Dual-Energy CT Cuts Costs, Radiation Dose

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WARF: P130360US01

Inventors: Guang-Hong Chen

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a system for generating multi-energy medical images of a subject using a single-energy X-ray source.

Overview

Dual-energy computed tomography (CT) was first proposed in the 1970s but has wavered in practical usage ever since. In essence, the process employs two different X-ray spectra (i.e., a high energy level and a low energy level) to image a subject. Recently, such systems have been used to successfully differentiate types of renal stones and quantitatively discriminate materials like calcium and iodine. Still, several issues continue to hamper widespread implementation.

Firstly, the process subjects patients to higher levels – two doses – of ionizing radiation. Also, specialized hardware is required (some commercially available systems use two distinct X-ray sources; others use a single source that switches between high and low energies). This raises costs and complexity.

The Invention

A UW–Madison researcher has developed a system for generating multi-energy CT images using a single-energy, polychromatic X-ray source. 'Polychromatic' means the X-rays have more than one wavelength.

In the new process, the polychromatic radiation is delivered to a patient and received by a detector array, which generates attenuation data. This data is segmented based on several component criteria. Ultimately, various forms of data are synthesized and used to reconstruct a number of multi-energy images, including separable images weighted for each of the component criteria.

Applications

- CT data acquisition systems, including diagnostic multislice scanners, on-board and C-arm cone-beam scanners for radiation therapy, and security CT scanners used at checkpoints

Key Benefits

- No need for two separable X-ray spectra
- Cuts X-ray dose to patient
- Works with existing CT systems
- No need to modify data acquisition hardware
- Simpler and less expensive

Additional Information

For More Information About the Inventors

- Guang-Hong Chen

Related Technologies

- For more information about reconstructing high quality medical images while reducing radiation dose, see WARF reference number P100141US01.

Tech Fields

- Medical Imaging : CT

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846