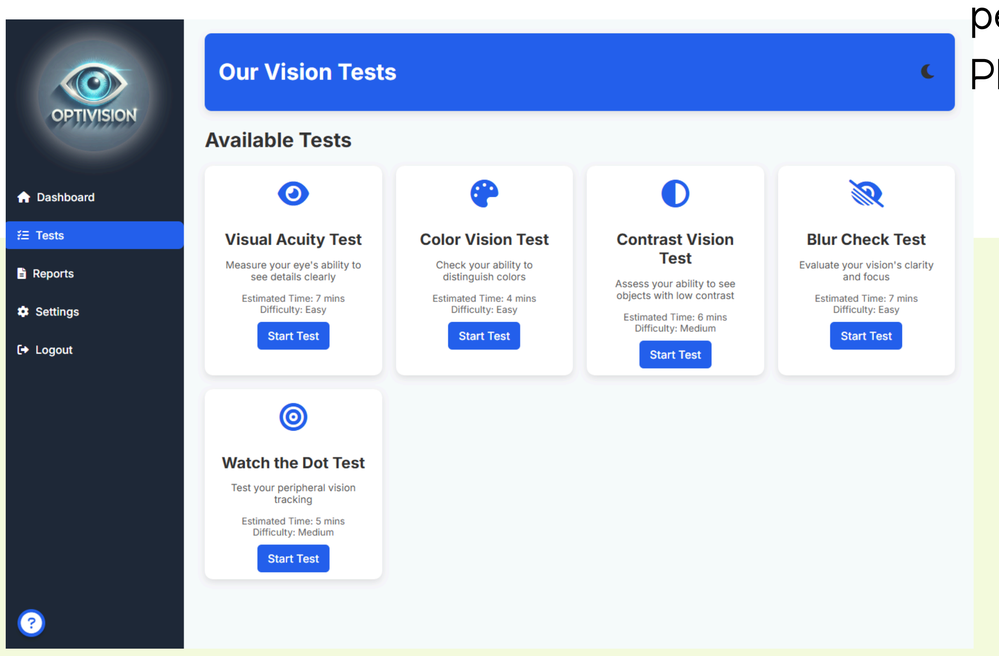
✔ Supervised Testing – Participants took tests under controlled conditions.

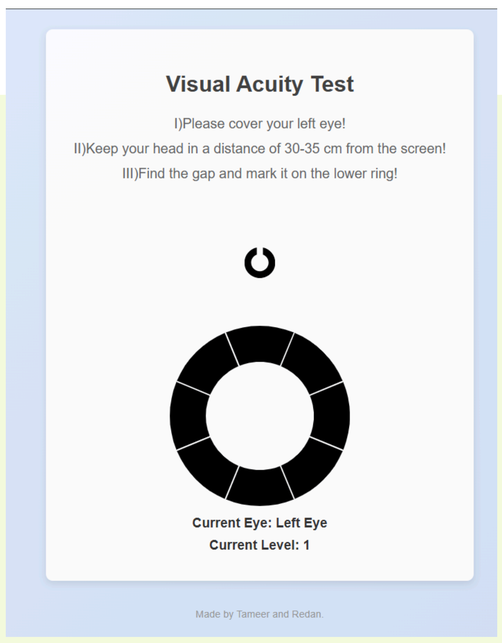
✔ Remote Testing – Users tested the system independently.

✔ Cross-Device Validation – Ensured consistency across desktops, laptops, and tablets.

📊 Accuracy Results:
Visual Acuity Test: 92% correlation with Landolt C clinical tests.

Screenshots





OptiVision's Key Innovations

- Accurate Calibration: Ruler-based calibration combined with a new screen-distance measurement ensures optimal precision for all vision tests.
- Adaptive difficulty adjusts tests based on user performance.
- Comprehensive PDF reports with progress tracking and professional insights.
- Designed for all demographics, including those with minimal tech knowledge.

References

- World Health Organization (2019). World Report on Vision.
- Rosenfield, M. (2011). Computer vision syndrome: A review of ocular effects. Optometry and Vision Science.