AeroSense: AI-Powered Respiratory Health Companion

A Strategic Response to Digital Health Market Failures

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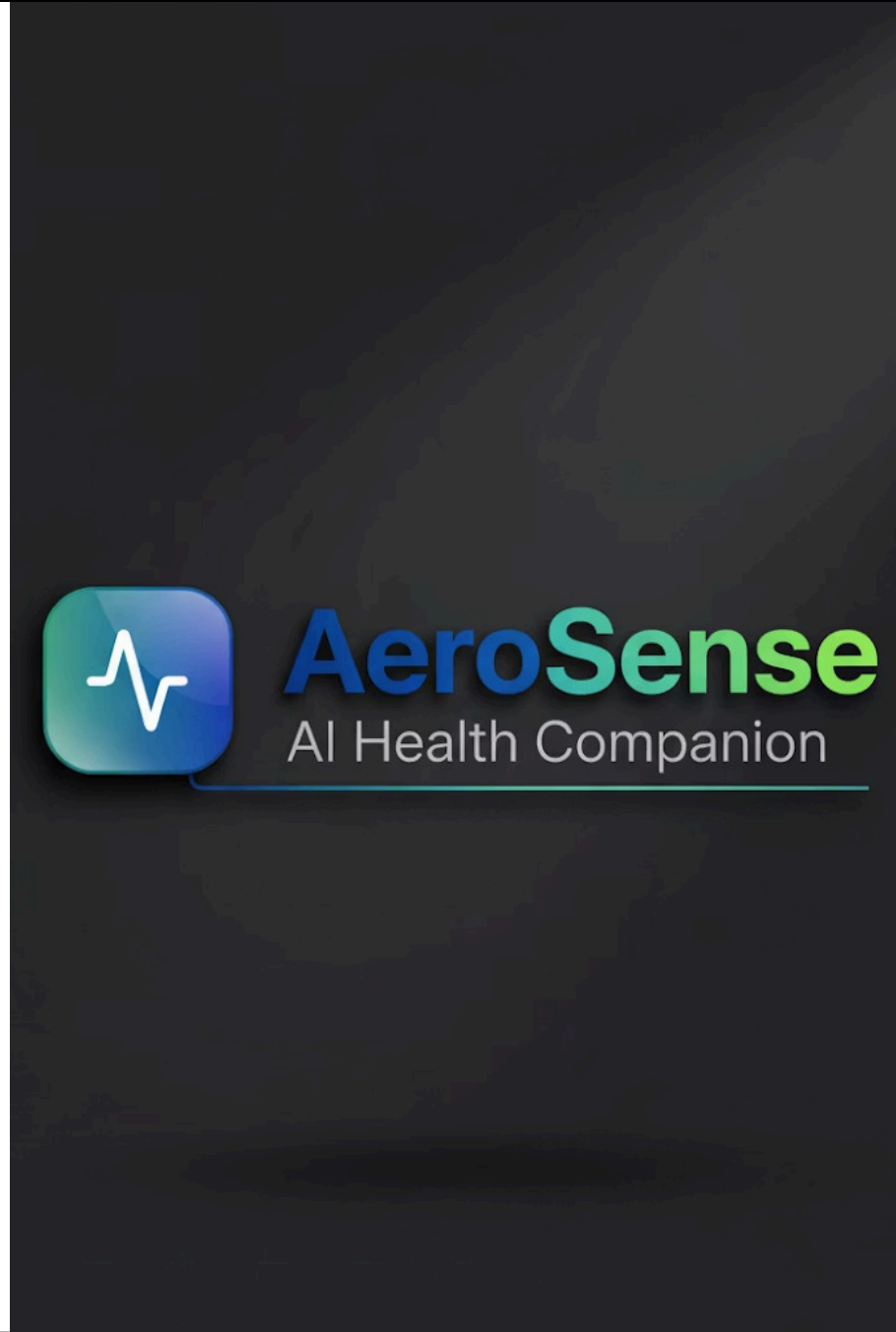
ITAI-2372 - Artificial Intelligence Applications



The Digital Health Crisis

Hardware Failures

Teva's Digihaler discontinued, Propeller Health ceased direct-to-consumer operations

Engagement Crisis

Manual-entry apps suffer from "data fatigue" and high abandonment rates

Fragmented Solutions

Current tools are reactive, not proactive, failing to address patient needs

Market Opportunity

The digital health market for chronic respiratory diseases reveals a landscape defined by significant market failure. Current solutions are fragmented, fundamentally reactive, and fail to address the profound, unmet needs of patients.

70%

Trigger-Related

Asthma exacerbations linked to environmental triggers

90%

Technique Errors

Patients make critical inhaler technique mistakes

82%

Lack Validation

Exacerbation prediction studies without external validation

Critical Jobs-to-Be-Done

01

Trigger Identification Dilemma

Patients struggle to correlate symptoms with environmental factors like pollen, air quality, and weather patterns

02

Inhaler Technique Crisis

Critical medication delivery failures compromise treatment efficacy for nearly 90% of patients

03

Invisible Data Gap

Crucial nocturnal symptoms go unrecorded due to recall bias and sleep-time occurrence

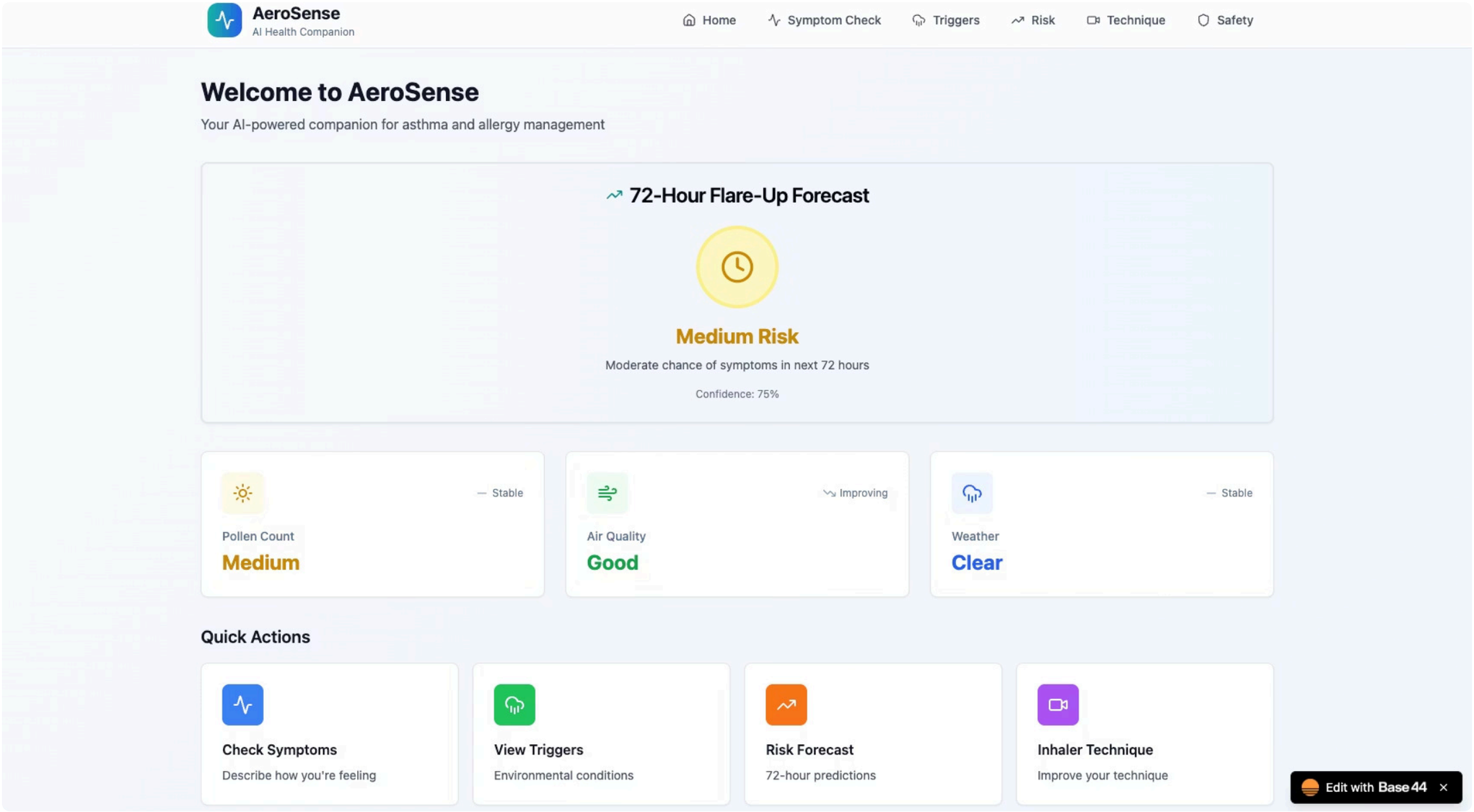
04

Psychological Toll

Constant monitoring creates cognitive load, contributing to anxiety and depression

The Solution

AeroSense is an AI-powered educational companion that moves beyond reactive tracking to offer proactive, personalized insights. Each core feature is engineered to solve a specific, research-validated problem.



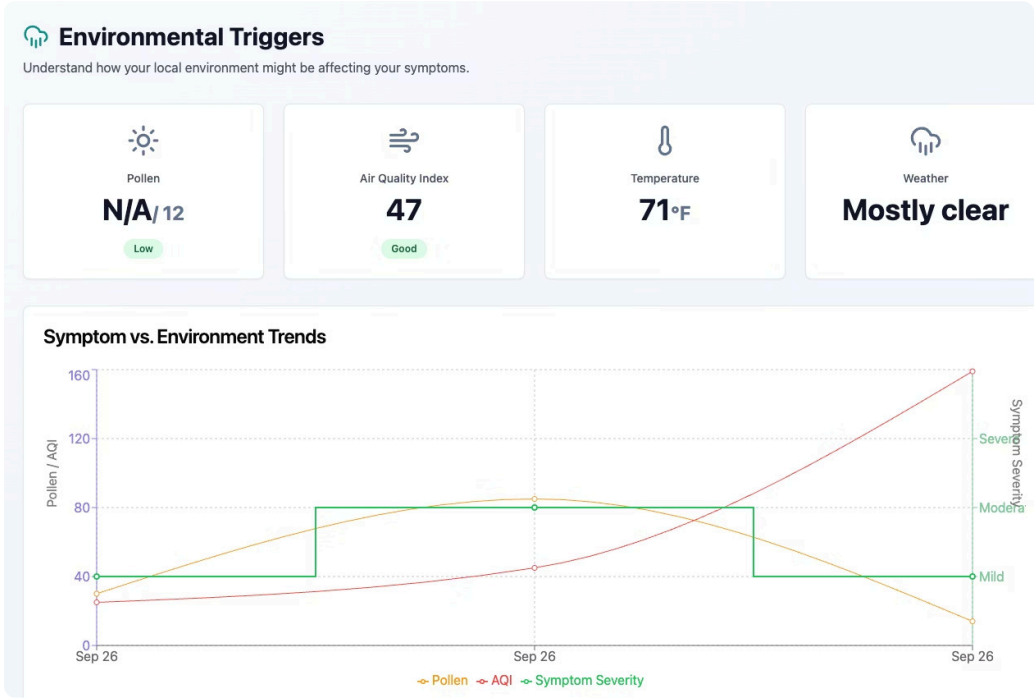
Environmental Intelligence Dashboard

Problem Addressed

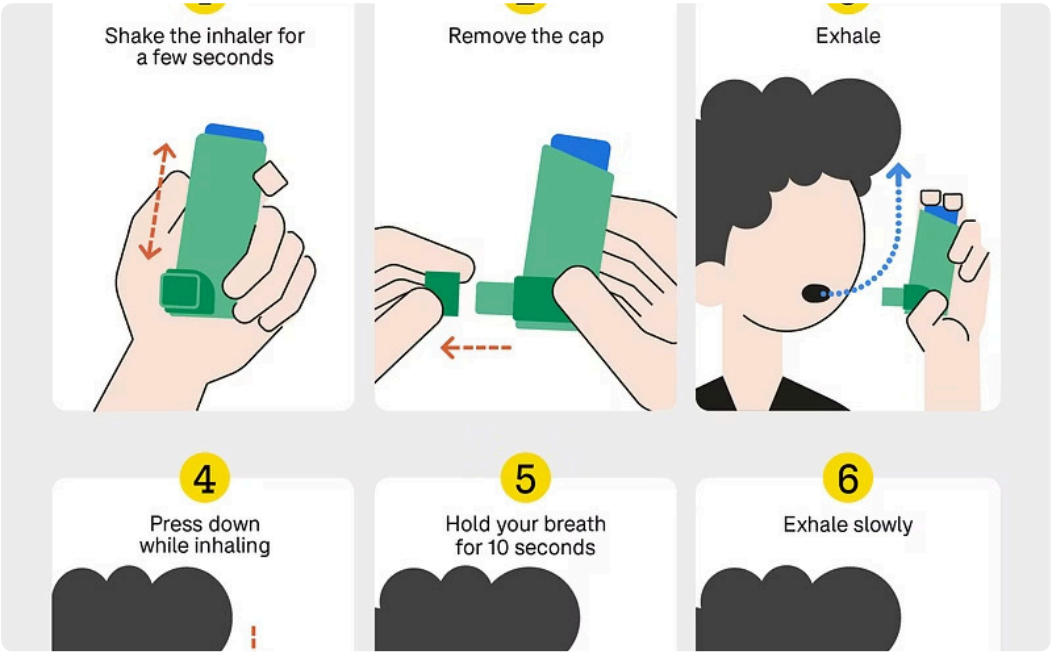
The Trigger Identification Dilemma - patients can't connect environmental factors to their symptoms.

Solution

AeroSense integrates real-time API data for pollen, AQI, and weather, allowing users to visually correlate external data with logged symptoms. This transforms one-dimensional data into personalized, two-dimensional insights.



Smart Inhaler Technique Analyzer



Computer Vision Analysis

Uses webcam to analyze inhaler technique in real-time, providing immediate feedback

Educational Feedback

Democratizes access to training typically only available during clinical visits

Addresses the critical 90% error rate in inhaler technique that severely compromises treatment efficacy.

AI Symptom Interpreter & Risk Forecasting

Natural Language Input

NLP interprets symptoms from natural language, lowering data entry barriers

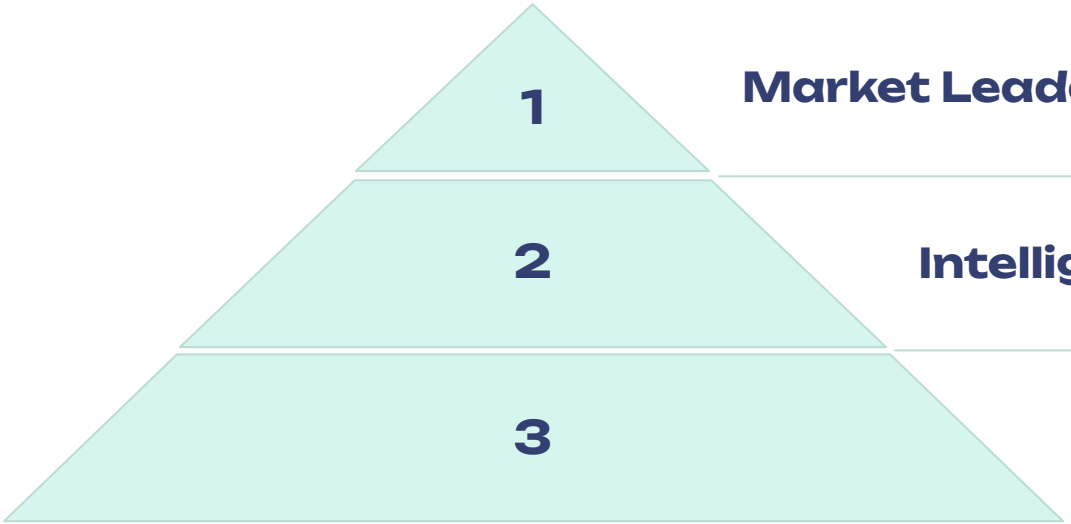
Pattern Analysis

AI analyzes symptom patterns over time using advanced machine learning

72-Hour Forecast

Creates risk predictions enabling proactive rather than reactive care

Strategic Positioning



Market Leadership

Intelligent Health Education

Software-Only, Data-Rich, Insight-Driven

AeroSense creates and leads a new market category, avoiding the fatal flaws of hardware-centric predecessors through pure software innovation.

Ethical AI Framework

Educational Tool

Explicitly positioned as educational, not a medical device, with clear disclaimers

Confidence Scores

All information presented with transparency about AI model limitations

Healthcare Guidance

Consistently directs users to consult qualified healthcare professionals

Recognizing that 82% of exacerbation prediction studies lack external validation, AeroSense operates with strict ethical guardrails.

Technical Architecture

Real-Time APIs

Integration with environmental data sources for pollen, air quality, and weather information

Computer Vision

Webcam-based inhaler technique analysis using advanced image processing

Natural Language Processing

Symptom interpretation from user descriptions in natural language

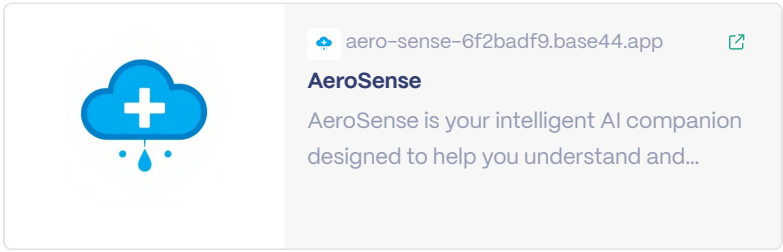
Predictive Analytics

Machine learning models for 72-hour risk forecasting and pattern recognition

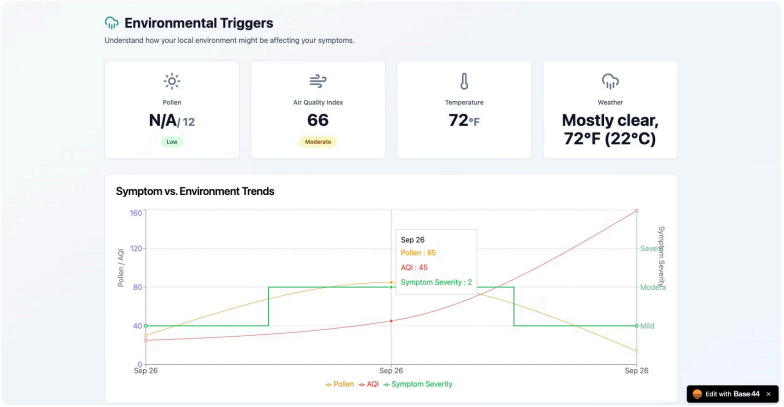
Live Application

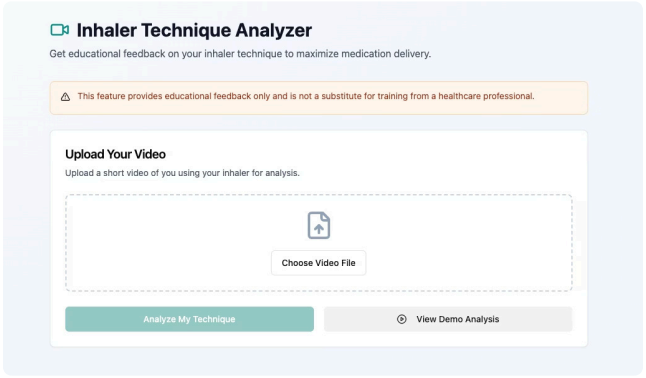
Experience AeroSense

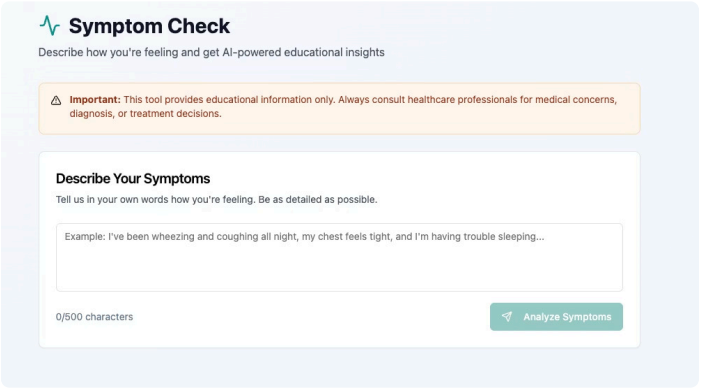
The fully functional application demonstrates all core features including environmental intelligence, inhaler technique analysis, and AI-powered symptom interpretation.



Launch Application







Development Repository

The complete source code and development history showcase the technical implementation of AeroSense's AI-powered features.

Open Source

Full codebase available for review and collaboration

Technical Documentation

Comprehensive implementation details and architecture decisions

View Repository

Research Methodology

1 Market Analysis

Systematic review of digital health market failures and discontinued products

2 User Research

Analysis of 373 app store reviews and 2,180 Reddit posts from asthma community

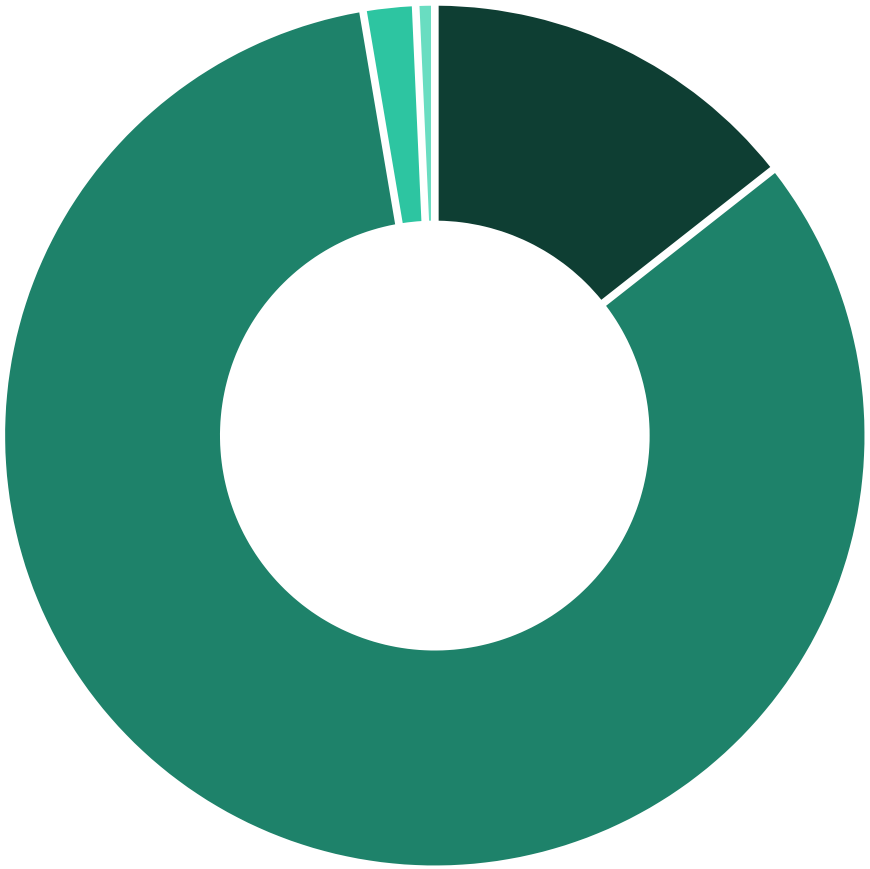
3 Clinical Literature

Review of peer-reviewed studies on asthma management and AI applications

4 Solution Design

Evidence-based feature development addressing identified pain points

Key Research Findings



Comprehensive research across multiple sources revealed consistent patterns of user frustration and unmet needs in current respiratory health applications.

Personal Mission

Born from Experience

This project began with a personal mission, born from a lifelong journey with asthma and allergies, to understand how technology could genuinely help patients.

Beyond Academic Exercise

More than coursework, this assignment has reshaped my perspective on AI's role in healthcare - not to replace clinicians, but to empower patients as partners in their own care.

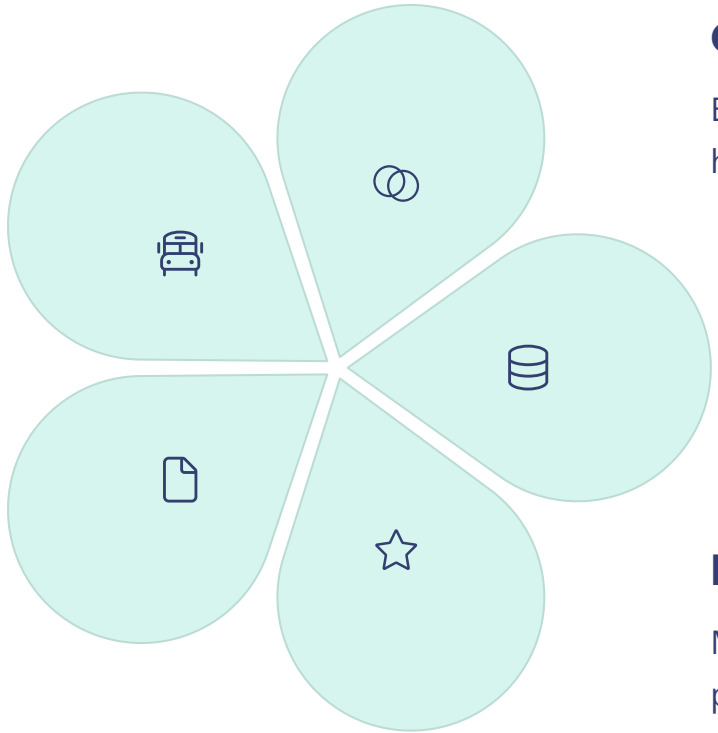
Impact on Healthcare AI

Patient Education

AI's immediate opportunity in personalized health education

Patient Empowerment

Providing control and confidence in disease management



Care Partnership

Enabling patients as true partners in their healthcare journey

Data-Driven Insights

Transforming personal health data into actionable understanding

Proactive Care

Moving from reactive treatment to predictive prevention

Future Vision

Immediate Impact

Deploy AeroSense to help current respiratory patients gain control and confidence

Platform Expansion

Extend intelligent health education model to other chronic conditions

Healthcare Integration

Partner with healthcare providers to enhance patient-clinician collaboration

Market Transformation

Establish new category of AI-powered health education tools

Key References

- **App Store Review Analysis (2025):** Systematic review of 373 reviews across top 10 asthma/allergy apps
- **Budiarto, A., et al. (2023):** Machine learning-based models for predicting asthma exacerbations. *JMIR AI, 2(1)*
- **FDA (2025):** Artificial Intelligence/Machine Learning-Enabled Device Software Functions: Lifecycle Management
- **MarketResearch.com (2024):** Smart Inhalers Market Global Forecast to 2032
- **Patient Forums Analysis (2025):** Reddit r/Asthma community analysis (2,180 posts, 2022-2025)

Thank You

AeroSense represents more than a technical solution - it's a blueprint for the future of AI in healthcare, where technology empowers patients with the personalized education and data-driven understanding needed to become true partners in their own care.

DeMarcus Crump

Ready to carry this vision forward