

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.

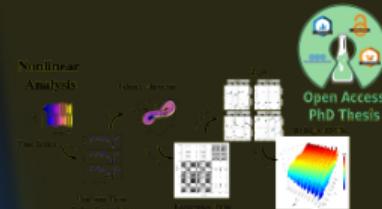
2020

2030

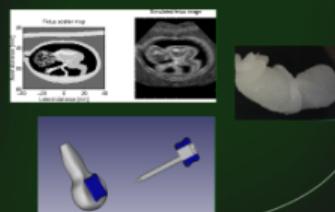
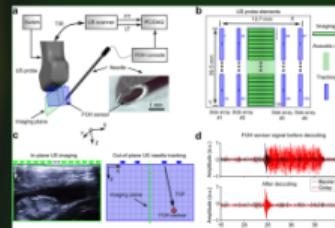
$t[\text{years}]$



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



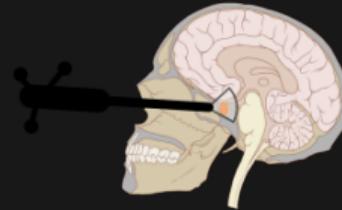
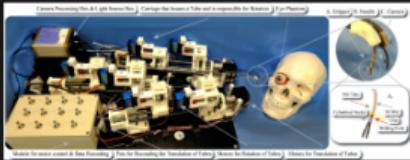
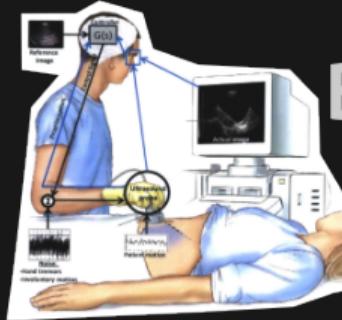
Shu
Wang



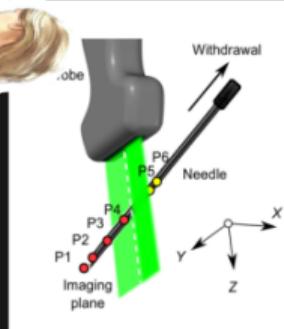
Tareen
Dawood



What does a Biomedical Engineer do?



Biomedical Engineering

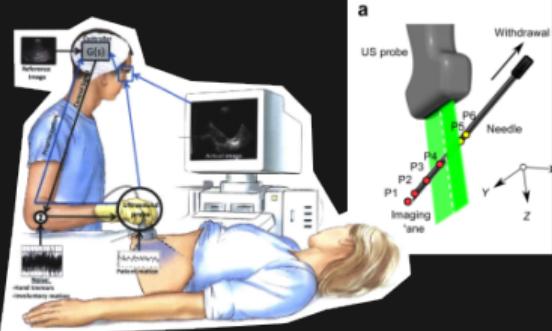


Where we are based?



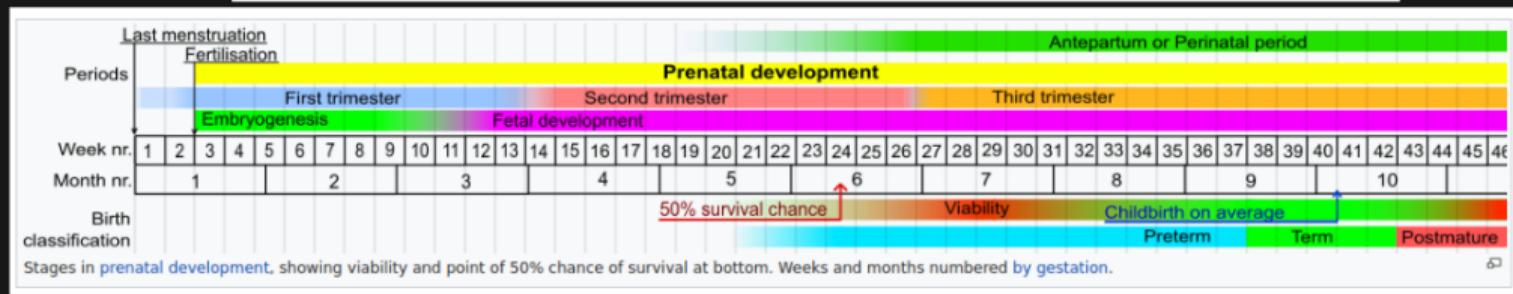
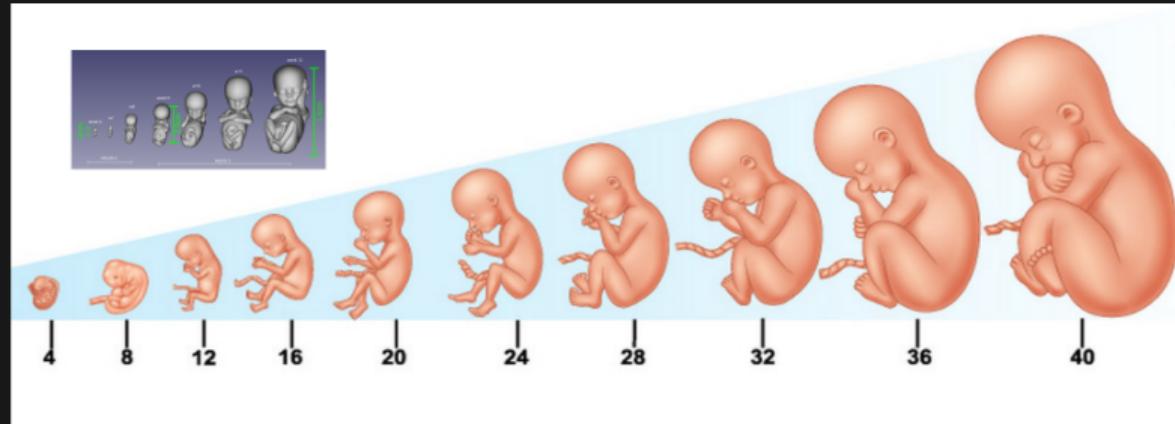
School of Biomedical and Imaging Science

Department of Surgical and Interventional Engineering



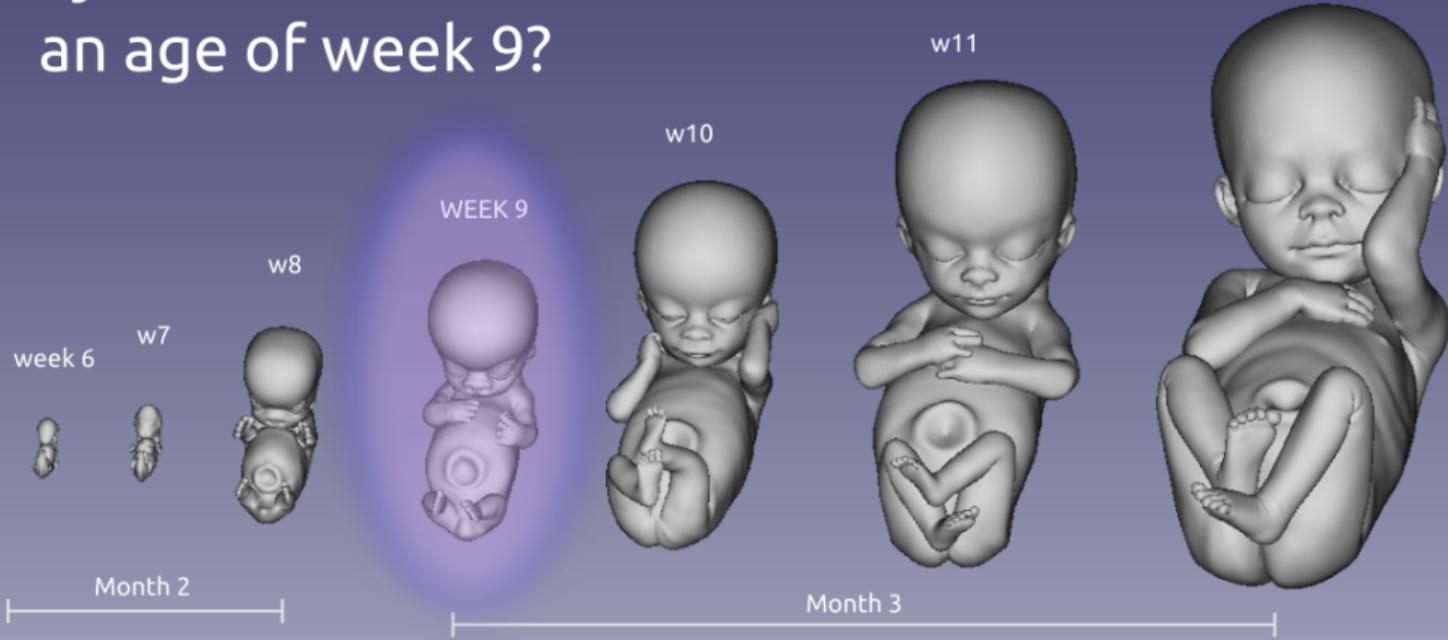
If you were a Sonographer for a day,
what do you think would be the most
challenging activities you would
encounter?

Fetal Growth



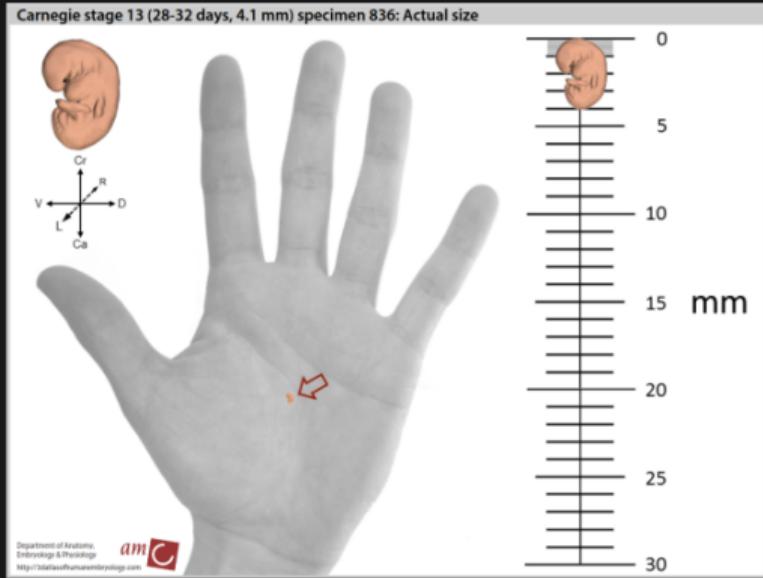
Fetal Growth

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

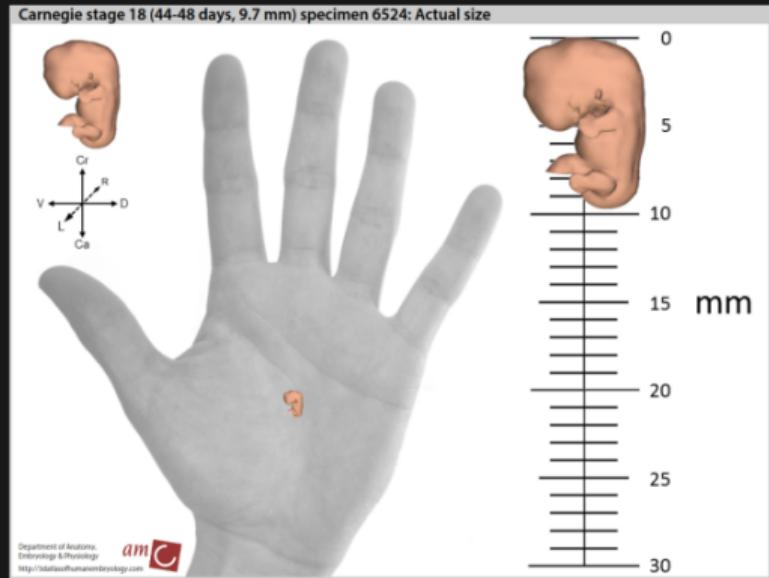


Can you guess the *SIZE* of these fetus?

week 5

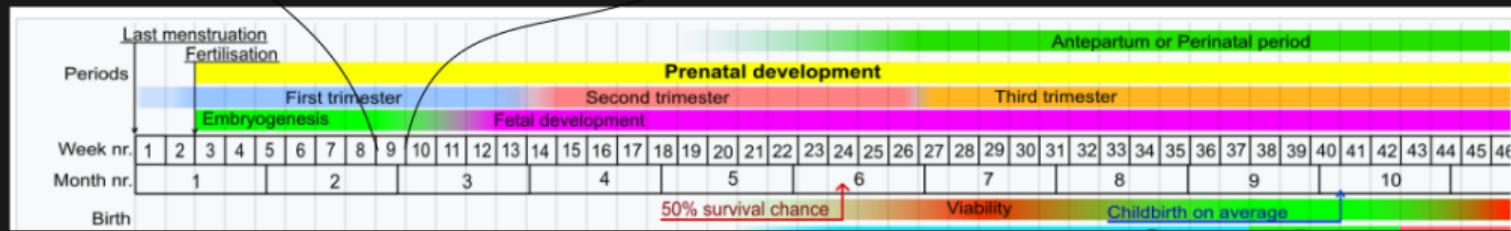
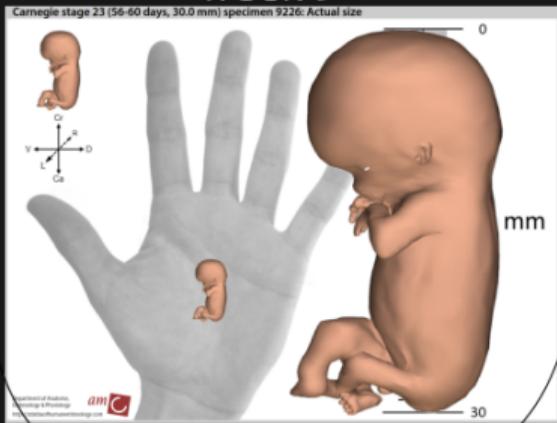


week 6



Can you guess the *SIZE* of these fetus?

week 9



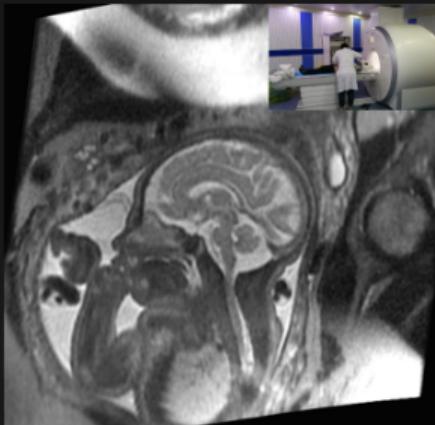
Do you know how can we actually see a fetus?

Medical Imaging in Pregnancy

CT



MRI



US



+ high image quality - non-real-time

+ high image quality - non-real-time

+ 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 a Biomedical Engineer would help
a Sonographer?

Modelling US imaging

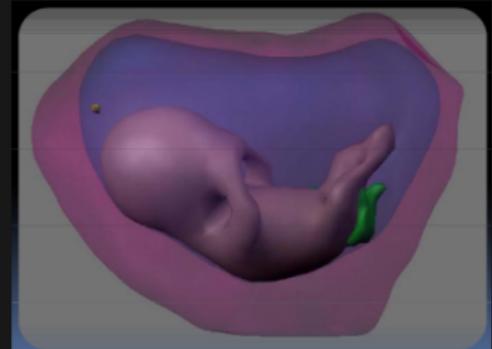
Segmentation on 3D US data



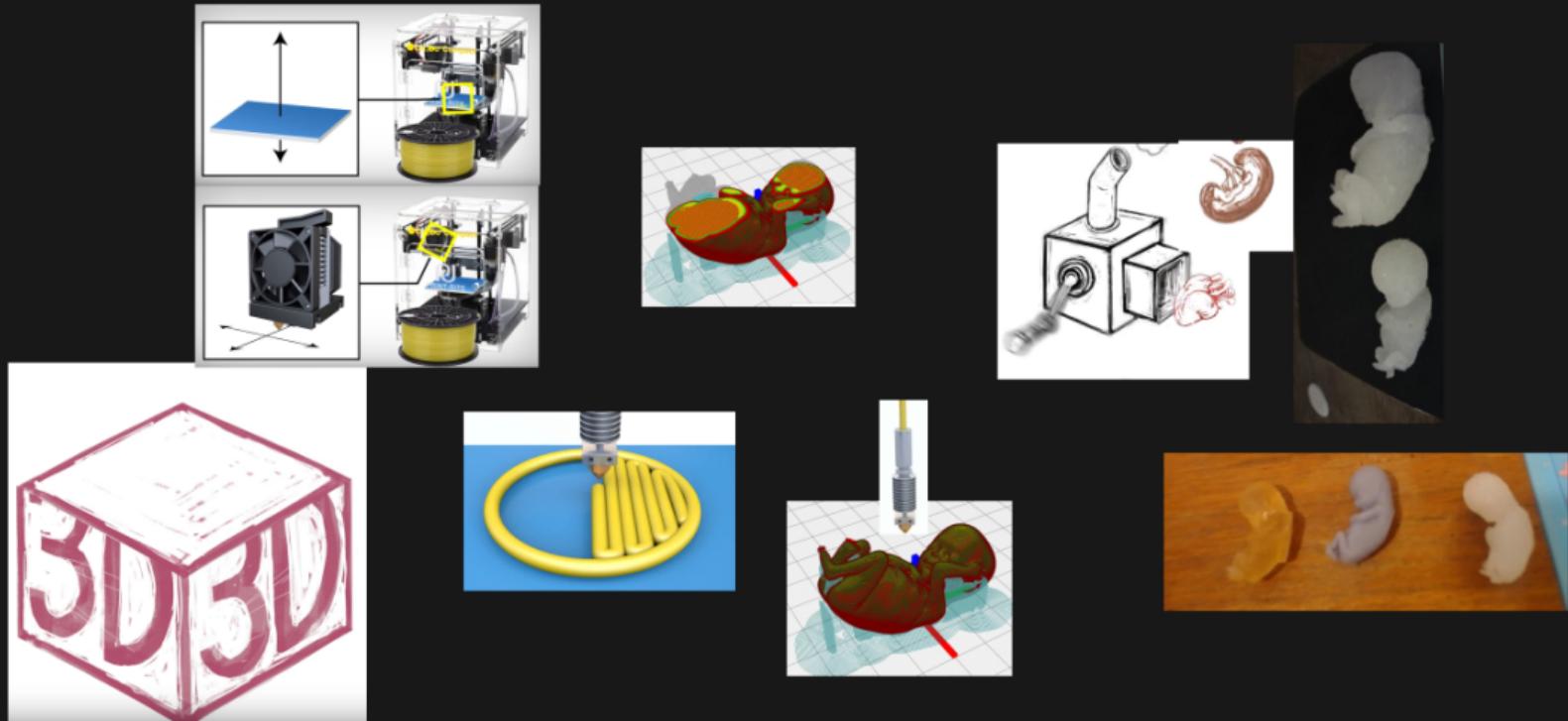
Tissue Labelling



Surface Reconstruction



3D printing a fetus



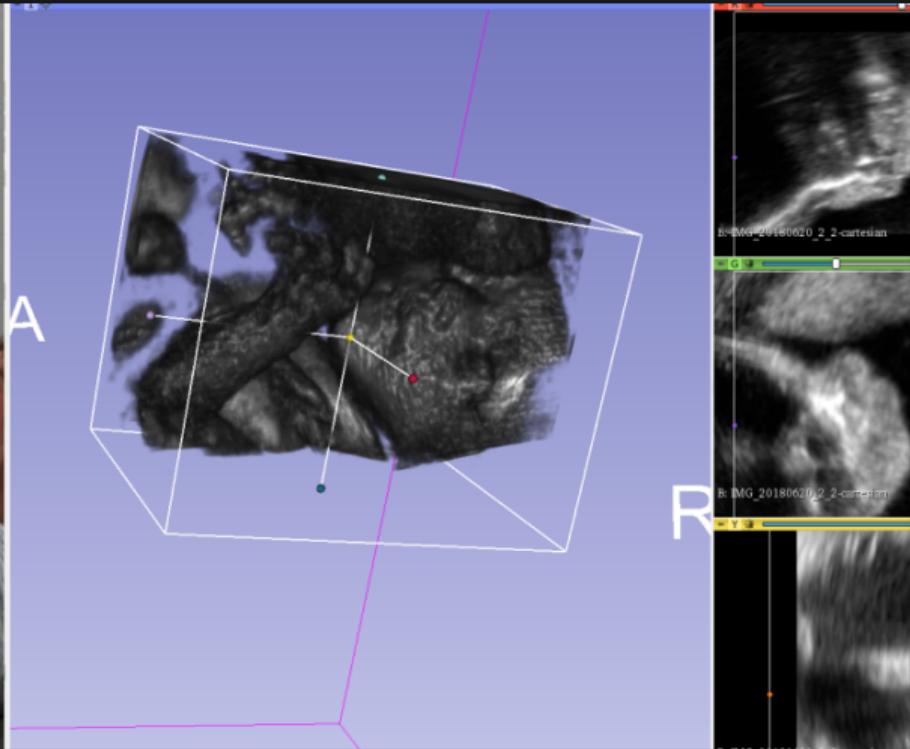
3D printing Fetus



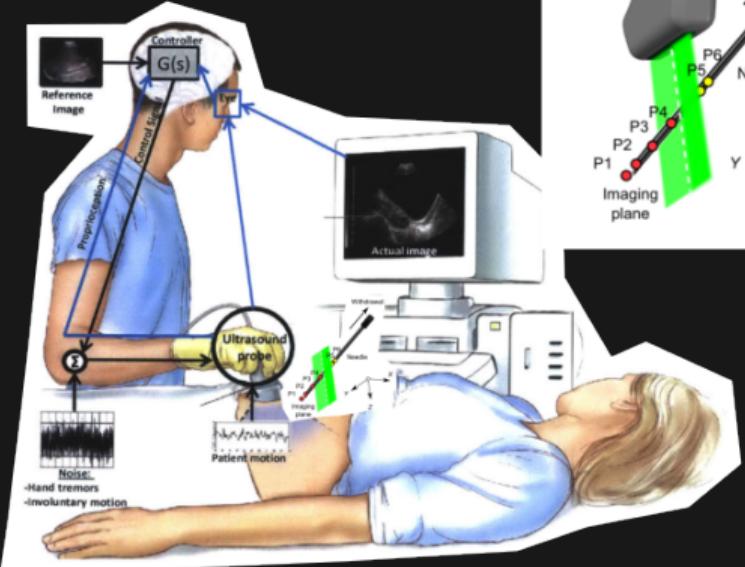
Interactive DEMO

Can you identify the face of a fetus
with Ultrasound?

Interactive Ultrasound Imaging



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



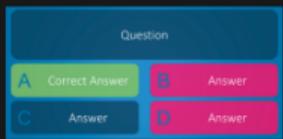
- Applications of US

- Modelling US
- 3D printing
- US needle tracking



Quick evaluation and Surprises

Q1



Q2

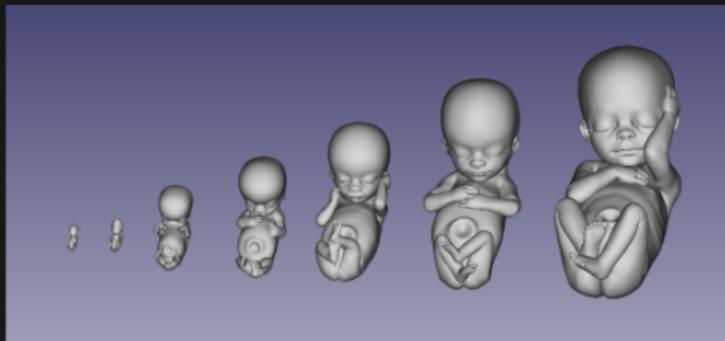


Q3



Quick evaluation 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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