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(54) Title: NEAR-REAL-TIME CONTINUAL 3D REGISTRATION OF OBJECTS IN 2D X-RAY IMAGES

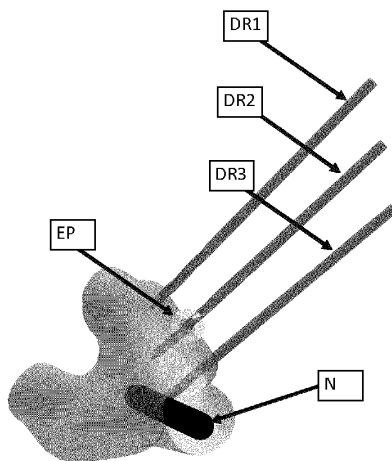


Fig. 38

(57) Abstract: Systems and methods are provided for a continual automatic registration of bone (- fragments), instruments, and implants based on only one additional X-ray without the need of changing the position of the X-ray source. According to the invention, a 2D X-ray image is received, which X-ray image shows a surgical region of interest. Artificial intelligence assisted automatic detection and localization of objects like bone (-fragments), tools (like a drill) and/or implants combined with a priori information about the surgical procedure are used to compute their relative 3D positions and orientations at any desired point in time. This registration of the objects can be repeated multiple times and can thus provide guidance in near real time.