3D reconstruction of the surgical scene using structured light

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3D RECONSTRUCTION OF THE SURGICAL SCENE USING STRUCTURED LIGHT
The technique: Camera + projector
Visible + NIR
The core of the technology: Stripe indexing and generation of 3D data
Steps in 3D reconstruction

Pre-processing operations (2D):
- image acquisition (visible and NIR)
- image filtering
- stripe indexing/image correspondence

Post-processing operations (3D):
- generation of 3D point cloud and triangulation
- noise removal, hole filling, mesh smoothing
- mesh subdivision
- pose normalization / registration
- inclusion in an AR system
3D post-processing: hole filling
3D post-processing: smoothing
Pose registration
Need external markers for liver registration
Performance and the future

- Real-time performance
- Tracking features and registration to a standard pose
- Embed into AR systems

Future work:
- Embedding the design into DSPs
- New optics
- Develop methods for 3D image compression