

AngleNav: Micro-Electro-Mechanical Systems (MEMs) Trackers to Facilitate Computed Topography (CT)-Guided Needle Puncture

Summary (1024-character limit)

The National Institutes of Health - Clinical Center (NIH-CC) seeks partners to co-develop and/or license an improved computed topography (CT)-guided needle puncture tracker.

NIH Reference Number

E-158-2017

Product Type

- Devices

Keywords

- Computed Topography, CT, CT Guided Needle Puncture, Micro-Electro-Mechanical Systems, MEMS sensor, Gyroscope, Angular Tracking, Surgical Biopsy System, Xu

Collaboration Opportunity

This invention is available for licensing and co-development.

Contact

- John D. Hewes
NCI - National Cancer Institute

240-276-5515

John.Hewes@nih.gov

Description of Technology

Conventional free-hand needle puncture procedures for biopsy and other procedures, often rely on unguided manual movements to guide a needle to its destination. Freehand procedures risk missing the tumor, or accidental injury, such as puncturing a vital organ. Needle guidance systems may improve accuracy and reduce risks but available guidance technologies are cumbersome and expensive and may carry other risks. For example, Computed Topography (CT)-guided fluoroscopy for needle guidance may be used, but fluoroscopy requires expensive bulky equipment and exposes patients to increased radiation. The high costs, cumbersome ergonomics, complex usability, and longer procedure times have limited wider adoption of needle guidance. Therefore, a nimble, low-cost, user-friendly, safer, guidance technology may improve accuracy and usage of guided biopsy for physicians and improve outcome & safety for patients.

Scientists at the National Institutes of Health - Clinical Center (NIH-CC) have developed a nimble, low-

cost, user-friendly, needle guidance system (AngleNav). The AngleNav system requires minimal equipment, a tracker, software, and display. The tracker is attached to the needle and consists of a Micro-Electro-Mechanical Systems, (MEMs)-based measurement unit including gyroscope, magnetometer sensors, and accelerometer to provide accurate three-axis angular data. The tracker wirelessly transmits positional information to a portable display, such as a smartphone or tablet. Phantom and preclinical animal studies with an AngleNav prototype system in live pigs have been completed and show improved accuracy using the AngleNav system versus freehand procedures. These advantages address many of the issues that have limited wider adoption of needle navigation systems; significantly improving usability, portability, and safety.

Potential Commercial Applications

- Tumor biopsy
- Tumor ablation
- Targeted drug delivery

Competitive Advantages

- Safer than conventional needle puncture procedures
- Highly portable
- Inexpensive to produce and operate

Inventor(s)

Sheng Xu (NIH-CC), [Brad Wood M.D. \(NIH-CC\)](#), Zion Tse (3T Technology, LLC)

Development Stage

- Prototype

Publications

Li R, et al. AngleNav: MEMS Tracker to Facilitate CT-Guided Puncture. *Annals of Biomedical Engineering*, Vol 46, No. 3, March 2018, pp 452-463 [[Annals of Biomedical Engineering](#)]

Patent Status

- **U.S. Provisional:** U.S. Provisional Patent Application Number 62/068,872 , Filed 16 May 2017
- **U.S. Patent Filed:** U.S. Patent Application Number US 18/33,025 , Filed 16 May 2017