TripleRing

Real-Time Tissue Oxygenation Status

ViOptix

Client
ViOptix

Practice Areas
Smart Medical Devices

Core Disciplines
Systems Engineering
Transfer to Manufacture
Electrical Engineering
Optical Science
Photonics & Imaging
Quality System Management
Embedded Systems

Challenge

ViOptix needed to develop a quantitative, real-time tissue oxygenation monitor capable of delivering highly sensitive measurements in the surgical theater — in a compact, easy-to-use handheld form factor. Key technical hurdles included designing a multi-wavelength oximeter, developing compensation algorithms for variable tissue morphologies, and ensuring consistent performance across varying tissue conditions, all within the constraints of a virtual startup environment.

Solution

Triple Ring and ViOptix worked side-by-side from concept through clinical validation, applying deep clinical and technical expertise to accelerate development. Advanced optical modeling and Monte Carlo simulations were used to evaluate and optimize system performance early in the design process, while compensation algorithms were developed to handle variable tissue morphologies. The effort spanned subsystem and system-level invention, user-centered handheld design, and flexible R&D resource support tailored to a growing startup.

Client Impact

- Achieved FDA 510(k) clearance after demonstrating accurate, instantaneous StO2 measurement without capital equipment or dye injection
- Progressed from concept to clinical validation and FDA clearance in approximately 18 months
- Enabled real-time tissue viability assessment during surgery, supporting earlier intervention
- Improved both clinical and financial outcomes for tissue transfer procedures worldwide

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