Hed: Pusan National University Research Team Develops MoGLo-net Model to Enhance Handheld 3D Medical Images

Dek: The deep learning model increases handheld 3D medical imaging access.

3Key:

MoGLo-Net enables affordable and accurate 3D medical imaging capabilities to healthcare professionals.

The model enhances 3D image quality.

MoGLo-Net will help increase accessibility to accurate and precise 3D imaging.

A team of South Korean researchers developed a new deep learning model to improve handheld 3D medical imaging.

The research team led by MinWoo Kim, associate professor from the School of Biomedical Convergence Engineering and the Center for Artificial Intelligence Research at Pusan National University, was inspired to develop its new model to improve upon the current methods of medical imaging.

Ultrasound imaging is one of the most employed diagnostic tools for real-time imaging of internal organs and tissue. Images are captured by sending ultrasonic waves into the body and using the reflections to create images. This method is often paired with photoacoustic imaging, where laser light pulses are used to produce sound waves in tissues, a combination referred to as PAUS Imaging.

PAUS imaging consists of doctors controlling a transducer emitting ultrasonic or laser pulses and guiding it to the desired areas. Although this method offers flexibility to the wielder, the process only produces 2D images.

3D freehand is an alternative method to PAUS imaging. This scans 2D images with a transducer and stitches the images together to form a 3D view. Although this is not a proven method to create accurate 3D images, as it requires precise transducer motion tracking and involves expensive and cumbersome sensors.

Professor MinWoo Kim’s research team newest development, MoGLo-Net, solves the extensive 3D imaging problems. MoGLo-Net is a deep learning model that automatically tracks transducer movements without the use of additional external sensors.

Kim explained, “This model can create clear 3D images from 2D ultrasound scans, helping doctors understand what's happening inside the body more easily, and making better decisions for treatment." **(1 Citation)**

MoGLo-Net operates by estimating transducer movements from ultrasound b-mode image sequences and consists of an encoder and motion estimator for operation. The encoder is driven by a ResNet deep learning framework consisting of special blocks that extract correlations between images using the correlation operation method. Meanwhile the motion estimator receives its power from the Long-Short Term Memory neutral network. With the combination of the two, it assists in capturing in-plane and out-of-plane motions.

Collected information is then channeled into a novel self-attention mechanism within the encoder. This function highlights local features in specific sections in captured images allowing for a base summary of the entire image. Building upon currently employed methods, MoGLo-Net established a foothold to affordable healthcare options for all, while also pushing the envelope in ultrasound imaging accuracy, and efficiency.

MoGLo-Net additionally outperformed the competition when being tested in diverse conditions. Researchers tested the model using both proprietary and public datasets, producing high quality 3D ultrasound images.

Head of the research team Professor Kim notes, “Our model holds immense clinical potential in diagnostic imaging and related interventions, by offering clear 3D images of various bodily structures, this technology can help make medical procedures safer and more effective. Importantly, by removing the need for bulky sensors, this technology democratizes the use of ultrasound, making it accessible to clinics where specialists may not be available.” **( 2 Citation)**

The research team additionally pushed the boundaries of this model, allowing it to become the first of its kind to combine ultrasound and photoacoustic data to reproduce 3D images of blood vessels.

**Sources:**

1. Pusan National University Researchers Develop Breakthrough Deep Learning Model that Enhances Handheld 3D Medical Imaging  *Pusan National University* Jul 15, 2025 <https://www.prnewswire.com/news-releases/pusan-national-university-researchers-develop-breakthrough-deep-learning-model-that-enhances-handheld-3d-medical-imaging-302504323.html>
2. Pusan National University Researchers Develop Breakthrough Deep Learning Model that Enhances Handheld 3D Medical Imaging *Electronic Engineering Journal* July 15, 2025 <https://www.eejournal.com/industry_news/pusan-national-university-researchers-develop-breakthrough-deep-learning-model-that-enhances-handheld-3d-medical-imaging/>