2D – 3D registration using texture information

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Modern handheld structured light scanners, such as the Artec Spider and Eva scanners, have the ability to rapidly, and non-invasively create 3d surface models with high accuracy and resolution. Due to a series of visible light pattern projected onto the object, 3d geometry of the object is determined and a surface model containing geometry as well as texture information is created.

Goal of this project is to investigate if texture information contained in the 3D light scanner model can be used to register this model to a 2D image, captured by a digital camera. Such registration would allow accurately aligning the 3D model with the 2D camera position and orientation, which would permit to superimpose 3D structures onto the 2D image. If successful, this technology could be applied as a user-friendly intraoperative tracking technology for biopsies.

Outline of student's role: (1) Work in a multidisciplinary technology research lab specialized in computer- assisted surgery. (2) Learn concepts of structured light scanner. (3) Literature review for 2D-3D registration algorithm; (4) Develop prototype software for image analysis and registration; (5) Perform preliminary feasibility study.

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