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3D Conformal Digital X-Ray Detector

Traditional x-ray detectors capture images in flat, rectangular 2-D shapes while many of the objects of interest are 3-D. Digital x-ray imaging in 3-D is vital in the medical field as well as in the industrial field. Applications in the mechanical field include inspection such as detecting hairline cracks or leaks in pipes, aircraft, and military equipment. To image irregularly-shaped objects in the past, scientists have used flex processing, a common type of imaging. Flex processing uses a flexible substrate as a backbone for various electronic layers to produce a flexible detector backplane. Thereafter, a deposited scintillator layer (the component that converts x-rays into visible photons) attaches on top to complete the structure. Although the backplane is flexible, the scintillator layer prevents true flexibility, making it difficult to have a conformal detector on a surface. Therefore, scientists are now looking for alternative methods of 3-D x-ray imaging.

Researchers at ASU have developed a method to capture x-ray images of 3-D surfaces using conformal x-ray sensors. The method works by pre-molding or pre-shaping the scintillator layer into various 3-D shapes and then attaching the backplane to complete the detector. The pre-molded scintillator improves the fitting of the backplane, creating an overall durable and robust detector. The detector can conform around the surface of an object and capture very small features, reducing the quantity of imaging and giving improved visibility and resolution. In summary, the detector can essentially conform to various objects with a pre-molded scintillator.

Potential Applications

- Medical Imaging
- Mechanical Inspection
- Military Application

Benefits and Advantages

- Conformal – The detector can image non-planar and/or irregular objects with appropriate premade molds
- Efficient – The framework allows users to take one, cohesive picture of an object instead of taking multiple images for different angles

For more information about the inventor(s) and their research, please see:

[Joseph T. Smith's directory webpage](#)

[Rita Bottesch's directory webpage](#)

