

Creating Precise, Touchless, and Safe Technology to Restore Eye Vision Accommodation



Artificial intelligence, image processing, and simulation techniques are transforming digital healthcare today. These technologies are enabling the first ultra-minimally invasive technology to treat the cause of presbyopia, a naturally-occurring age-related eye condition. Presbyopia results from a gradual decrease in accommodation, which is the eye's ability to adjust the lens focus for various distances.

The medical system built on these advanced technologies can restore natural visual accommodation for more than 1 billion presbyopes who do not currently have a therapeutic solution to treat their condition.

The Challenge

Alternative technologies in the market only treat the symptoms of presbyopia and by necessity, there are visual trade-offs associated with such treatment. The client's approach to treating presbyopia is one of the most promising techniques because it tackles the root of the problem. But what's needed for superior safety, precision, and efficiency of the treatment is sophisticated depth control, eye tracking, and semi-automation. These outcomes can be achieved through implementing complex technologies such as artificial intelligence (AI), machine learning (ML), image processing, finite element analysis, and computational fluid dynamics-based simulations, and cloud infrastructure.

Additionally, the outbreak of the pandemic has induced people from all over the world to make significant changes in their lifestyles. Similarly, in the healthcare landscape, the way doctors and patients are interacting is evolving towards a touchless service. Therefore, the client is interested in building a touchless system that guides the patient through the entire journey from pre-screening to the post-treatment phase.



Client Need

Our client, a leader in the field of ophthalmology, is conducting research and development of an innovative LASER treatment device and procedures for ocular dysfunction, disability, and disease. The client is developing innovative touchless microporation therapeutics to treat presbyopia for aging eyes.

The client needed a multi-disciplinary team to own their complete software solution development. The key was to go deep into technical, medical, and business use cases to realize the AI core, UI, and apps for an integrated solution platform, a critical need for their ophthalmic LASER treatment system.

What We Did

Innominds, with its expertise in AI, cloud, and software development took the ownership of developing the complete software solution needed for the client's new LASER treatment system.

Ophthalmic eye simulations using Finite Element Analysis (FEA) and Computational Fluid Dynamics (CFD) analysis



As it is difficult to realistically investigate human eyes using a clinical laboratory test, Innominds helped the client in capturing biomechanics and creating geometrical simulations of the eye using FEA and CFD with ANSYS workbench and other commercial codes to help with pathologic eye treatment.

Innominds has done a design of experiments (DoE) using ANSYS FEA and CFD analysis in the last one year and also carried out research on effective use of computational methods to arrive at optimal and effective solutions to diagnose the micro-level anatomy of the human eye and its problems. These analyses also help in evaluating the condition of the pathologic eye before and after the surgery by providing a measure of vision improvement.

AI/ML solution for medical image processing



Innominds developed an indigenous software to analyze OCT/UBM data of a patient using image processing and AI/ML techniques. The software identifies the actual problem and gives a solution in terms of treatment needed along with animations of the eye condition pre and post-treatment. This analysis helps surgeons with accurate and fast decision-making abilities and rejuvenates the patient eye's natural ability to accommodate and focus for various distances with short waiting times.

Graphical User Interface (GUI) of the device



The device being developed by the client assists the surgeons across all the stages of the treatment such as pre-screening, pre-planning, treatment, and post-treatment. To deliver a user-friendly and clutter-free experience, Innominds' Experience Engineering teams carefully designed and developed a patient dashboard and visualization screens across all these four stages.

Virtual assistant for mobile devices

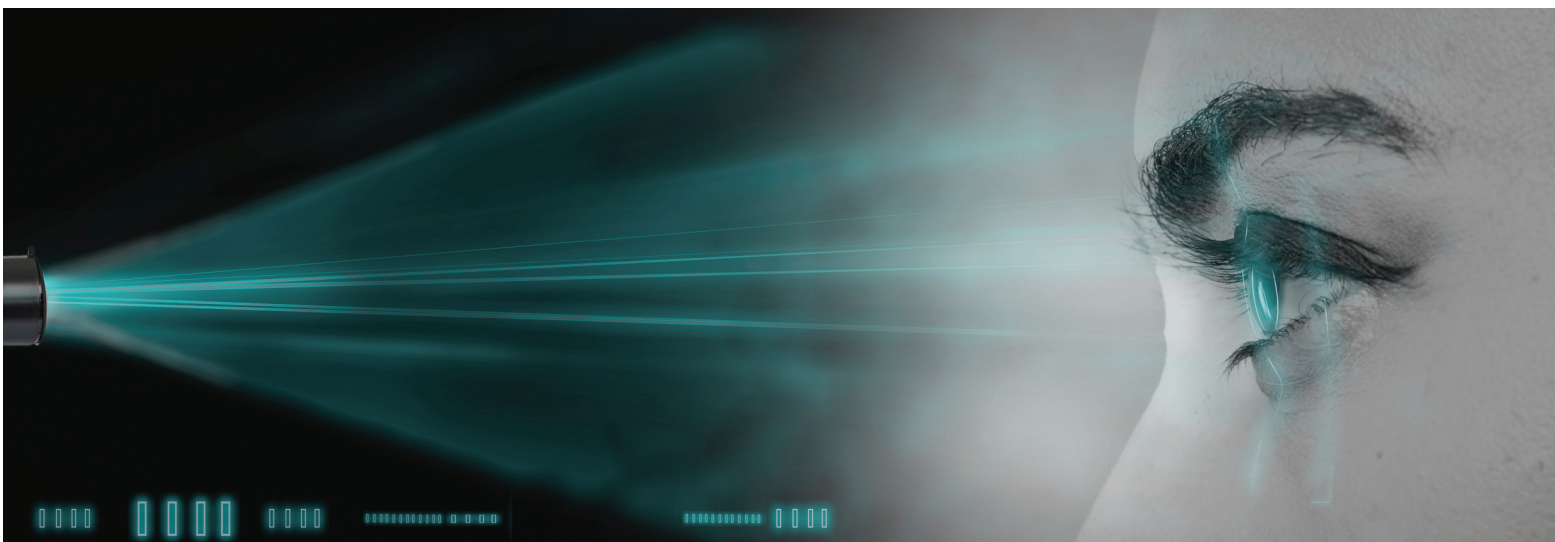


Innominds designed and developed a virtual assistant to enable telemedicine and help patients with remote diagnostics using a mobile application. It analyzes the eye condition based on the scans and the answers provided by the patient in terms of visibility. It informs the patients of any issues they have and whether a doctor visit is required.

Virtual assistant for LASER devices



Innominds designed and developed an inbuilt virtual assistant which will guide the patient during the procedure carried out using the LASER Device. The assistant interacts with doctors and technicians and supports them with insights across different stages of the procedure.



The impact

✓ Accelerated go to market

Innominds developed the minimum viable AI-based solution in less than 6 months and continues to optimize and enhance the provided solutions.



✓ Quick diagnosis

AI/ML methodologies developed by Innominds helped for quick diagnosis and expedited timelines to act upon a given problem faced by a patient.



✓ Extreme precision

Provided accurate and efficient analysis of LASER-based medical images of the human eye for pre and post procedures.



✓ Touchless treatment

Developed virtual assistant for remote diagnostics and touchless treatment of patients considering future needs.



✓ USFDA compliant

Helping the client to get the United States Food and Drug Administration (USFDA) approval by providing safety systems needed for their innovative laser treatment.



About Innominds

Innominds is an AI-first, platform-led digital transformation and full cycle product engineering services company headquartered in San Jose, CA. Innominds powers the Digital Next initiatives of global enterprises, software product companies, OEMs and ODMs with integrated expertise in devices and embedded engineering, software apps and product engineering, analytics and data engineering, quality engineering, and cloud and devops, security. It works with ISVs to build next-generation products, SaaSify, transform total experience, and add cognitive analytics to applications.