

5M AI-assistant Surgical Navigation System

Principal Investigator: Prof. Jason Pui Yin Cheung



Technology

Multiview, Markerless, Multimodality, Machine Learning, Mixed Reality (5M) AI Surgical Navigation System redefines precision surgery through a transformative integration of advanced technologies.

By replacing expensive infrared systems with multi-camera RGB sensors, it delivers superior resolution and accuracy at a fraction of the cost. The platform combines optical and magnetic tracking to overcome traditional limitations like tissue occlusion and movement, while its AI-driven, markerless registration and real-time multi-modal data fusion enable seamless workflow integration.

Through immersive mixed reality visualization, the system provides intuitive surgical guidance, making complex procedures accessible and efficient.

Stage of Development

- **Technology** Advanced prototype validated in the lab.
- **IP** Core patents granted; additional patents pending.
- **Regulatory** Still preparing for bench test and further clinical trials.
- **Commercial** Securing pilot partnerships; planning limited market release.
- **Team** Full cross-functional team (engineering, AI, regulatory, clinical).



Key Advantages

- **Hybrid Optical-Magnetic Tracking**
Combines optical and magnetic sensing to overcome occlusion and tissue shift, enabling unprecedented navigation accuracy.
- **Markerless AI Registration**
AI-driven, marker-free registration streamlines workflow, reduces setup time, and enhances usability.
- **Real-Time Multi-Modal Fusion**
Integrates CT, MRI, and ultrasound data in real time for dynamic, intelligent surgical guidance.
- **Disruptive Cost Efficiency**
Utilizes standard RGB sensors instead of costly infrared systems, dramatically lowering hardware costs.
- **Immersive Mixed Reality Interface**
Provides intuitive, hands-free 3D visualizations to improve situational awareness and surgical precision.
- **Flexible Platform Strategy**
Modular hardware and SaaS-based software enable customizable, scalable partnerships and recurring revenue streams.



Opportunities

- Increased adoption of minimally invasive surgery globally drives the need for advanced navigation and visualization tools.
- Applications extend beyond surgery into interventional radiology, oncology, and diagnostics.
- Integration as a core sensing and AI component in next-generation robotic systems.
- Increasing reliance on real-time analytics and AI-enhanced decision support in the operating room.
- Enabling expert surgeon support and training in underserved or remote locations.
- Potential to establish a new industry standard for universal, interoperable surgical guidance platforms.
- Rising healthcare investment and surgical volumes in developing regions present new market entry opportunities.



Intellectual Property

- A navigation system, US 63/748,061.
- An imaging apparatus for a navigation system, US 63/748,053.
- Non-contact, non-radiation device that accurately locates multiple implants in a patient's body, PCT/CN2022/108627



+852 62277980



w.eichen7@hku.hk



**HKU
Med**

LKS Faculty of Medicine
The University of Hong Kong
香港大學李嘉誠醫學院