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(54) Title: SYSTEMS AND METHODS FOR MIXED-REALITY SUPPORTED 3D NAVIGATION FOR MUSCULOSKELETAL SURGERY BASED ON X-RAY IMAGES

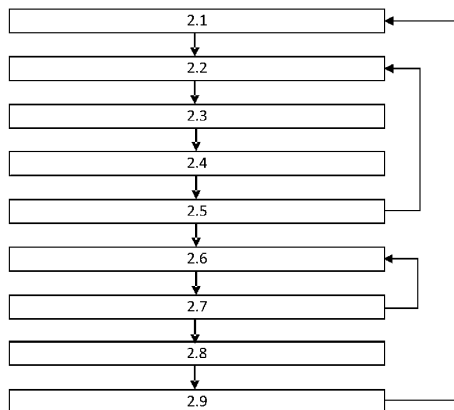


Fig. 5

(57) Abstract: A computer program product is provided including instructions which, when executed on a processing unit of a system, cause the system to receive one X-ray image, a 3D data set describing a region of interest within a patient's anatomy, and a 3D model of the surgical object. The X-ray image is a 2D projection image depicting at least part of a surgical object including an anchor point as well as the region of interest. The computer program product is configured to determine a 2D position of the anchor point in the X-ray image and an imaging direction onto the region of interest based on the X-ray image. Based on this information, a 3D position of the anchor point in a 3D coordinate system defined by the 3D data set is determined. Further, a 3D position and 3D orientation of the surgical object relative to the region of interest is determined by means of the computer program product based on the 3D model of the surgical object, the 3D position of the anchor point in the 3D coordinate system, and some form of tracking (e.g., extended-reality device or robotic arm).

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