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Faculty Summit 2012

ADVANCING THE STATE OF THE ART

Touchless Interaction in Surgery

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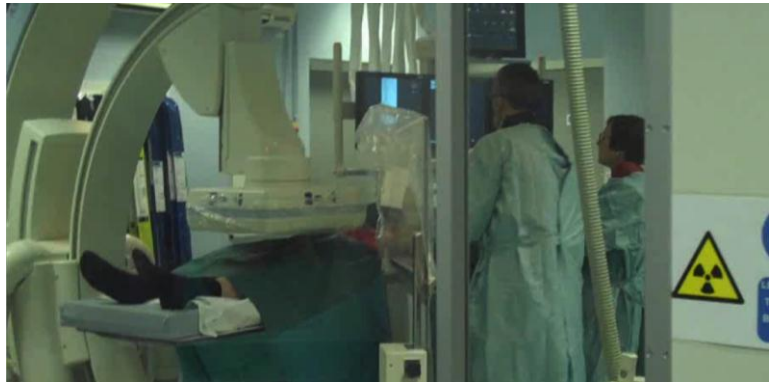
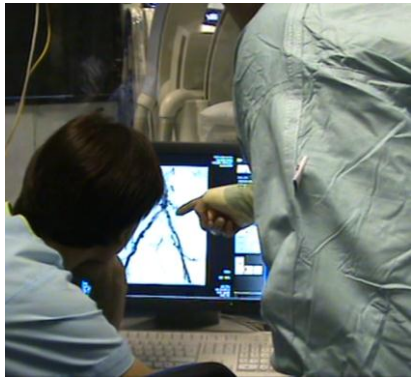
Project Goal

To allow a surgeon to interact with medical images in the operating room

Medical imaging systems are used to visualize the patient's inner anatomical structure
The surgeon's interaction with the system is limited due to sterility
The surgeon needs to depend on someone else to control the system

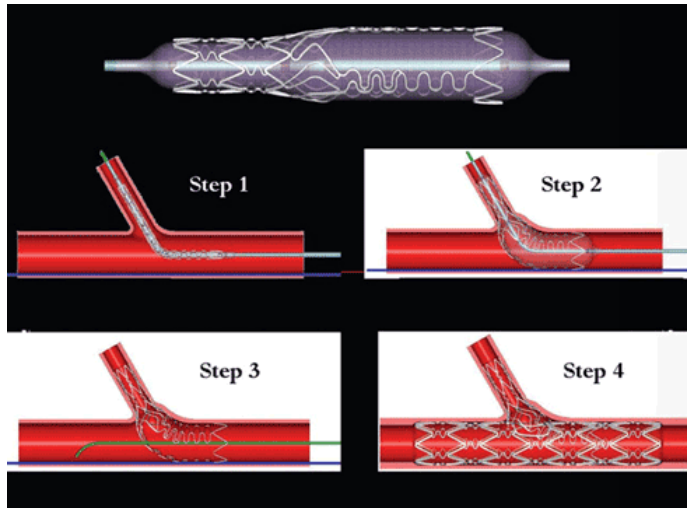




Vascular surgery

Minimally invasive surgery (a.k.a. Keyhole surgery)

Placement of a stent inside the aorta to treat aneurisms



Medical imaging system components

3D model of the patient's aorta (obtained from a CT scan)

Live fluoroscopic images (updated during the procedure)

Touchless interaction

Introduce the Kinect for Windows technology

Use of hand gestures to manipulate images

Touchless Technology in the Operating Room

Challenges

The operating room is a busy environment

Visual occlusion of the surgeon's lower body

Close proximity of users

Sterile interaction area

Noise environment

Aim to avoid false positives

Challenges

View from Kinect's perspective in 'idle' mode

System Interaction

Design of the gesture set in close collaboration with surgeons

Gesture control for ‘physical’ manipulations

Continuous interaction

One and two hand based interactions

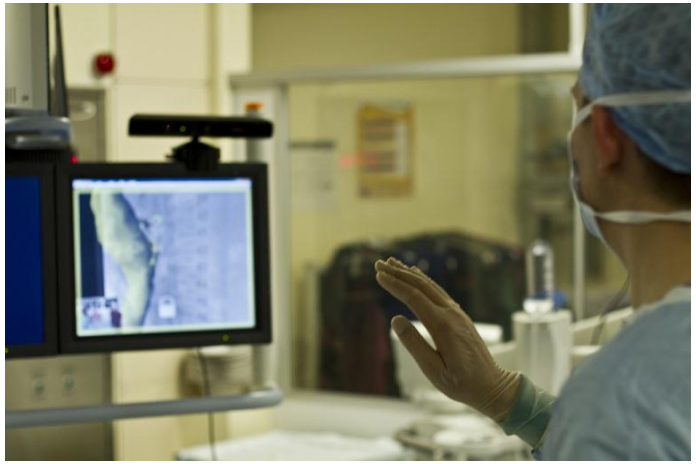
Gestural interaction within ‘sterile zone’

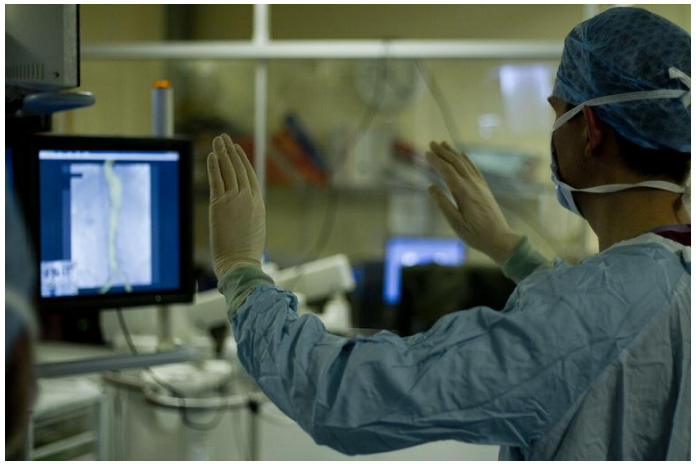
Active area of interaction

Voice control for event-driven interaction

Voice commands that surgeons are familiar with

Visual feedback





System Interaction

First time user

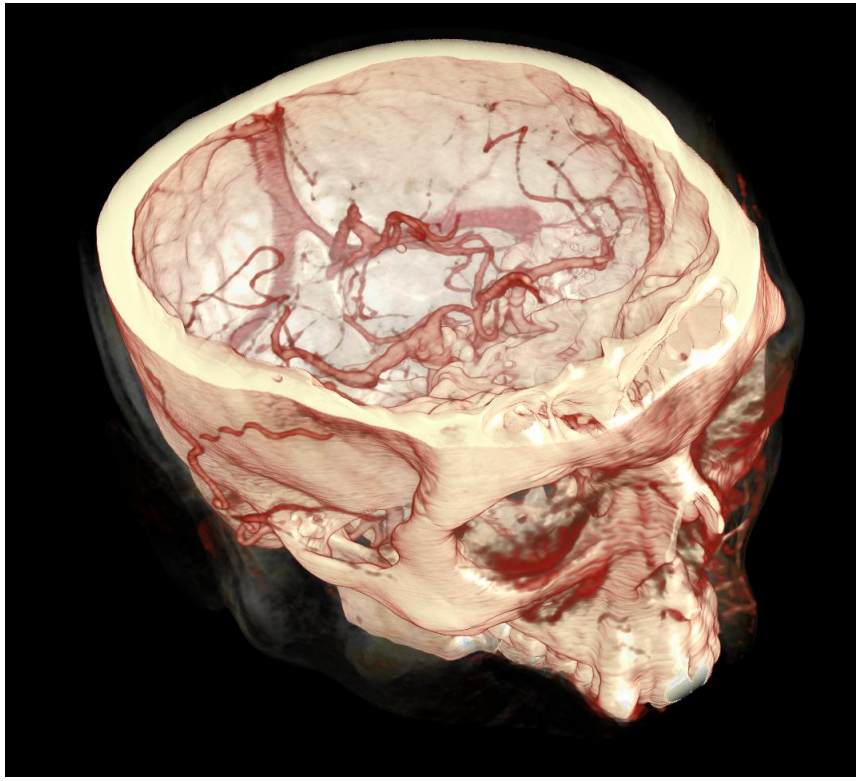
Future Work

Touchless interaction for other type of medical procedures

Neurosurgery

Different gesture set

3D volumetric models of the brain



Toolkit for surgical settings

Development of a gesture framework

Thank you

Collaborative work

Lancaster University:
Mark Rouncefield

Microsoft Research Cambridge:
Abigail Sellen, Helena Mentis, Antonio Criminisi, Kenton O'Hara and Robert Corish

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Graeme Penney and Andreas Varnavas

Guy's and St. Thomas' NHS Trust:
Tom Carrell and Neville Dastur

http://research.microsoft.com/en-us/projects/touchlessinteractionmedical

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