

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.

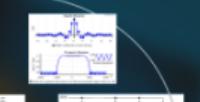
2010

Ph.D.

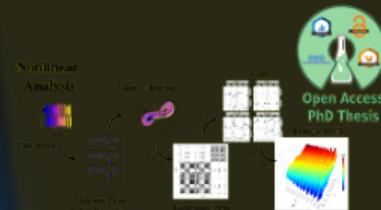
2020

2030

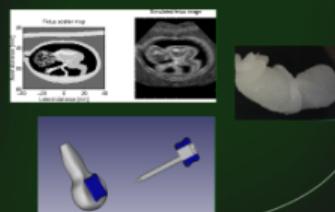
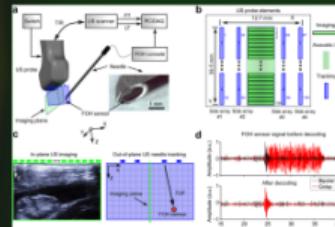
$t[\text{years}]$



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



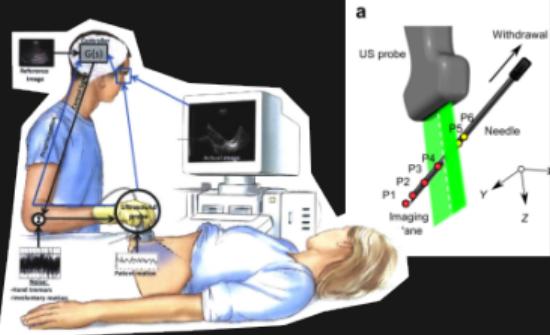
Do you know what a Biomedical
Engineer does?

Where we are based?



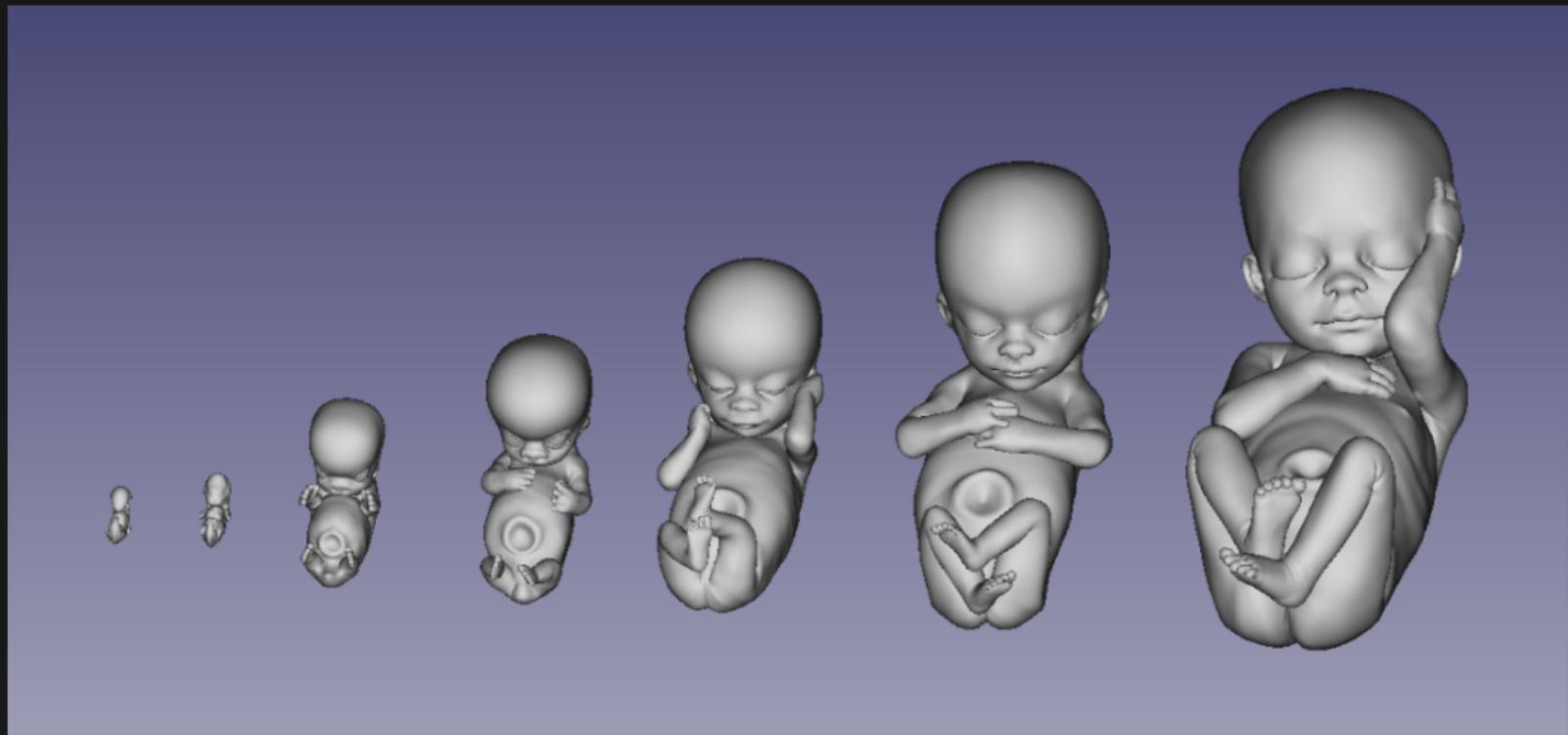
School of Biomedical and Imaging Science

Department of Surgical and Interventional Engineering

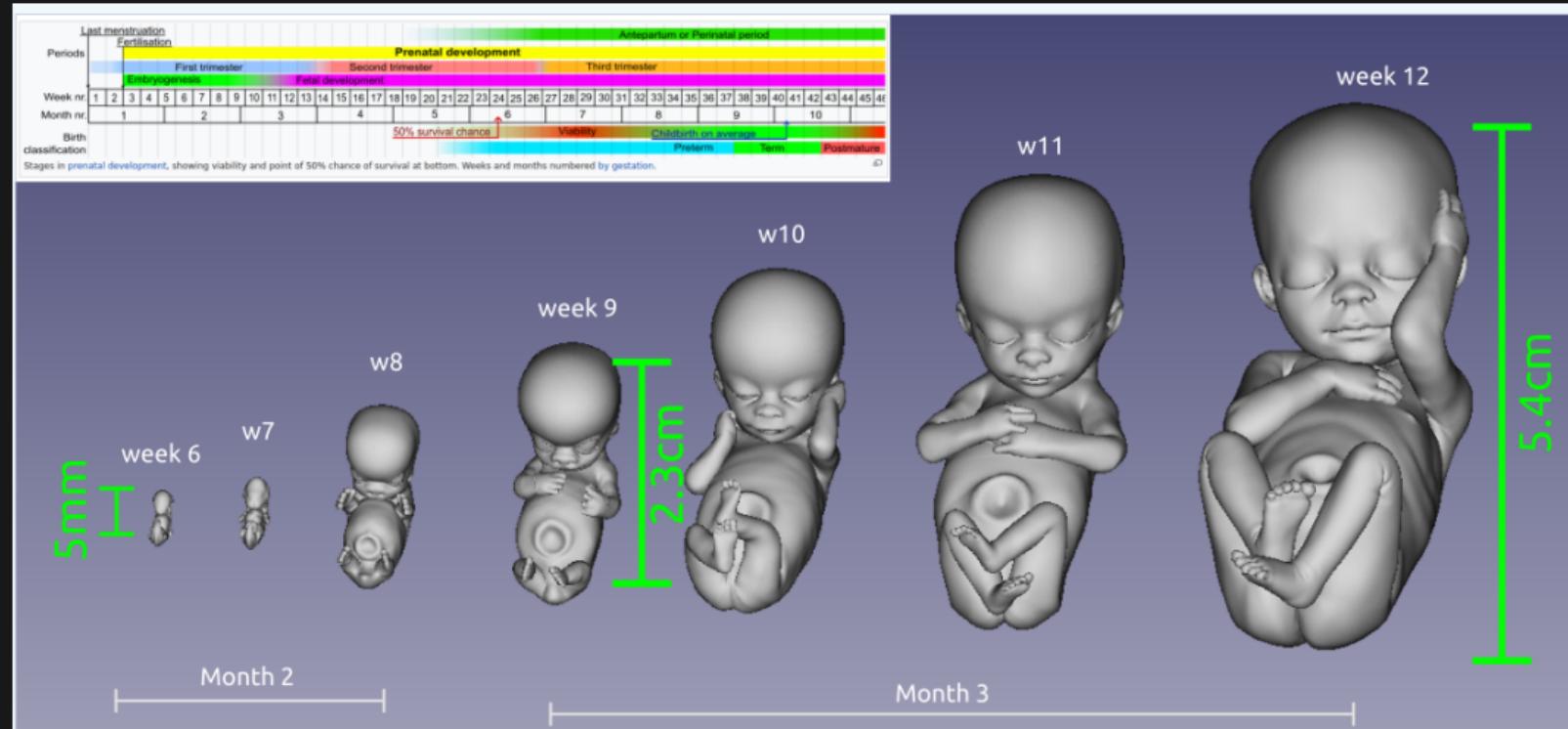


If you were a Sonographer for a day,
what would you think be the more
challenging activities?

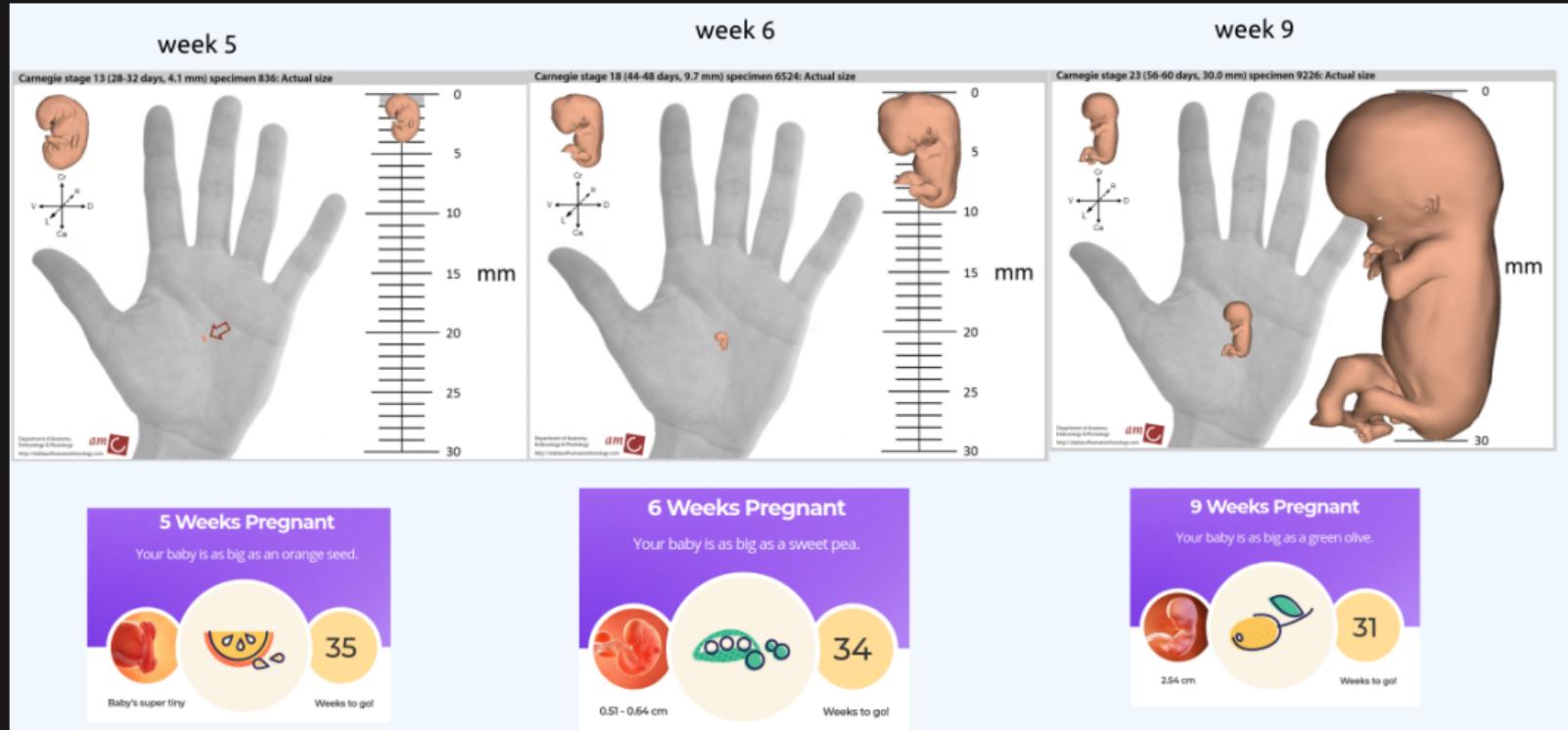
Can you guess the *AGE* of these fetus?



Can you guess the *AGE* of these fetus?



Can you guess the *SIZE* of these fetus?



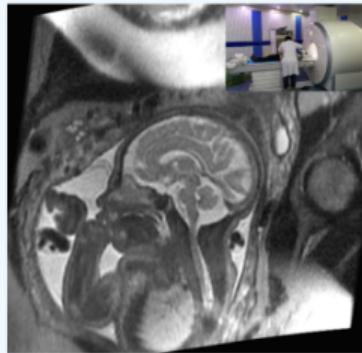
Medical Imaging in Pregnancy

CT



+ high image quality
- non-real-time

MRI



+ high image quality
- non-real-time

US



+ real-time
- poor image quality

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



How can a Biomedical Engineer would help a Sonographer?

Modelling US imaging

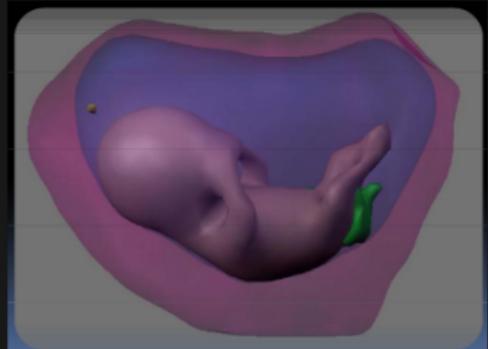
Segmentation on 3D US data



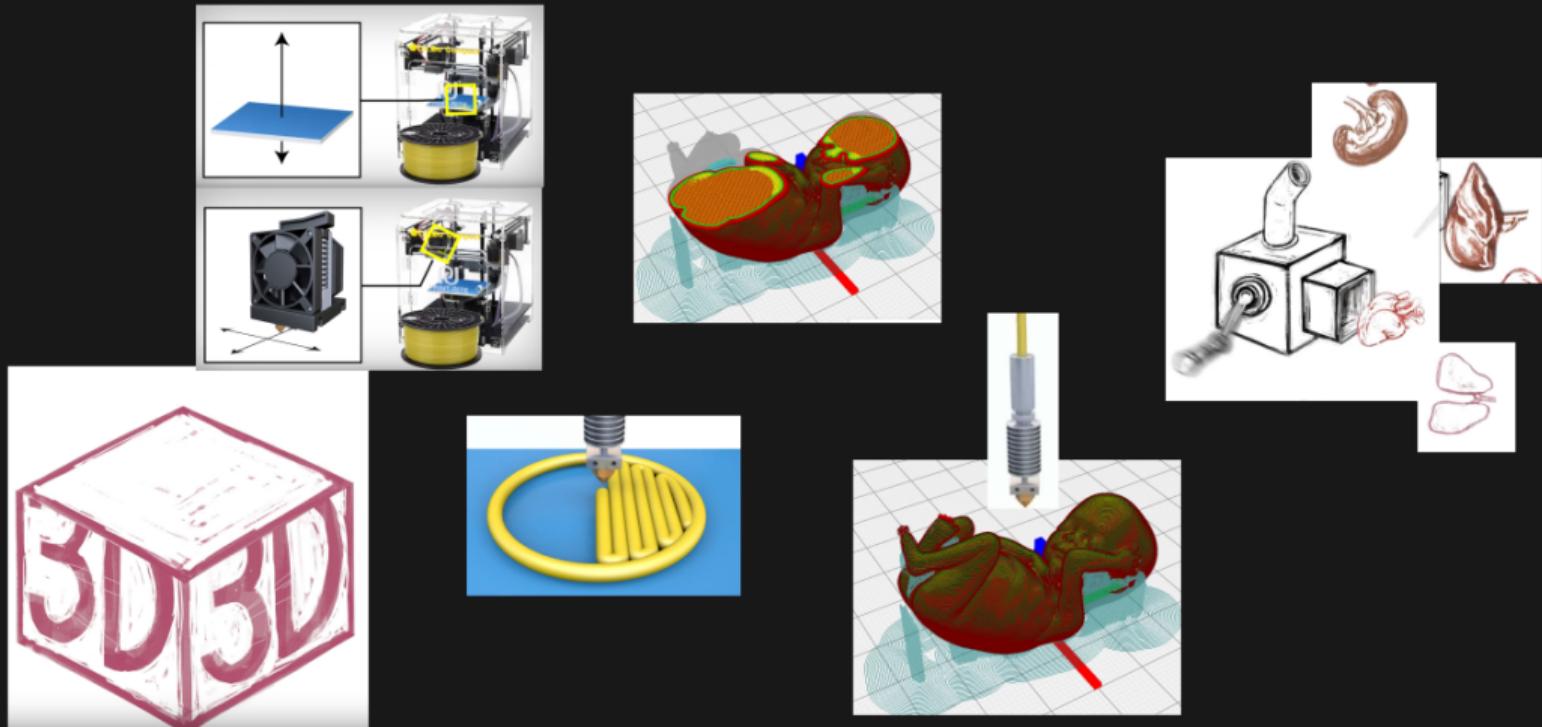
Tissue Labelling



Surface Reconstruction



How to do and Why to do 3D printing?



Simulator for Ultrasound-Guidance Interventions

Training in-plane/out-plane needle tracking



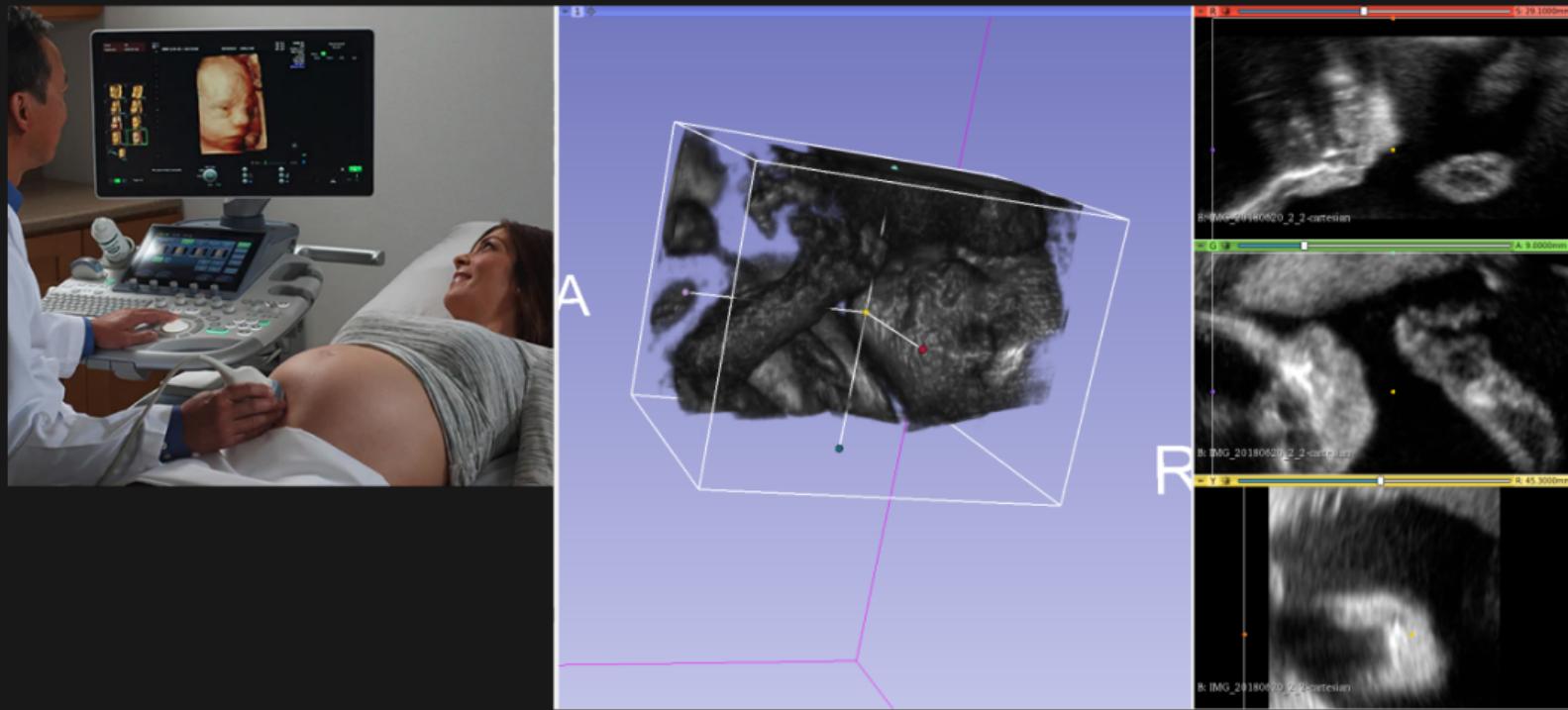
3D printing Fetus



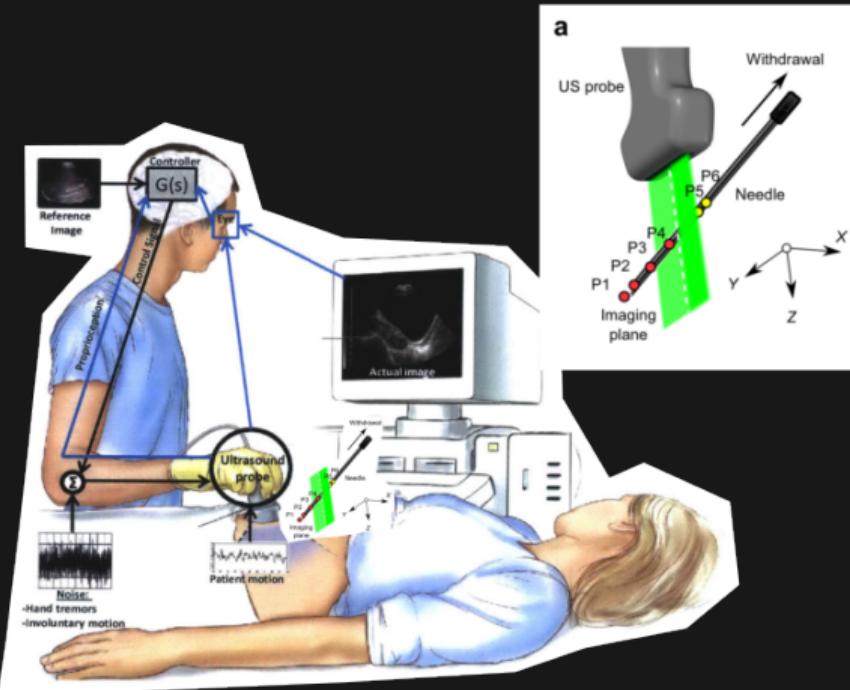
Interactive DEMO

Can you identify the face of a FETUS
using ultrasound?

Interactive US imaging



The sonographer-probe-patient control system



Challenges:

- Tracking needles
- Skillfullness of sonographers
- Anatomical view changes

Takeaway messages / Surprises / Evaluation

Takeaways

- Fetal development
- Ultrasound imaging
- 3D printing
- US needle tracking

Souvenirs



Evaluation



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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