

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.

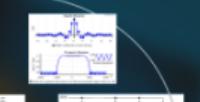
2010

Ph.D.

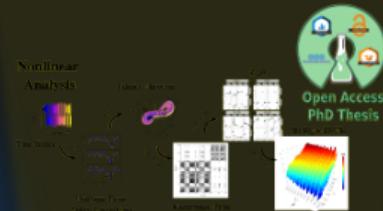
2020

2030

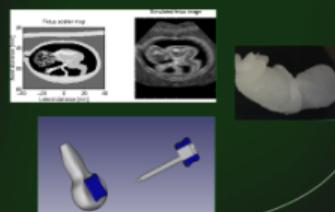
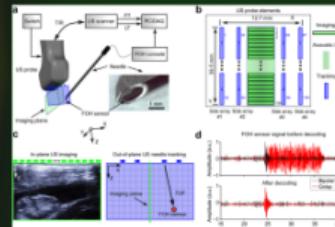
$t[\text{years}]$



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



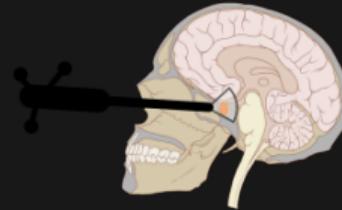
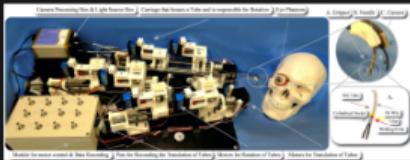
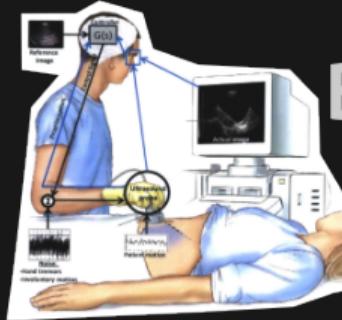
Shu
Wang



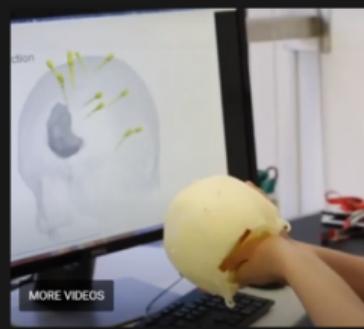
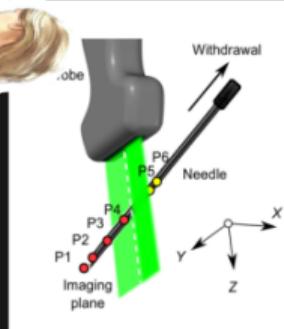
Tareen
Dawood



What does a Biomedical Engineer do?



Biomedical Engineering

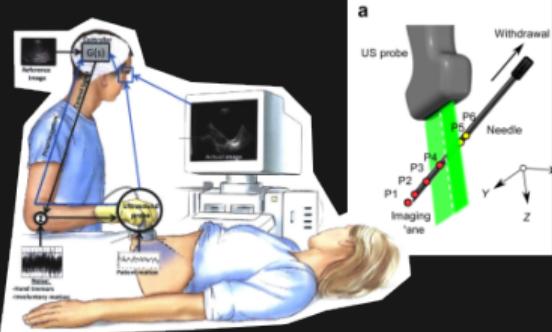


Where we are based?



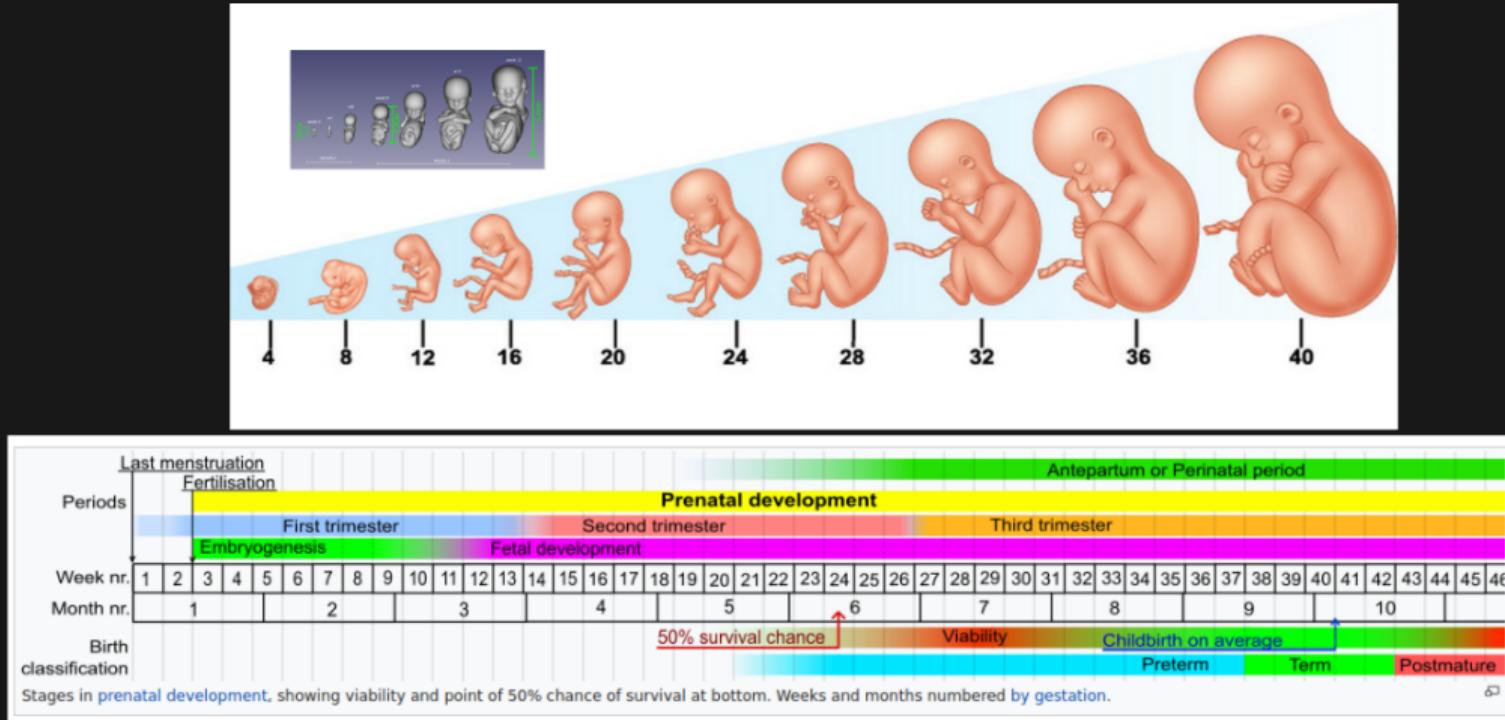
School of Biomedical and Imaging Science

Department of Surgical and Interventional Engineering



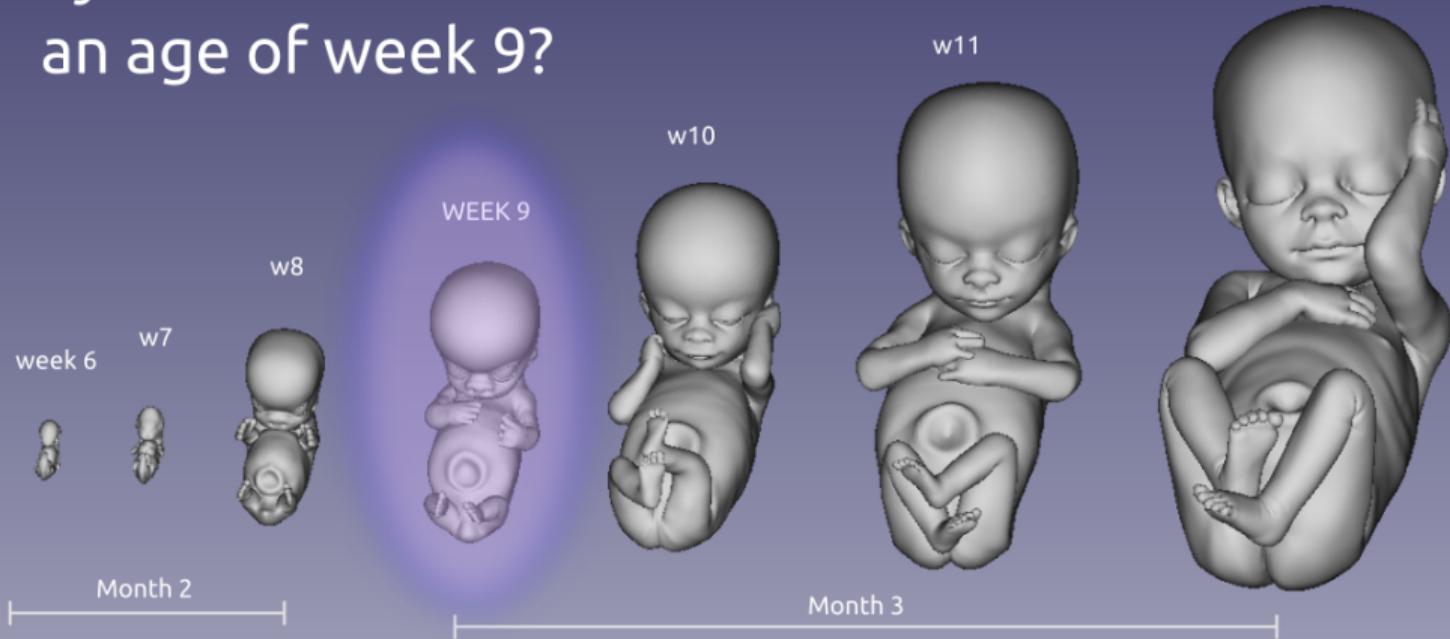
Understanding Fetal Growth

Understanding Fetal Growth



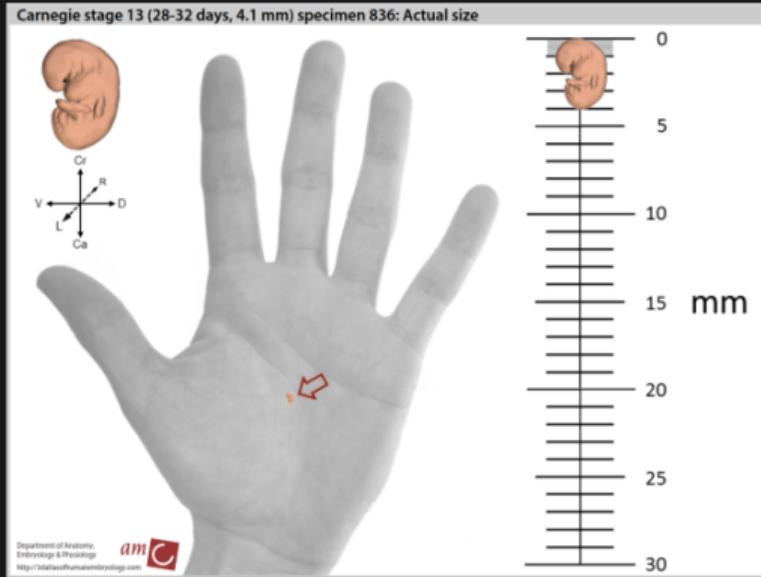
Guessing Fetal Growth

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

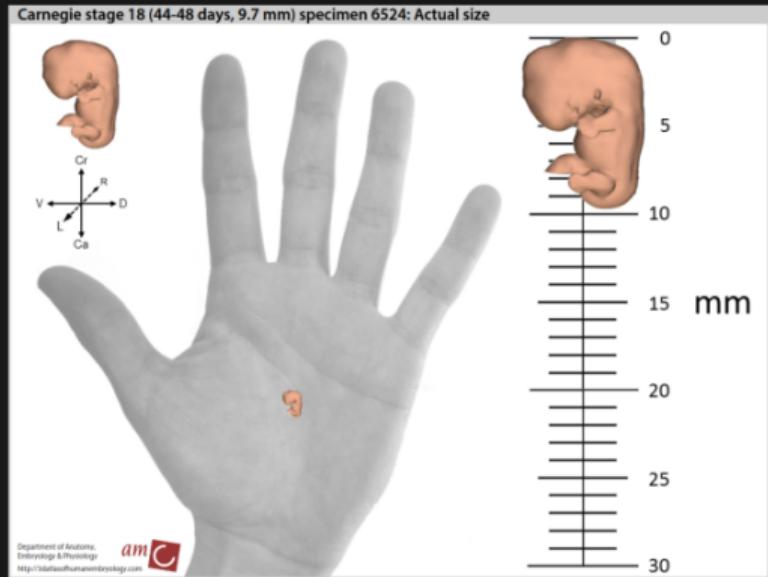


Understanding Fetal Growth

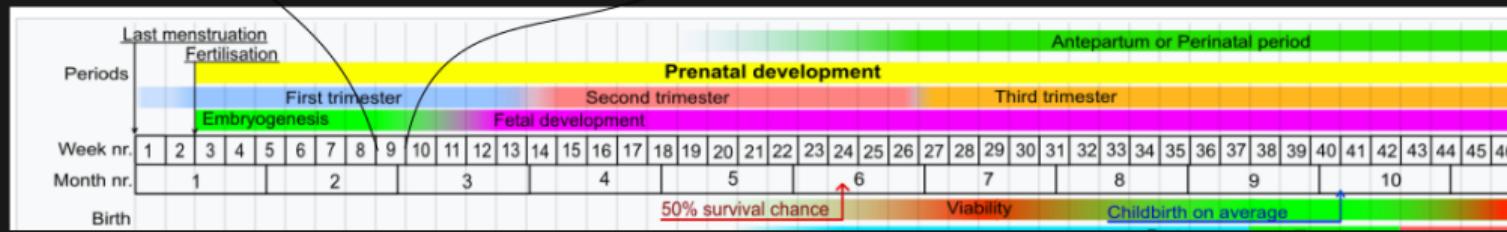
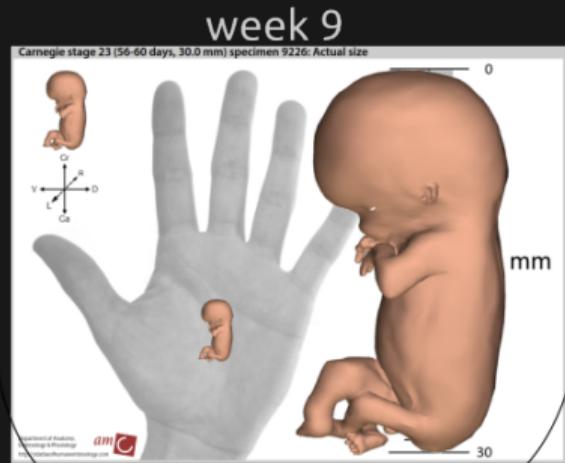
week 5



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

Ultrasound

+real-time  - poor-image quality



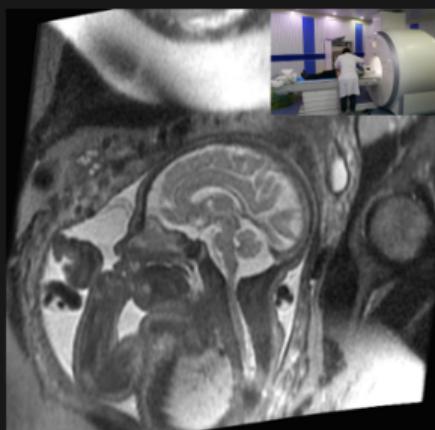
Medical Imaging in Pregnancy

CT



+ high image quality - non-real-time

MRI



+ high image quality - non-real-time

US



+ real-time - poor-image quality

How a Biomedical Engineer would help
a Sonographer?

Modelling US imaging

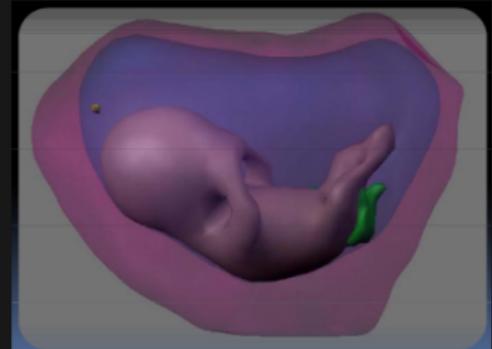
Segmentation on 3D US data



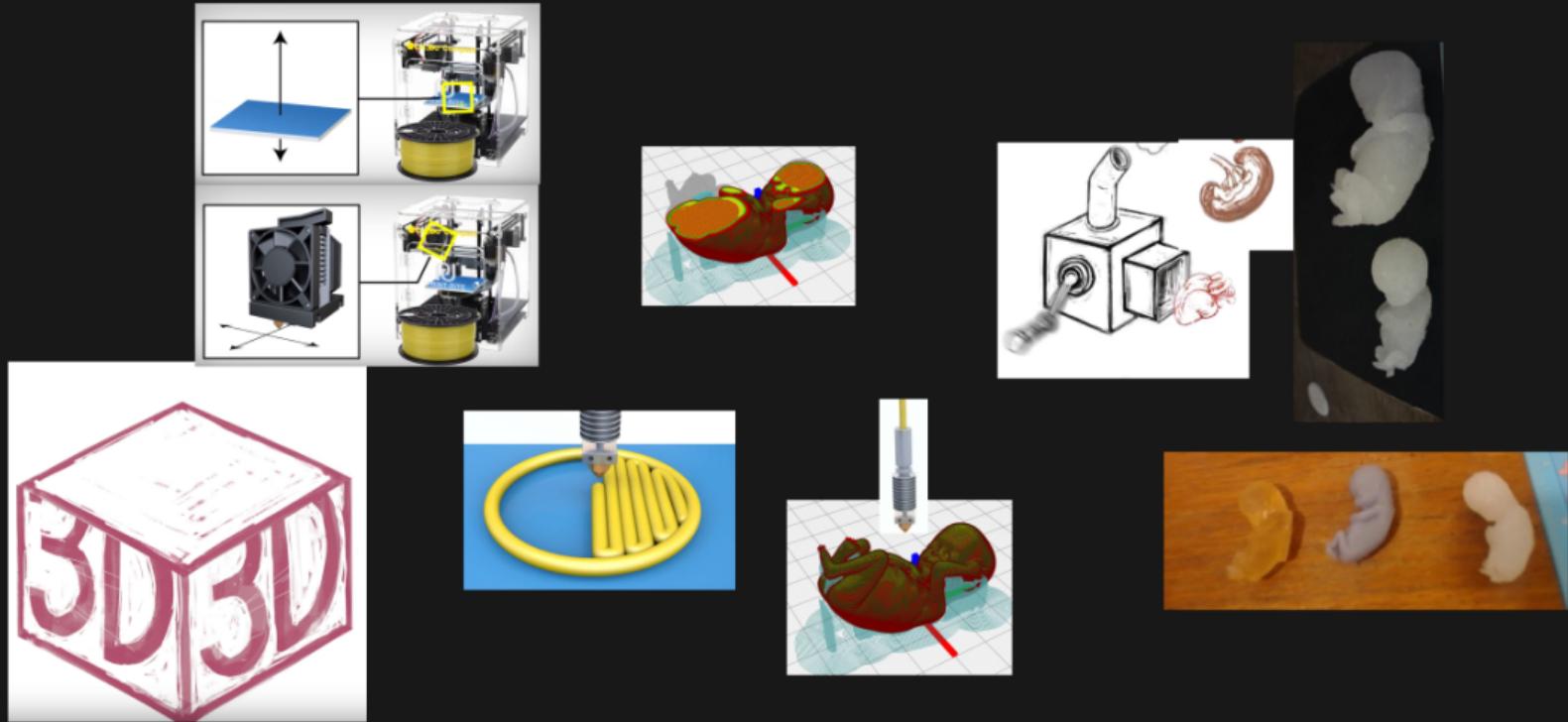
Tissue Labelling



Surface Reconstruction



3D printing Fetuses



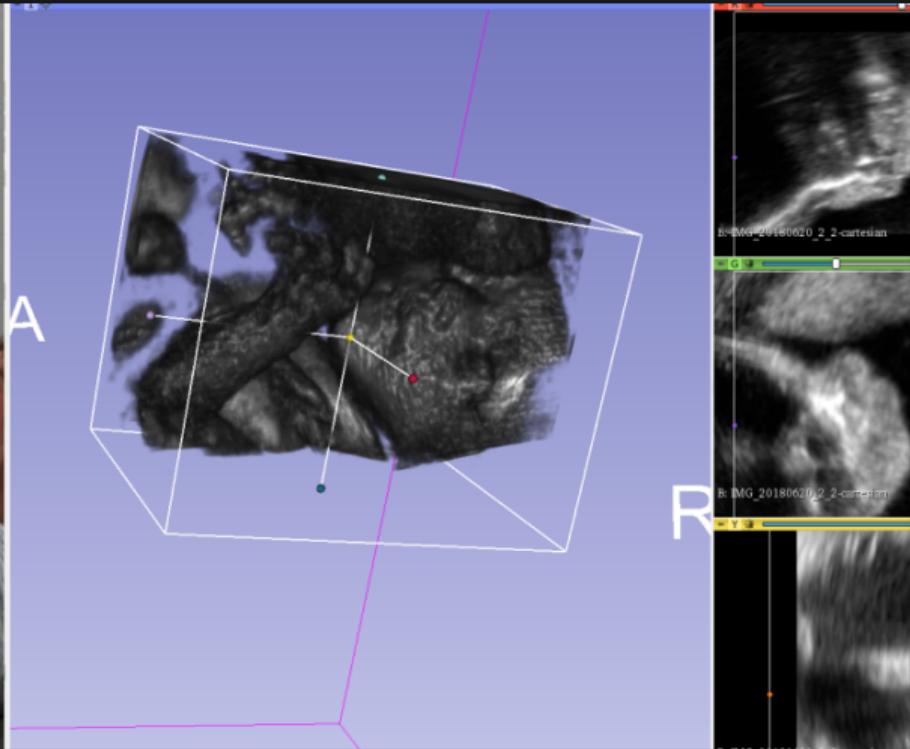
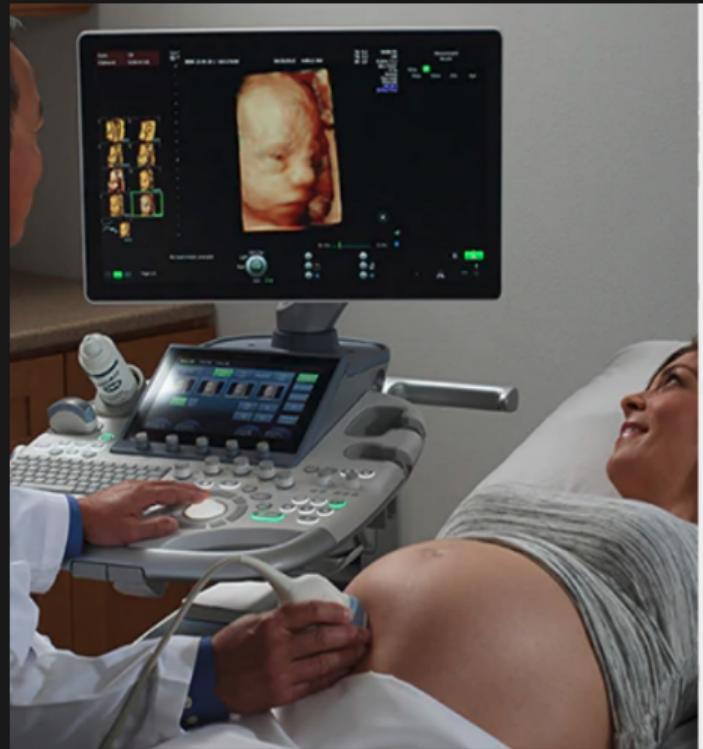
3D printing Fetuses



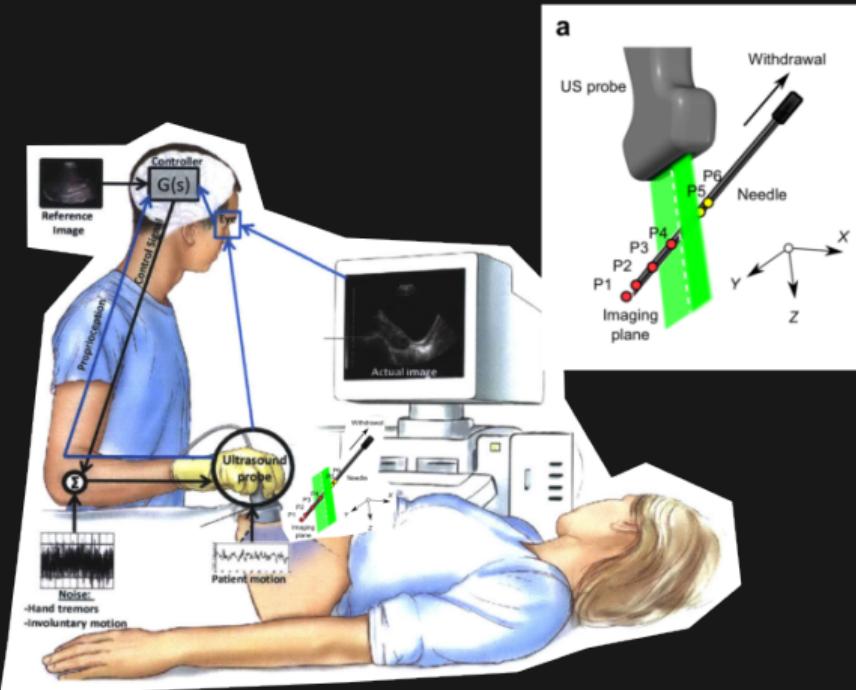
Interactive Ultrasound Imaging DEMO

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

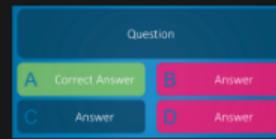
Q1



Q2

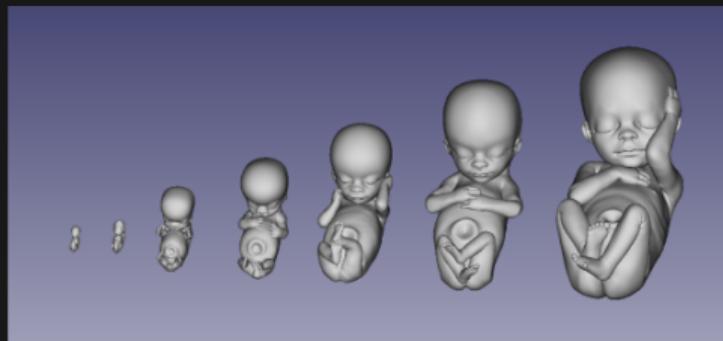


Q3



Pop Quiz and Surprises

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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