

## **3D reconstruction of the surgical scene using structured light**

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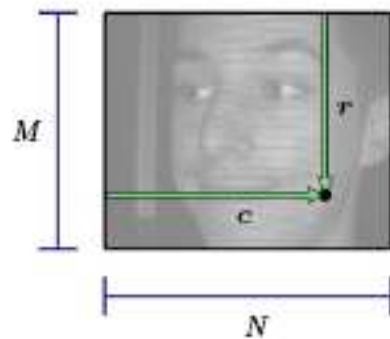
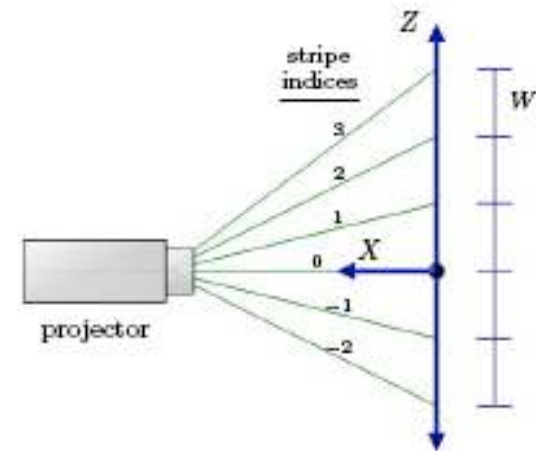
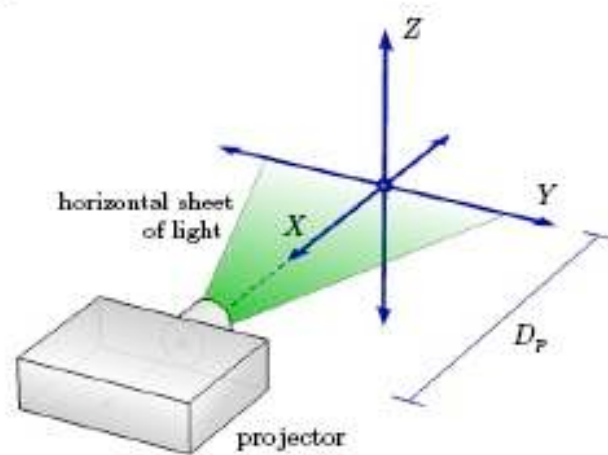
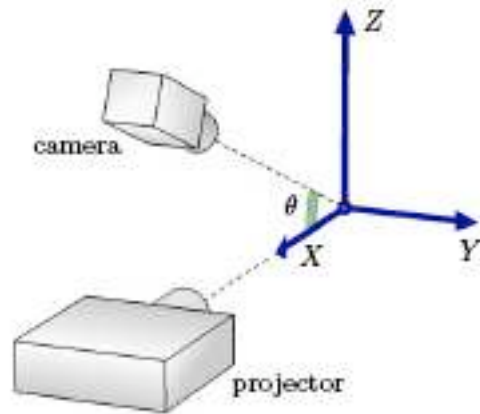
*m.rodrigues@shu.ac.uk*

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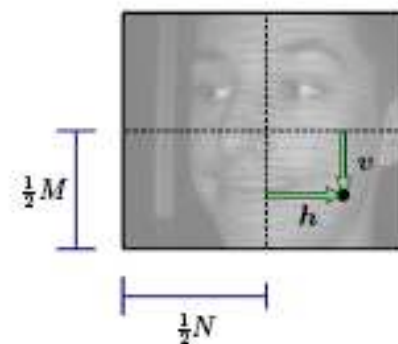


# 3D RECONSTRUCTION OF THE SURGICAL SCENE USING STRUCTURED LIGHT

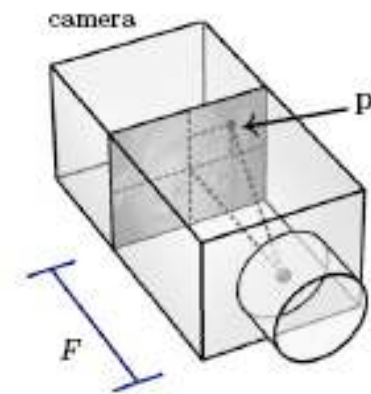
# The technique: Camera + projector Visible + NIR



(a) image space

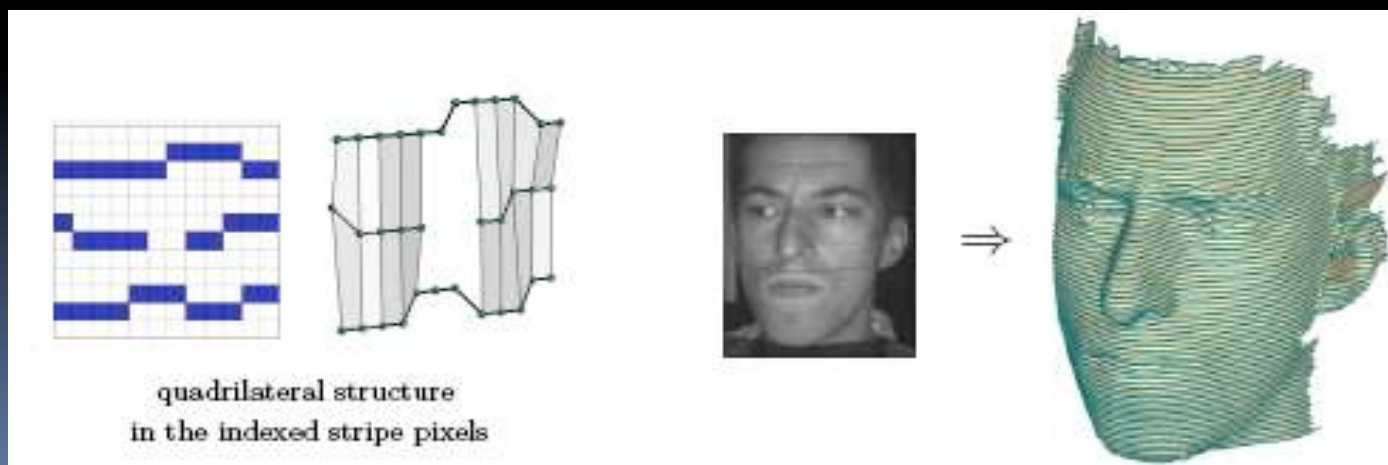
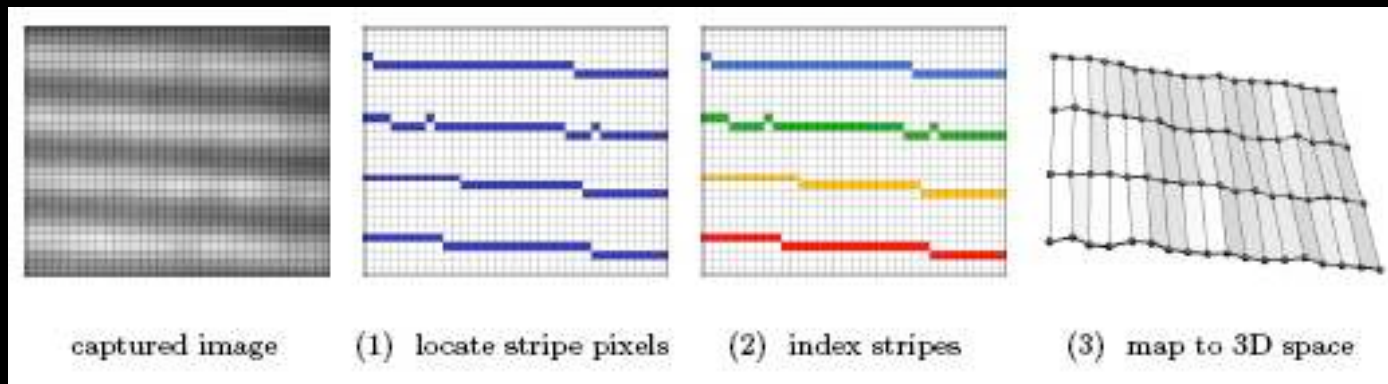


(b) centred



(c) system space

# The core of the technology: Stripe indexing and generation of 3D data



# Steps in 3D reconstruction

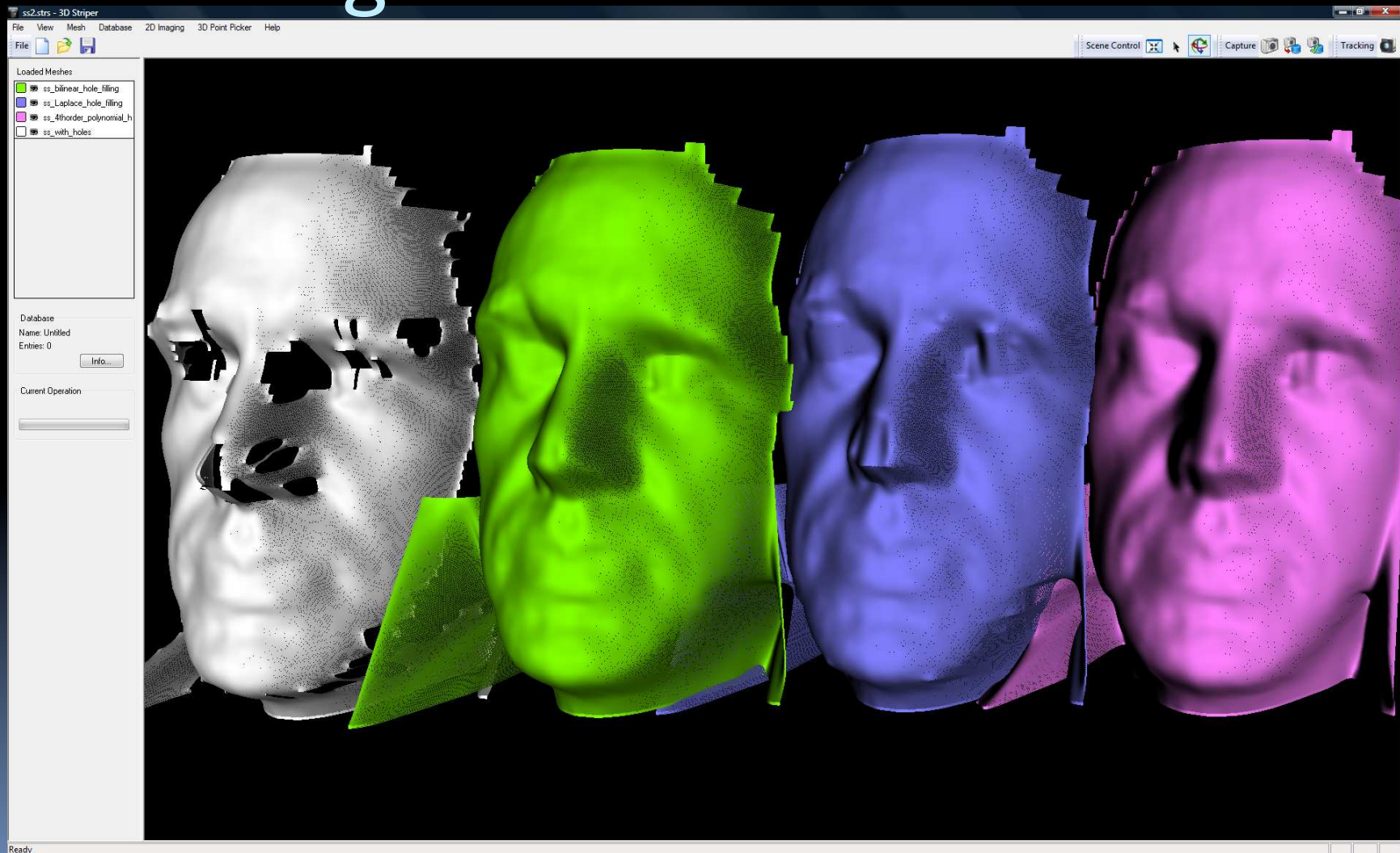
## Pre-processing operations (2D):

- image acquisition (visible and NIR)
- image filtering
- stripe indexing/image correspondence

## Post-processing operations (3D):

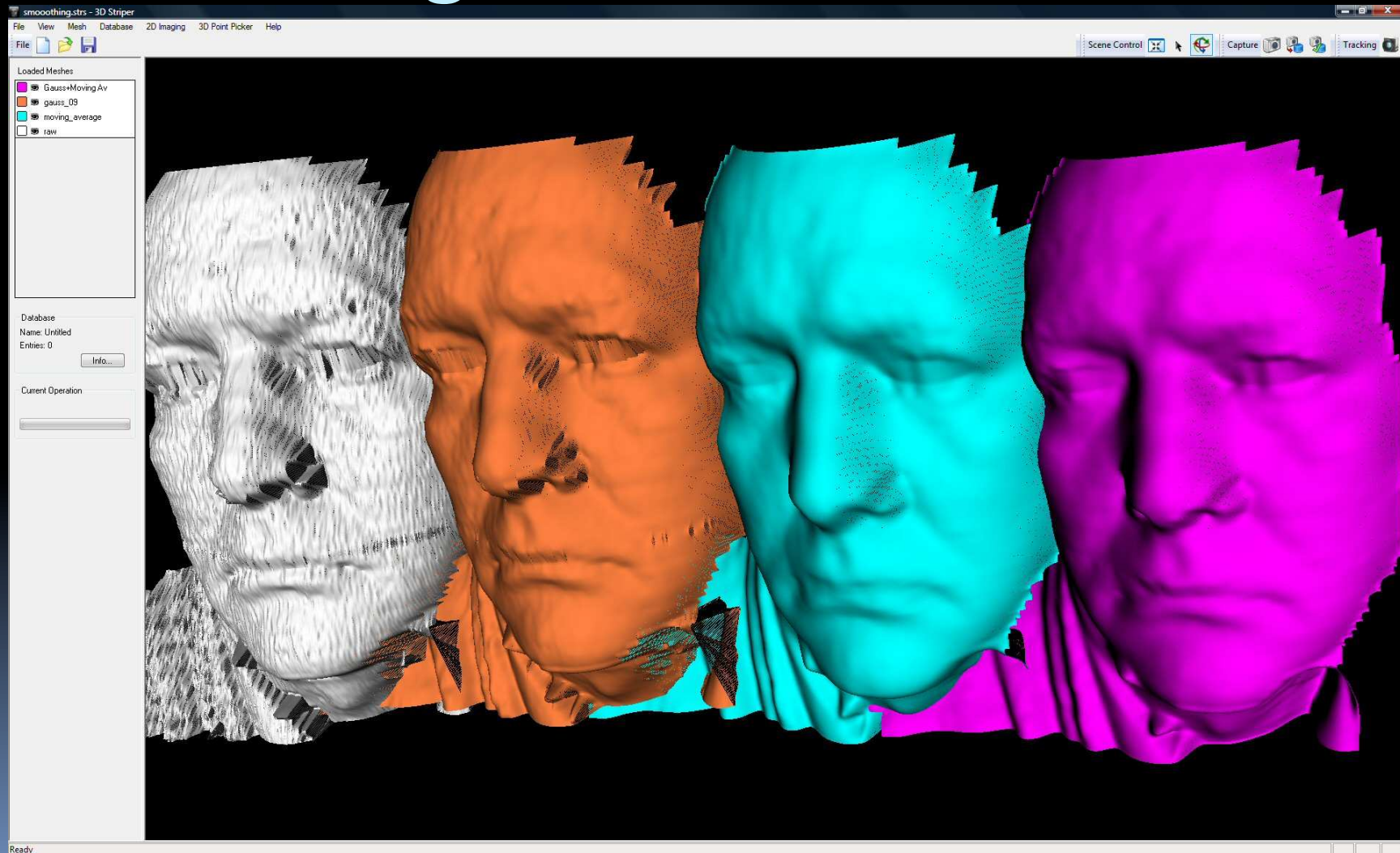
- generation of 3D point cloud and triangulation
- noise removal, hole filling, mesh smoothing
- mesh subdivision
- pose normalization / registration
- inclusion in an AR system

# 3D post-processing: hole filling

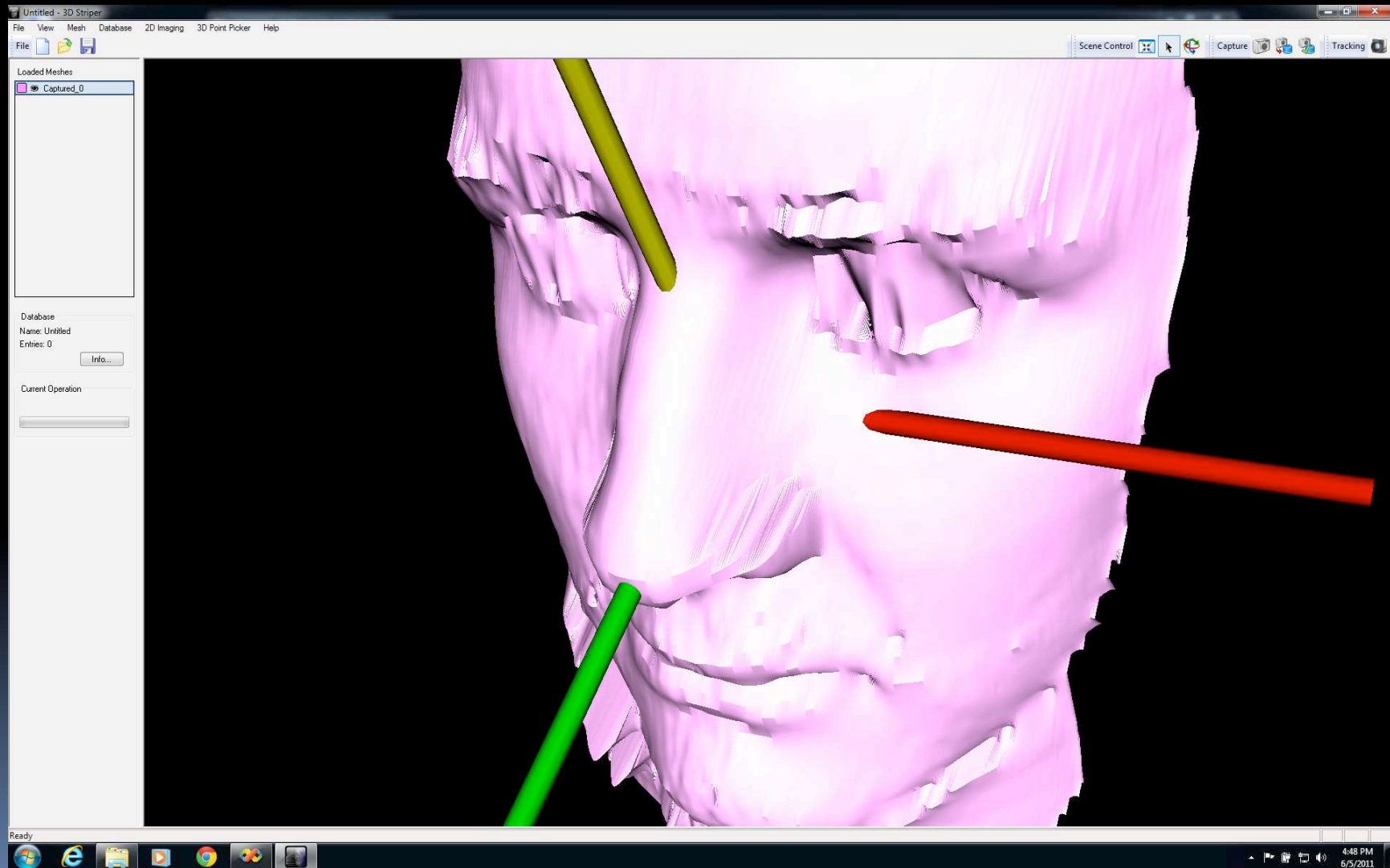




# 3D post-processing: smoothing

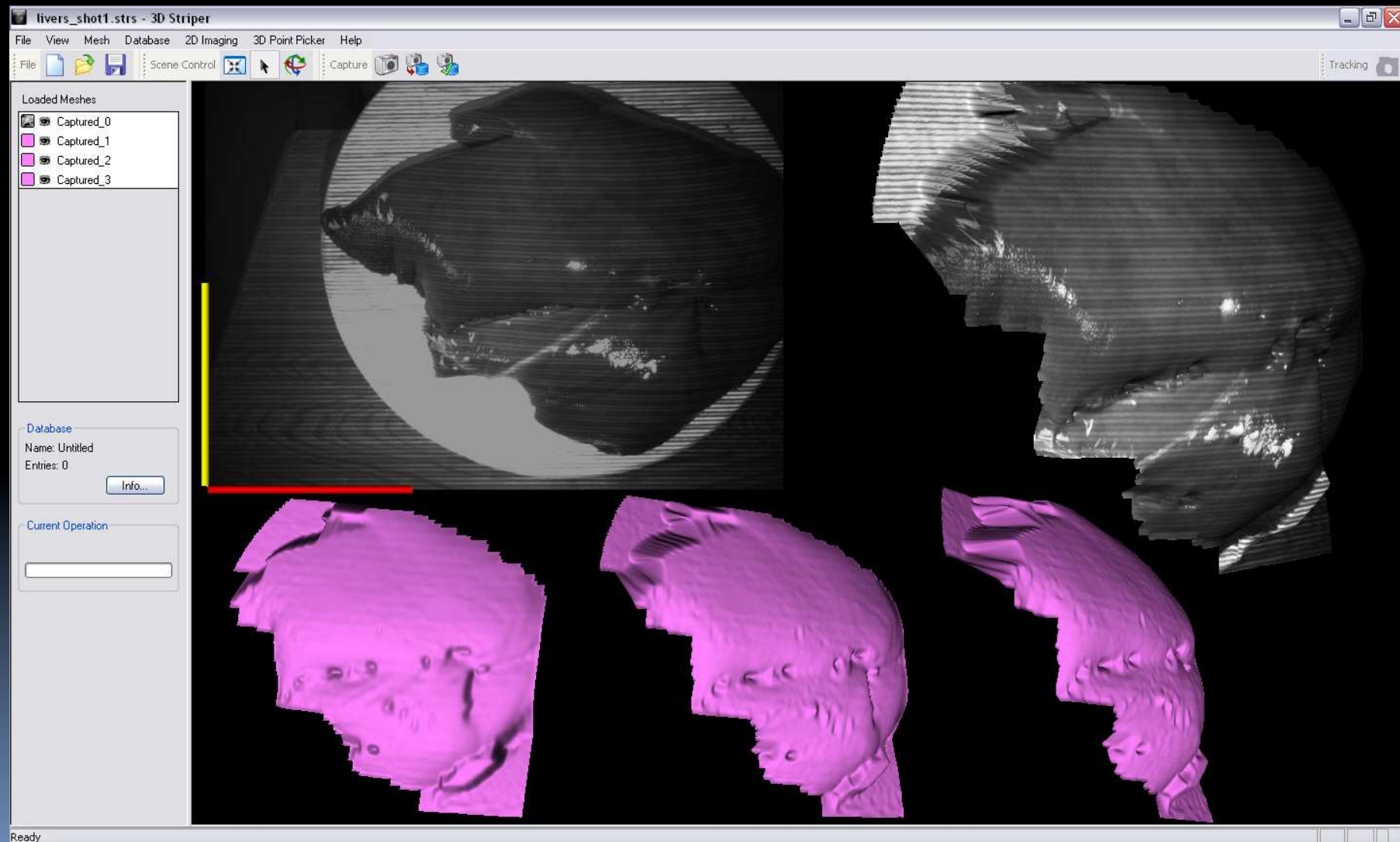


# Pose registration





# 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