

Digital Surgery 3D Optical Positioning Technology **MIRDC**

Introduction

- **Far-near field 3D composite IR real-time positioning scanning module:** Developing random pattern structured LED lighting tracking probes to carry out projection and image taking through the binocular 3D vision single probe configuration as well as integrate with 6DOF multi-icons tracking functions.
- **3D compound mark positioning tracking device technology:** Designing and developing QRCode 6DOF compound sphere in PEEK material with ORCode identification mark. The diameter of the sphere is 32mm and the marked machining accuracy is $\leq \pm 0.035\text{mm}$. The optical characteristics of QRCode are enhanced through coating technology with an identification rate $\geq 95\%$.
- **3D point cloud and multi-target 3D visual positioning technology:** Integrating multi-dimensional mark and image identification algorithm to trace 10 sets of ID at the same time. It uses 6DOF posture as the based to carry out georeferencing to achieve the second accurate positioning. The accuracy of positioning is $\text{RMS} \leq 1\text{mm}$.
- Solving the issue of navigation image data drifting caused by the failure of multi-point tracking within local small area on the location marker frame volume image currently used in clinic for the existing navigation and surgical assisted system.
- Based on the surgical field and demand specification, IR positioning tracking probes can be flexible located. It can also match with the implants/ tools from different manufacturers. The down-sizing marker does not occupy space.

Awards/ Patents

- 3 patents in Taiwan and U.S. in total, including the patent portfolio of real-time positioning method.

Industrial Applications/ Case Studies

- Bone surgery positioning, minimally invasive surgery positioning, and digital puncture guidance



Dodecahedron 6DOF
3D marker



Far-near field 3D optical
positioning system