SurgeryPad
A mobile augmented reality application using MITK

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How it came: Navigated Prostatectomy (2010)

Matthias Baumhauer:
2011: Reworked Navigated Prostatectomy
2011: In the meantime ... „MITK pocket“
2011: The idea
Initial Trials
SurgeryPad at EAU 2014 Live Surgery
MITK Integration
The Workflow

Preparation
- Marker attachment
- Imaging
- Segmentation
- Camera calibration

During intervention
- Marker detection
- Registration
- Visualization

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Architecture: Modules, Plugins

MITK (Application)
- Plugins
- Applications

MITK (Toolkit)
- Plugin framework
- GUI framework
- Algorithms, data structures, interaction

CTK | Qt | ITK

MITK Workbench
- Navigation plugin
- Camera calibration plugin

Calibration
- Unit Tests

Navigation
- Unit Tests

NavigationUI
- Mini Apps

OpenCV
DICOM Import & Segmentation: Standard Workbench tasks
Calibration

Data Manager

Camera Calibration

Take screenshots, calibrate and test

Focal length: 671.60 674.67
Principal points: 318.74 236.46
Distortion coefficients: 0.523 -1.0849 0.2 0.0011

Valid

Stop video

Take screenshots

Remove all screenshots

Calibration & test

6 screenshots available

Run calibration

Test parameters

Evaluate reprojection error (Page_Up: Activate; Page_Down: Go to next button)

Undistort images

Display

Reprojection Error: 0.24

Control

Image Navigator 22 Logging 22

Filter:

Level

Message

Copy to clipboard

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Finally: The Navigation pipeline

1. Record image
2. Compress image
3. Send image via Wi-Fi
9. Show augmented image on display

4. Receive image
5. Extract image points
6. Estimate camera pose

8. Send augmented image via Wi-Fi
7. Render augmented image
Conclusions: Augmented Reality Application with MITK

Benefits of using MITK:

1. Reused functionalities:
   1. DICOM Import
   2. Scene Management
   3. Segmentation
   4. Registration
   5. Visualization

2. Own code based on:
   1. Existing Module system and dependency logic
   2. Automatic setup of external toolkits (OpenCV!)
   3. Plugins integrated into given application frame

→ Thank you MITK.
Things where MITK cannot help...

Thank you

?Questions?