AN ENHANCED REALITY SYSTEM FOR PERCUTANEOUS NEEDLE PLACEMENT THERAPY INSIDE X-RAY CT SCANNER

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We present a simple, safe, and inexpensive image overlay system to assist surgical interventions inside a conventional CT scanner. The overlay system is mounted non-invasively on the gantry of the CT scanner and it consists of a passive mounting arm, a flat 15inch LCD display, and a half mirror. In a pre-operative calibration process, the display, half-mirror, and imaging plane of the scanner are spatially registered by imaging a simple calibration object. Following the calibration, the patient is brought into the scanner, an image is acquired and sent to the overlay display via DICOM transfer. Through the half-mirror, surgeon can look at the patient and the CT image floating inside the patient in correct size and position and orientation. This vision enables the physician to see both the surface and the inside of the patient at the same time, which is called 'Enhanced Reality', to perform a precise surgical intervention. In this paper, we also discuss the spatial positioning accuracy of the image registration, which depends on the human depth perception.