Polar Vision Drop-In Probe for Intraoperative Cancer Detection

Tech ID: 34789 / UC Case 2025-535-0

CONTACT
Michael M. Mueller
mmmueller@ucdavis.edu
tel: .

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ABSTRACT

Researchers at the University of California, Davis have developed a compact intraoperative sensing solution that helps clinicians identify cancerous tissue during minimally invasive procedures. The technology provides directional insight into the presence of approved molecular imaging tracers during surgery, addressing limitations of existing bulky or surface-limited tools. By offering intuitive, real-time guidance without disrupting surgical workflow, the approach supports more precise and confident tissue removal.

FULL DESCRIPTION

During minimally invasive and robot-assisted oncologic surgeries, surgeons increasingly rely on molecular imaging tracers to distinguish malignant tissue from surrounding anatomy. However, existing intraoperative detection tools are often large, difficult to maneuver, or unable to reliably indicate where tracer uptake is originating within the operative field. This gap limits the practical use of widely adopted imaging agents during surgery, particularly in confined or deep anatomical regions. As a result, surgeons may lack actionable feedback when attempting to localize small lesions or confirm complete tumor removal. The invention addresses this unmet need by enabling directional awareness of tracer signals directly at the surgical site.

The technology takes the form of a small, integrable probe that translates detected signals into an easy-to-interpret spatial indication for the user. Rather than producing conventional images, it conveys where signal intensity is coming from relative to the probe, supporting rapid orientation and decision-making. The solution is designed to integrate with existing surgical instruments, visualization systems, or robotic platforms. Its compact form factor and intuitive output reduce setup complexity and training burden. Overall, the approach improves surgical confidence, supports cleaner margins, and may reduce procedure time and downstream costs.

APPLICATIONS

- Robot-assisted surgical systems.
- Minimally invasive oncologic surgery tools.
- Intraoperative detection modules for PET-guided surgery.
- Surgical navigation and guidance systems.
- Targeted cancer resection instruments.
- Advanced molecular imaging-enabled operating rooms.

FEATURES/BENEFITS

- Directional signal indication — helps surgeons quickly orient toward cancerous tissue.
- Compact drop-in probe format — enables use in confined and minimally invasive settings.
- Intuitive real-time feedback — reduces cognitive load during surgery.
- Compatibility with molecular imaging tracers — expands intraoperative utility of existing agents.
- Workflow-friendly integration — supports adoption without major procedural changes.
- Improved localization confidence — may reduce residual disease and reoperation rates.

PATENT STATUS

Patent Pending

INVENTORS

- Mehadji, Brahim

OTHER INFORMATION

KEYWORDS

cancer detection, directional sensing, intraoperative imaging, minimally invasive surgery, molecular imaging, oncology devices, PET-guided surgery, robotic surgery, surgical guidance, surgical probe

CATEGORIZED AS

- **Optics and Photonics**
  - All Optics and Photonics
- **Engineering**
  - Engineering
  - Other
- **Imaging**
  - Medical
  - Molecular
- **Medical**
  - Devices
  - Diagnostics
  - Disease: Cancer
  - Imaging
- **Sensors & Instrumentation**
  - Medical

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ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Lightweight Directional Gamma and X-Ray Detection System
- Parallel Field Beam Delivery Treatment Device
- A Reconstruction-Agnostic Fan Phantom for Task-Relevant PET Spatial Resolution Assessment

University of California, Davis
Technology Transfer Office
1 Shields Avenue, Mrak Hall 4th Floor,
Davis,CA 95616

Tel: 530.754.8649
techtransfer@ucdavis.edu
https://research.ucdavis.edu/technology-transfer/
Fax: 530.754.7620

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