

Finding a fETus with UltraSound (FETUS)

King's Health Partners Summer School #2021

6th July 2021



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Get source of this slide and see further references from <https://github.com/xfetus/us-simulator>



Who am I?



Miguel
Xochicale



H.S.

2000

B.Sc.

M.Sc.

T.A.

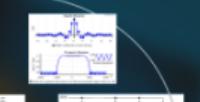
2010

Ph.D.

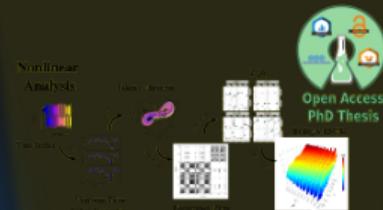
2020

2030

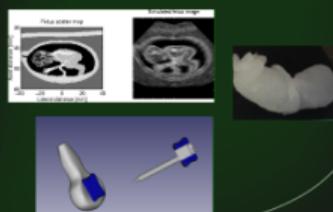
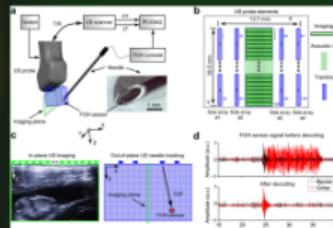
$t[\text{years}]$



Ph.D. in Human-Robot Interaction
University of Birmingham



Research Associate in
Ultrasound Guidance Interventions
King's College London



Who are we? / Where we come from? / Do we have hobbies?

Zhanchong
Ou



Shu
Wang



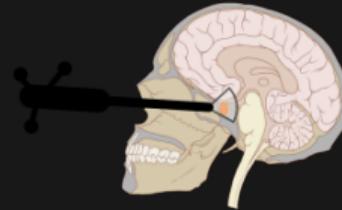
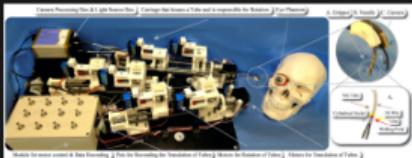
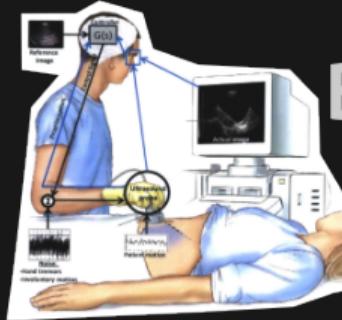
Tareen
Dawood



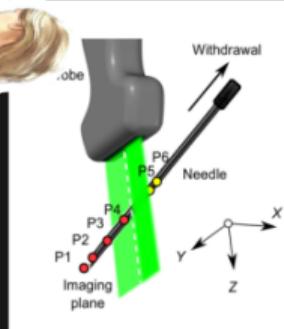
Beijing
China



What does a Biomedical Engineer do?



Biomedical Engineering

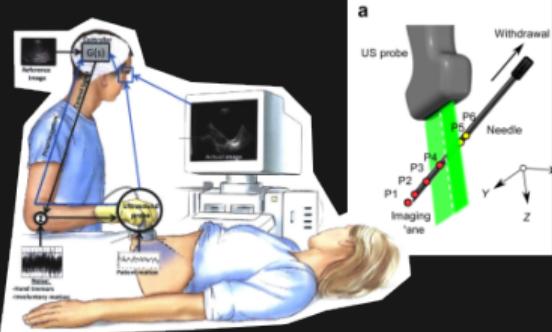


Where we are based?



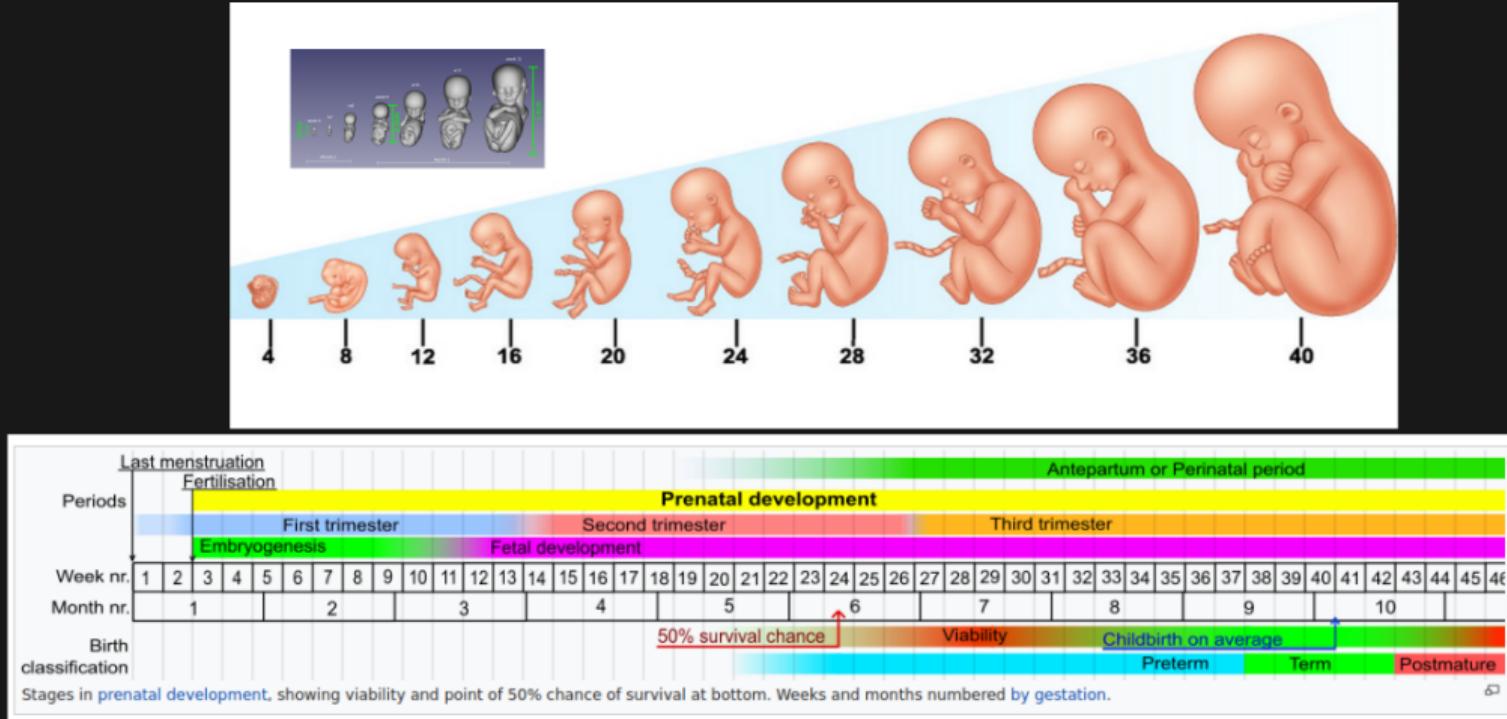
School of Biomedical and Imaging Science

Department of Surgical and Interventional Engineering



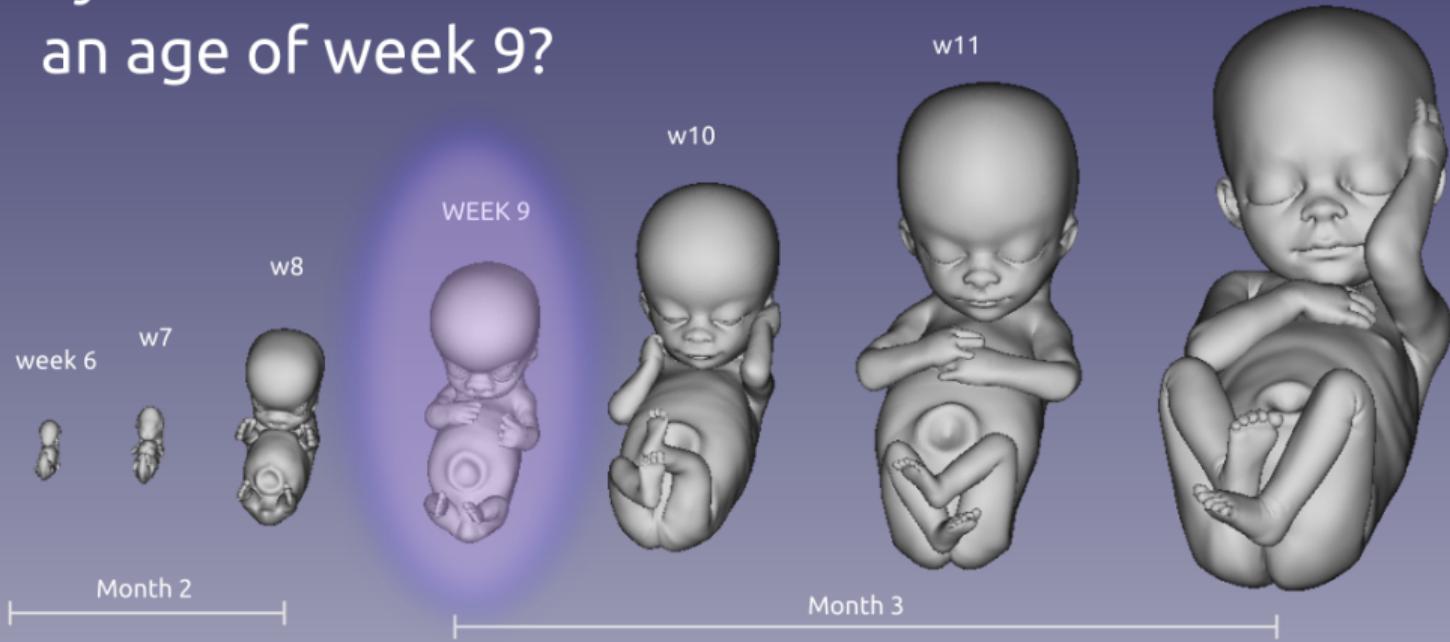
Understanding Fetal Growth

Understanding Fetal Growth



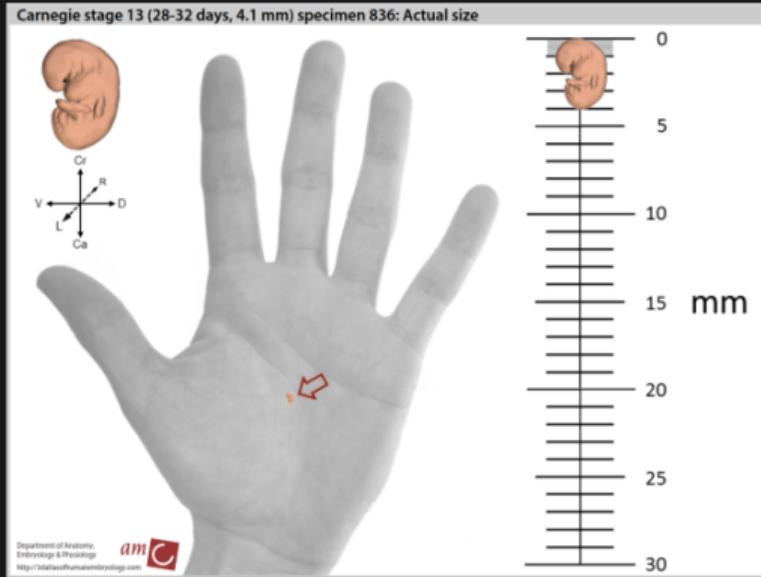
Guessing Fetal Growth

Can you draw a fetus of
an age of week 9?

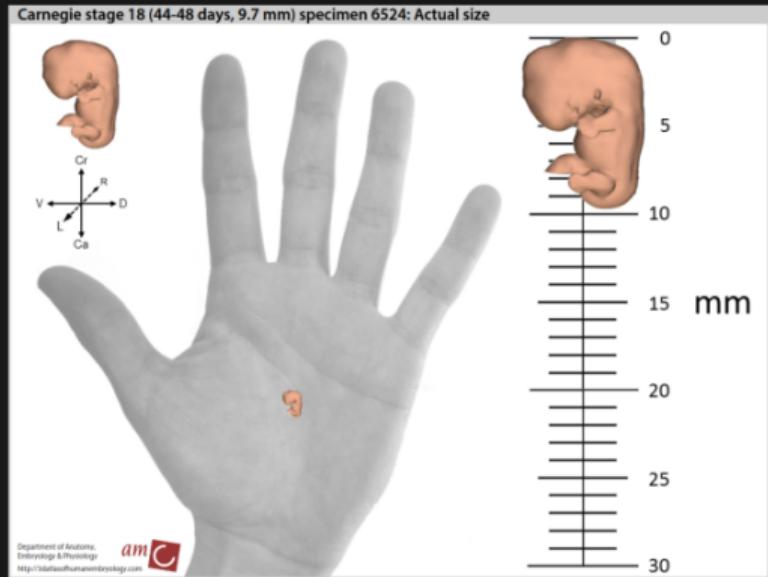


Understanding Fetal Growth

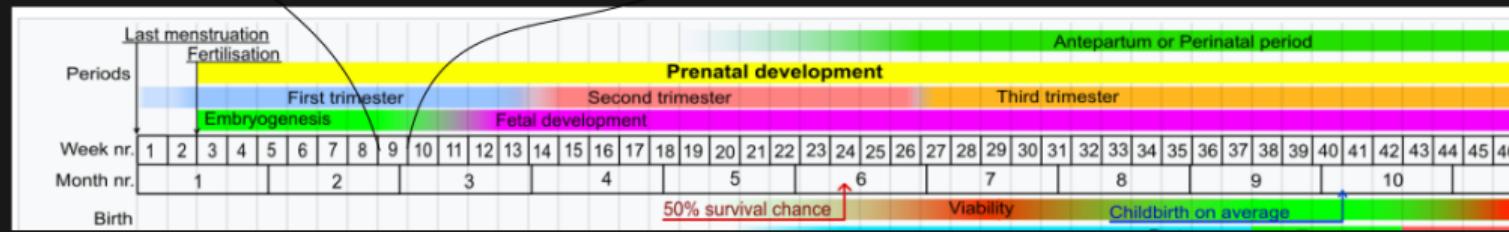
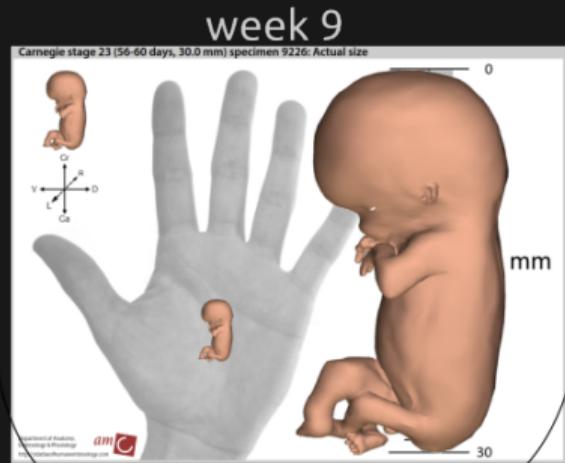
week 5



week 6



Understanding Fetal Growth



Do you know how we can actually see a fetus?

Computational Tomography

CT

+ high image quality



- non-real-time

Computational Tomography



Magnetic Resonance Imaging

MRI

+ high image quality



- non-real-time

Magnetic Resonance Imaging



Ultrasound

US

Ultrasound

+real-time  - poor-image quality



Medical Imaging in Pregnancy

CT



+ high image quality - non-real-time

MRI



+ high image quality - non-real-time

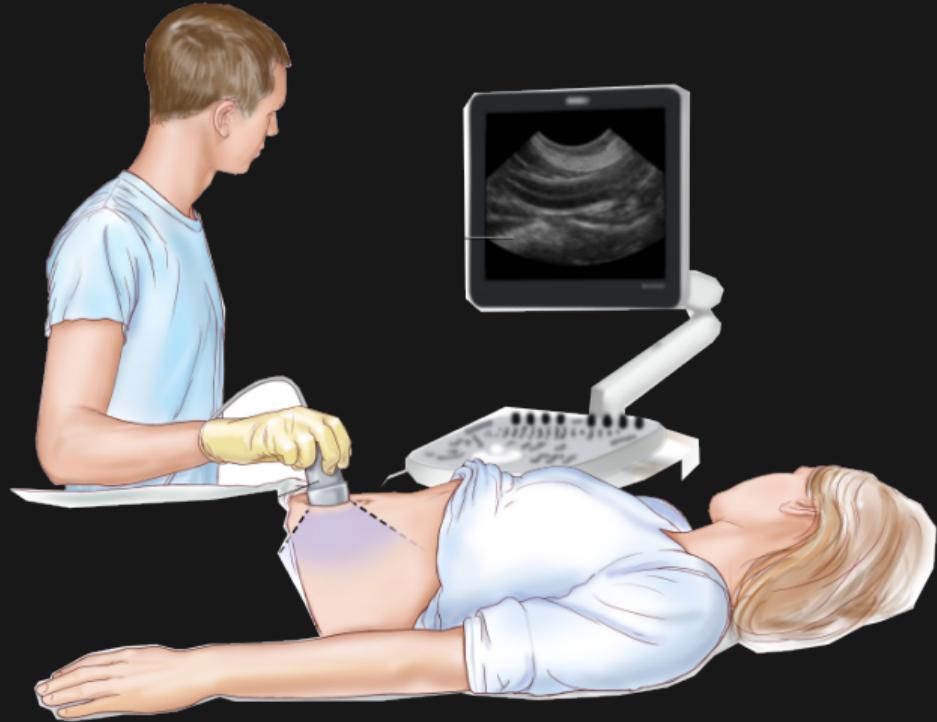
US



+ real-time - poor-image quality

Do you know what is the role of a
Sonographer?

The role of a Sonographer



How a Biomedical Engineer would help
a Sonographer?

Modelling US imaging

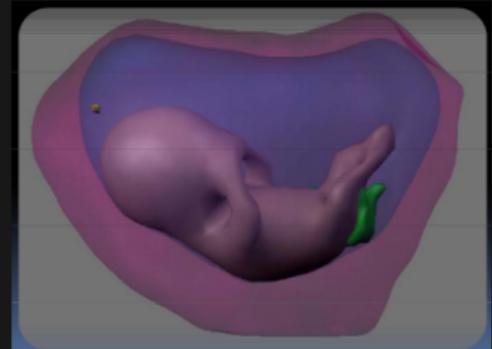
Segmentation on 3D US data



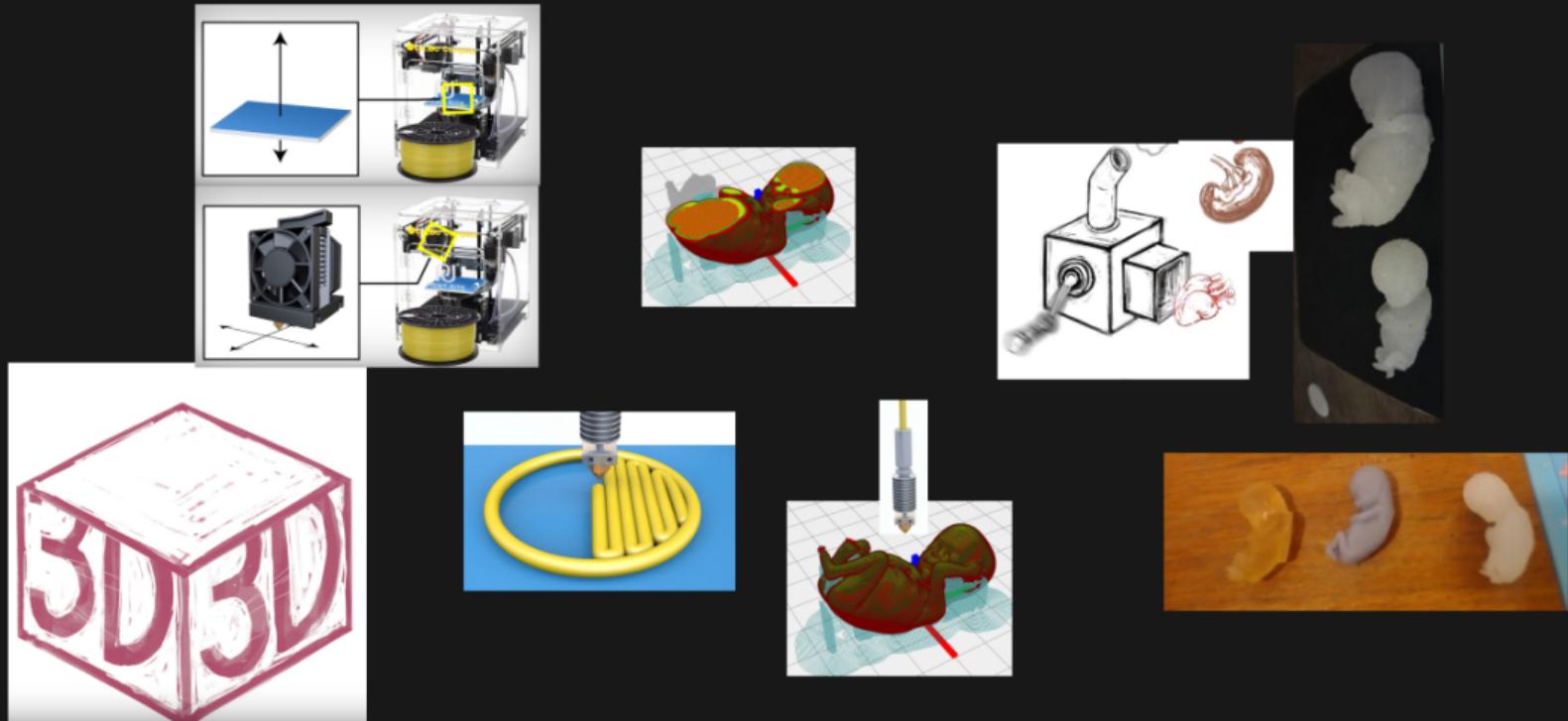
Tissue Labelling



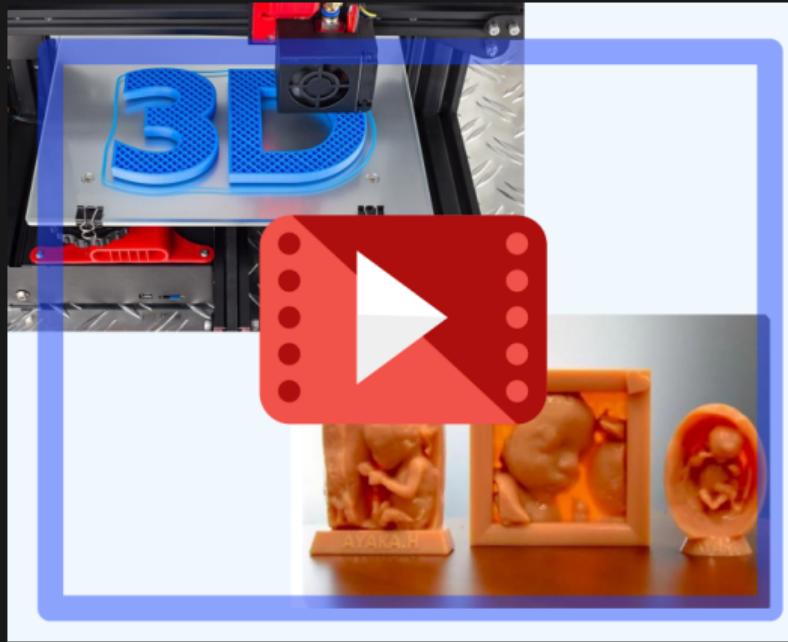
Surface Reconstruction



3D printing Fetuses



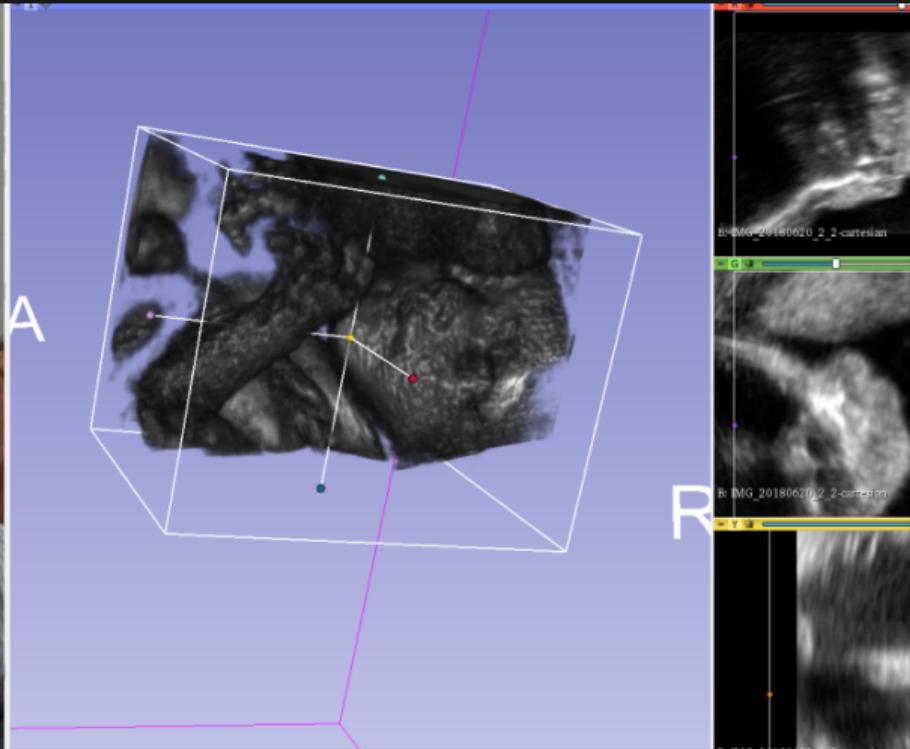
3D printing Fetuses



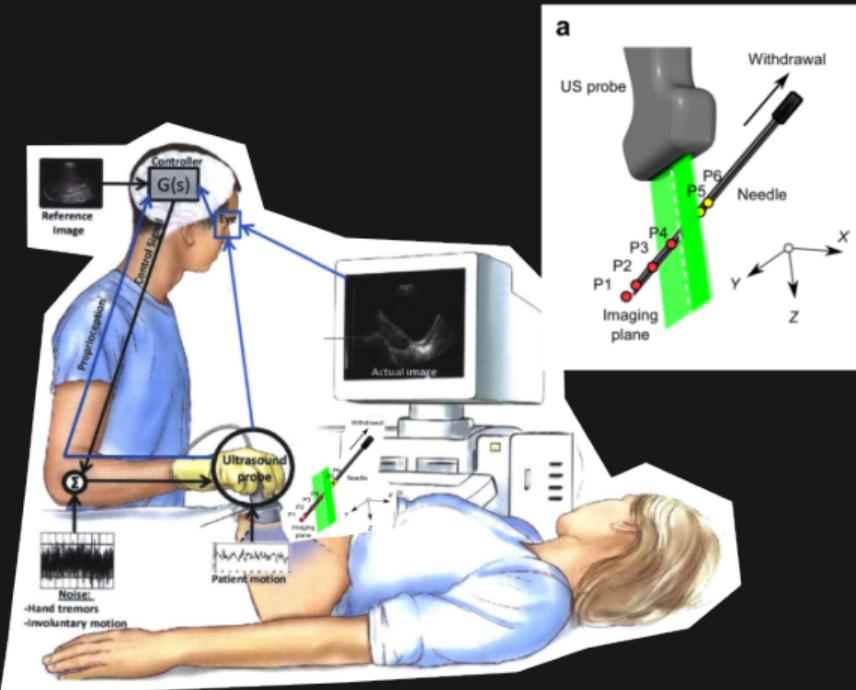
Interactive Ultrasound Imaging DEMO

Can you identify body parts of a fetus with Ultrasound?

Interactive Ultrasound Imaging DEMO



Ultrasound Needle-Tracking



Challenges:

- Tracking needles
- Skillfullness of sonographers
- Anatomical view changes

Takeaway messages

- Biomedical Engineers

- Electronics
- Mechanics
- Computer Science
- Medical Imaging



- Medical Imaging

- Computational Tomography
- Magnetide Resonance
- Ultrasound imaging



- Applications of US

- Modelling US
- 3D printing
- US needle tracking



Pop Quiz and Souvenirs

Q1. What is the most common imaging technique to see a fetus in a mother's womb?

Q2. Can you name the person's job who performs the imaging of fetus?

Q3. Can you name one of the other imaging techniques to diagnose and to monitor fetus in a mother's womb?

Pop Quiz and Souvenirs

Souvenirs



Acknowledgements

GIFT UNT team Surg



Miguel
Xochicale



Shu
Wang



Ou
Zhanchong Fang-Yu Lin

...



Name
Surname Name
Surname Name
Surname ...



Anna
David



Tom
Vercauteren



Wenfeng
Xia

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