

Finding a fETus with UltraSound (FETUS)

Westminster STEAM Week #WSW2022

15th March 2022



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Miguel Xochicale

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Contents

1. Who?, Why? Where?
2. Guessing Fetal Growth
3. Looking inside the human body
4. Applications of Biomedical Engineering
5. Takeaway messages, pop quiz, and few surprises

Miguel



Miguel
Xochicale



H.S.

2000

B.Sc.

M.Sc.

T.A.

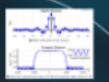
2010

Ph.D.

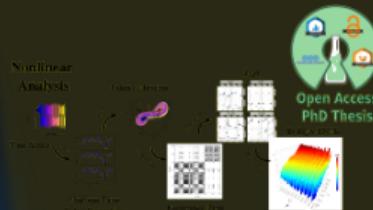
2020

2030

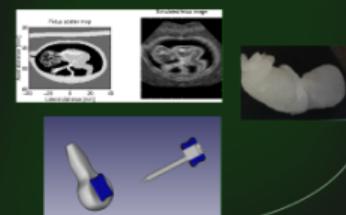
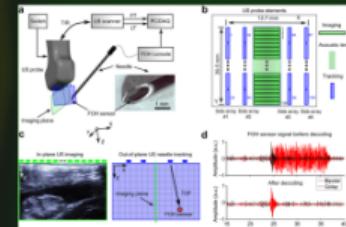
$t[\text{years}]$



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



Research Associate in Ultrasound Guidance Interventions King's College London



Thea and Gooise

Thea Bautista



Goosie Leung



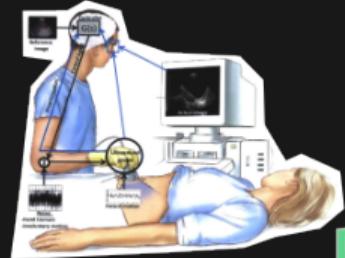
Where we are based?



School of Biomedical and Imaging Science



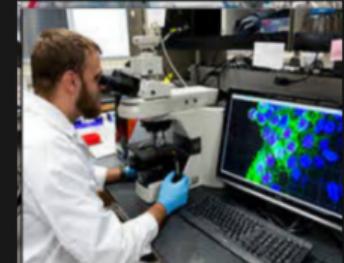
Ultrasound Imaging



Machine Learning and Deep Learning with Medical Imaging



Biomedical Imaging



Biomedical Engineering



**PET and MR Acquisition
and Reconstruction**

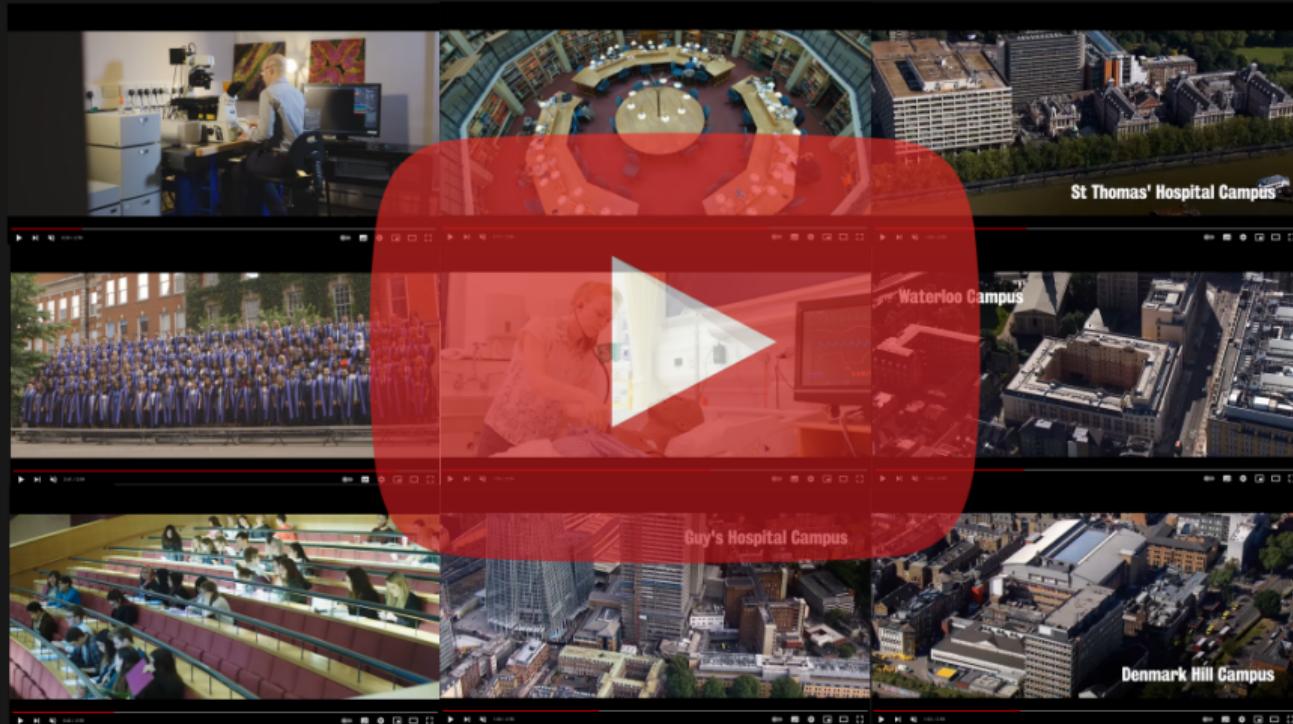


Image Computing, Analysis and Robotics



Image-guided navigation

Faculty of Life Sciences & Medicine: video



School of Biomedical Engineering & Imaging Sciences

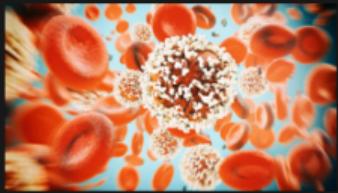
School of Immunology & Microbial Sciences



School of Basic & Medical Biosciences



Faculty of Life Sciences & Medicine



School of Cancer & Pharmaceutical Sciences

School of Cardiovascular Medicine & Sciences

School of Life Course Sciences

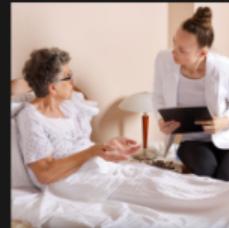
Sonographers



Radiologists



Social workers



Healthcare Professionals



General Doctor
and Surgeons



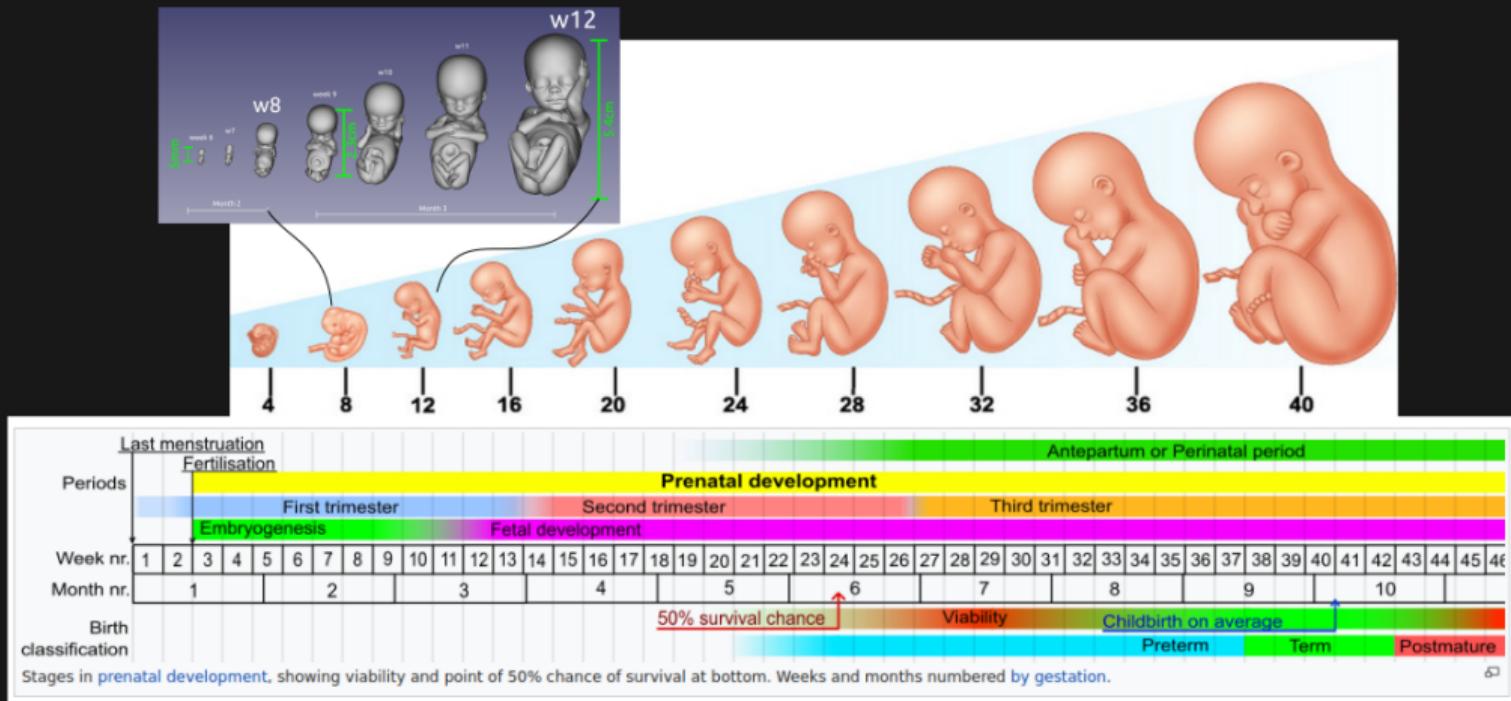
Nurses and Midwives



Physiotherapists

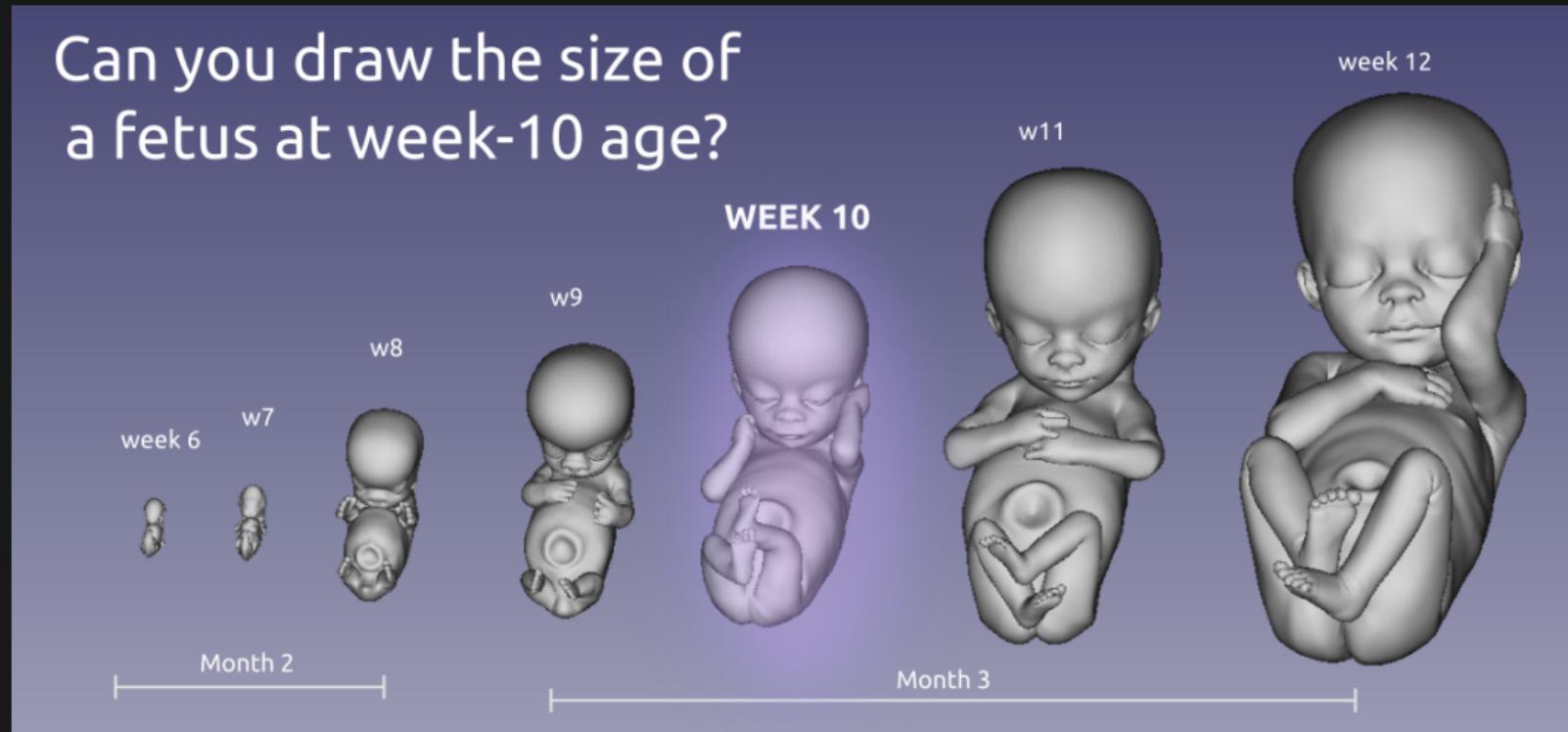
Understanding Fetal Growth

Understanding Fetal Growth



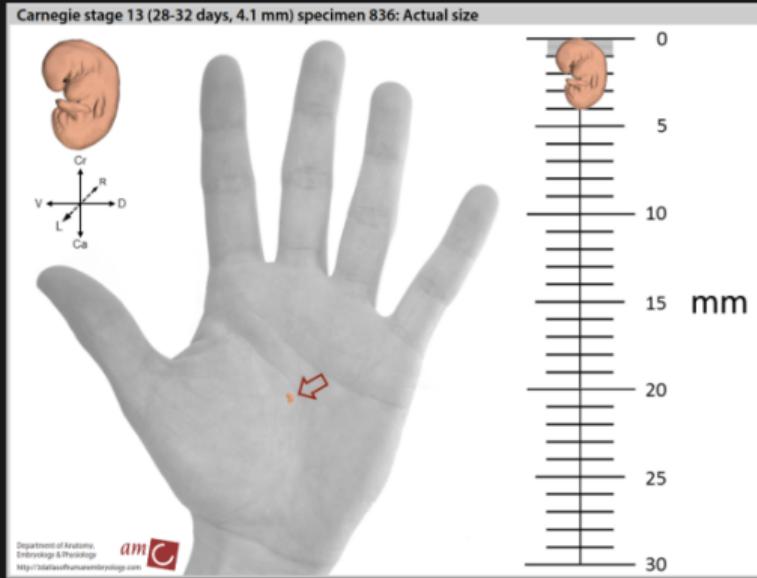
[ACTIVITY]: Guessing Fetal Growth

Can you draw the size of a fetus at week-10 age?

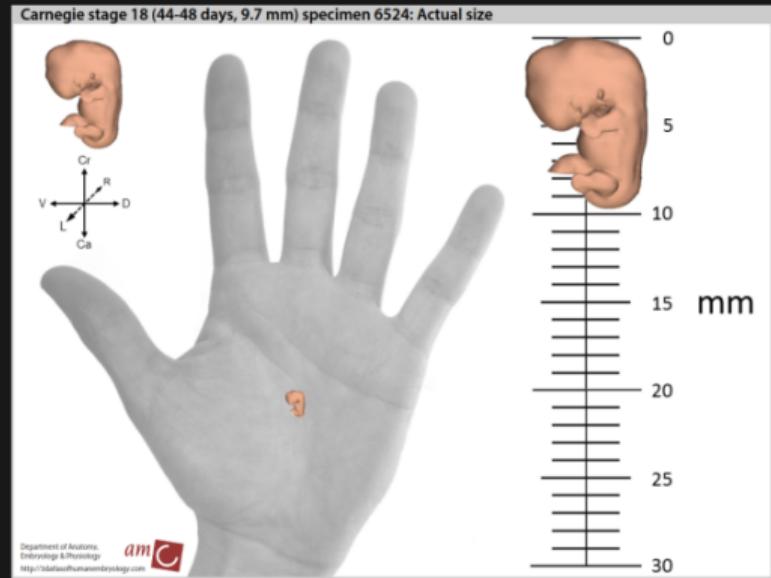


[ACTIVITY]: Understanding Fetal Growth

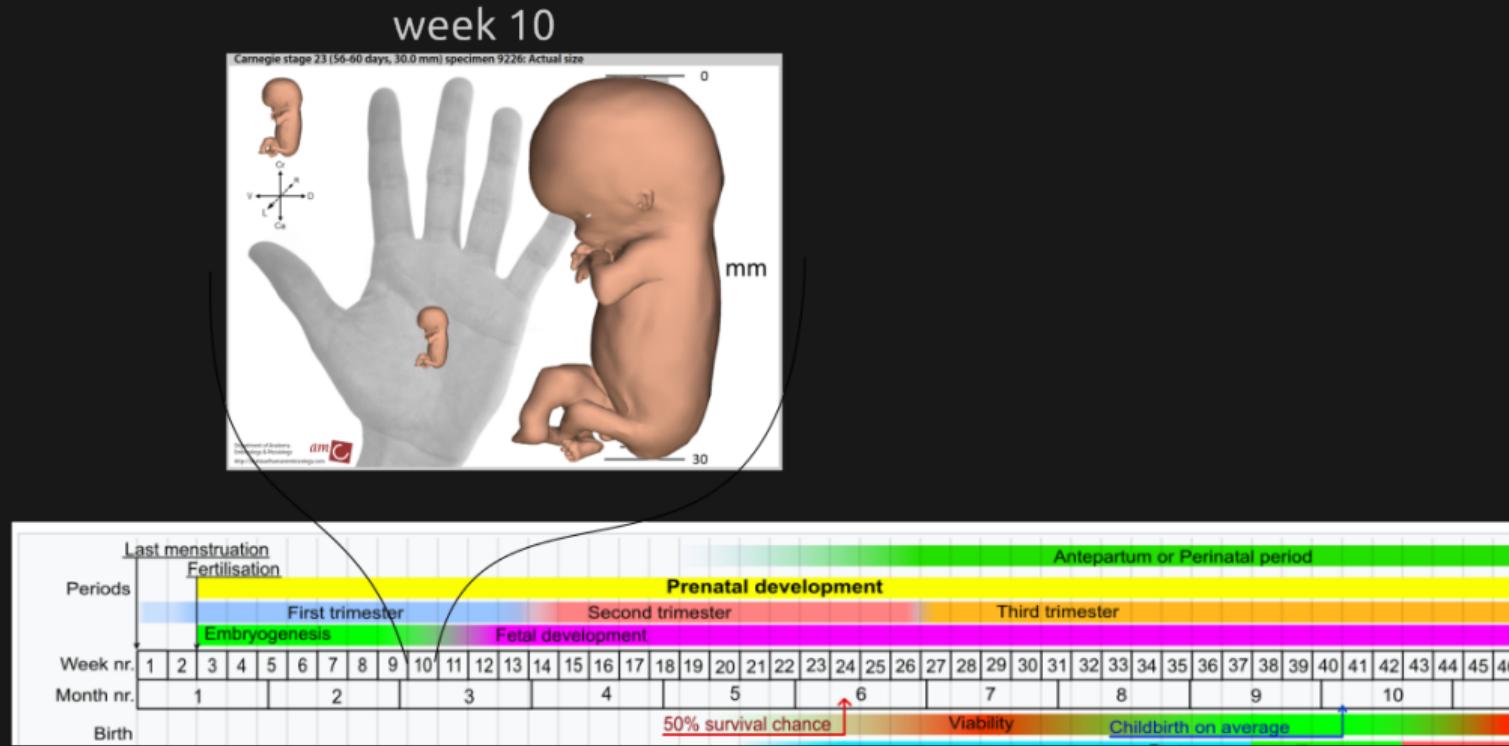
week 5



week 6

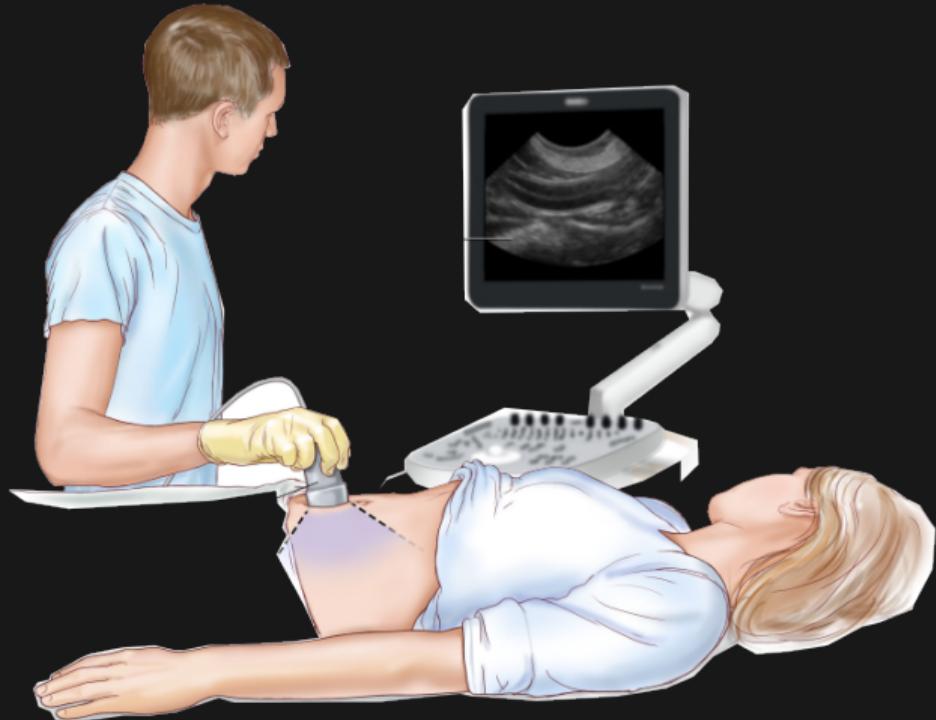


[ACTIVITY]: Understanding Fetal Growth



Do you know what type of healthcare professional helps to monitor fetal development?

The role of a Sonographer



Prepare Exam Room & Equipment



Use Sonography Equipment



Friendly Disposition & Good Patient Care



Maintain Confidence

Do you know
how clinicians can actually see fetal
development?

Computational Tomography

CT

+ high image quality



- non-real-time

Computational Tomography



Magnetic Resonance Imaging

MRI

+ high image quality



- non-real-time

Magnetic Resonance Imaging



US

Ultrasound

+real-time  - poor-image quality



Medical Imaging in Pregnancy

CT



MRI



US



+ high image quality - non-real-time

+ high image quality - non-real-time

+ real-time - poor-image quality

How a Biomedical Engineer would help
Sonographers?

What skills do you think a Biomedical
Engineer needs to have?

Modelling US imaging

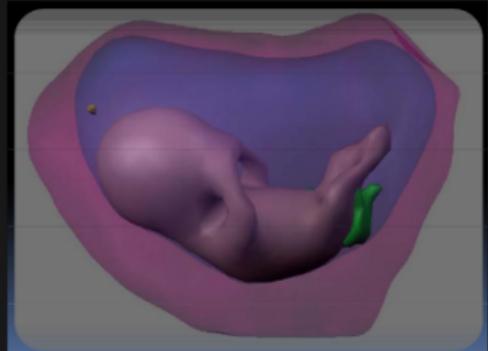
Segmentation on 3D US data



Tissue Labelling

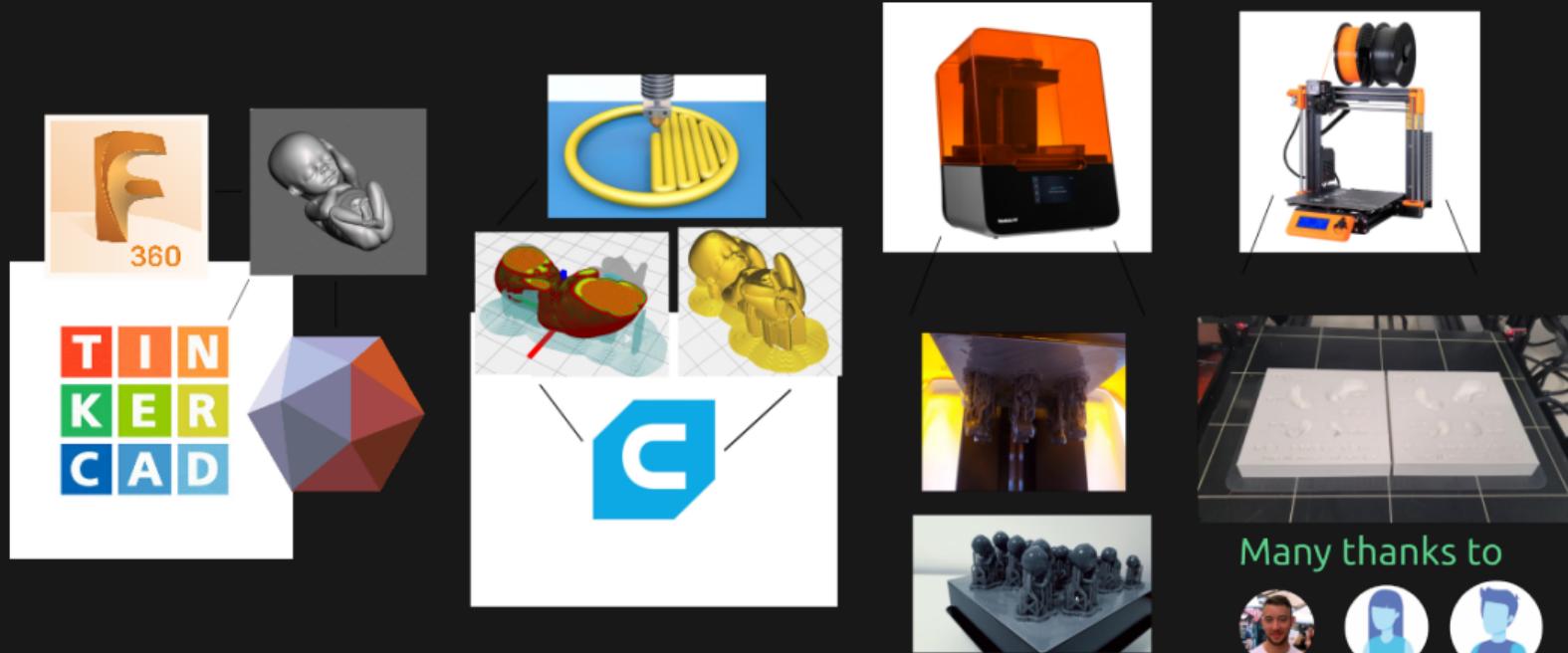


Surface Reconstruction



Does anybody know anything about
3D printing?

3D printing fetuses



Many thanks to



Guilherme
Gomes
De Figueiredo

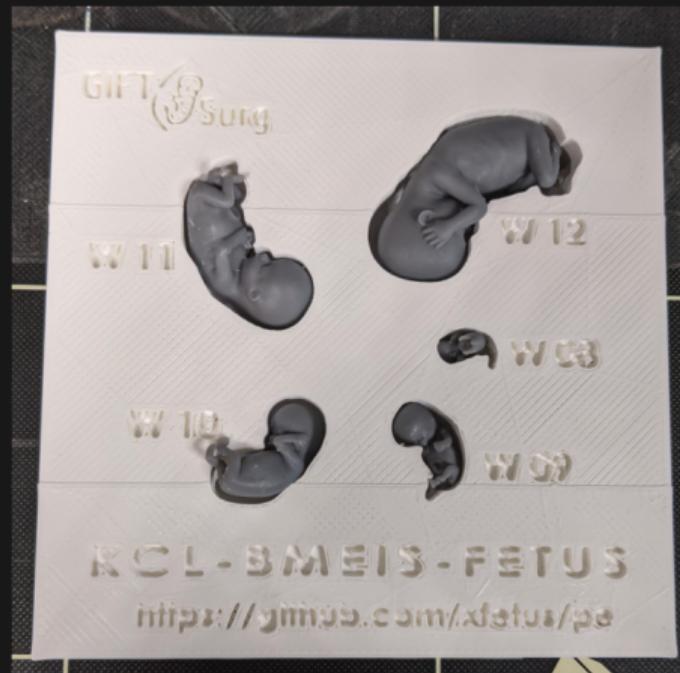
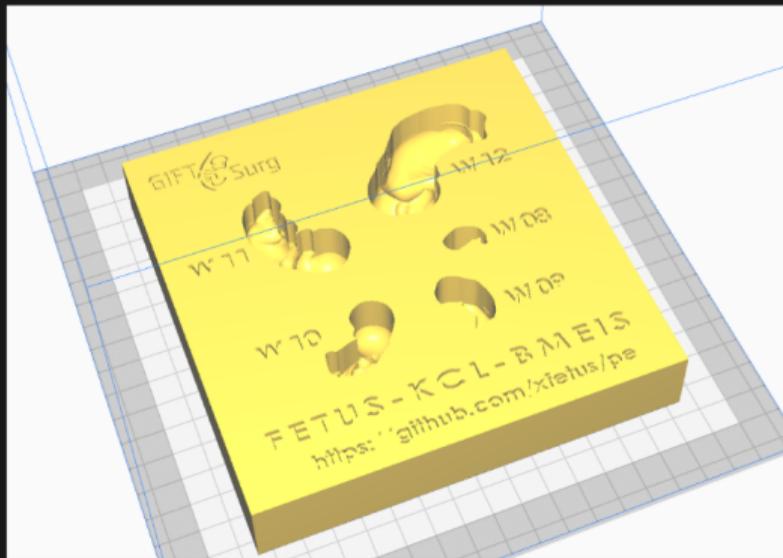


Maleeha
Al-Hamadani



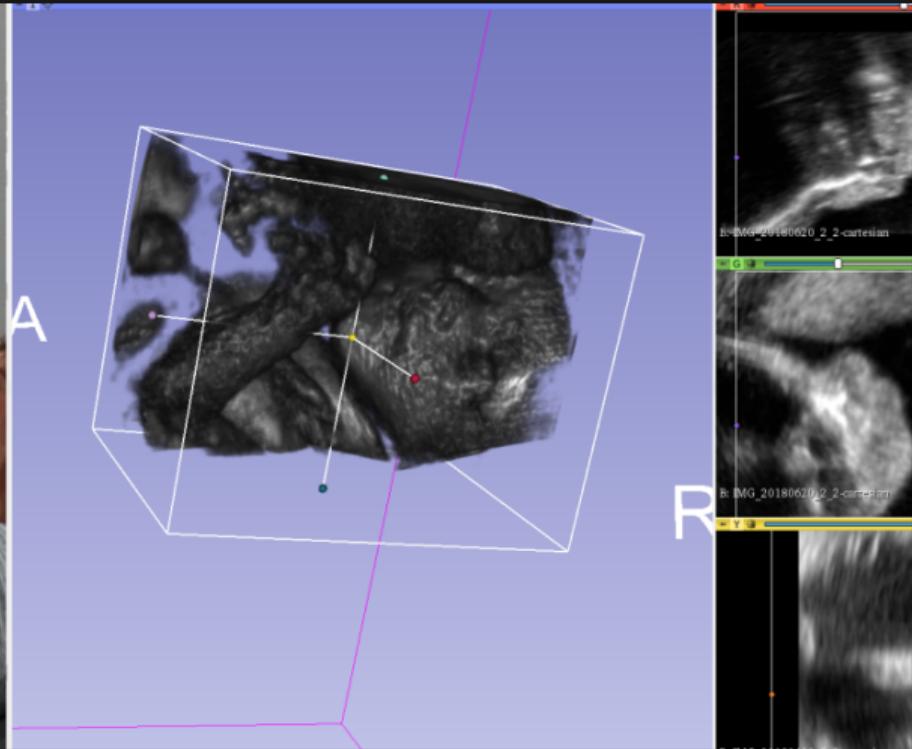
Carlo
Seneci

[ACTIVITY]: Fetal growth of 3D printed fetuses

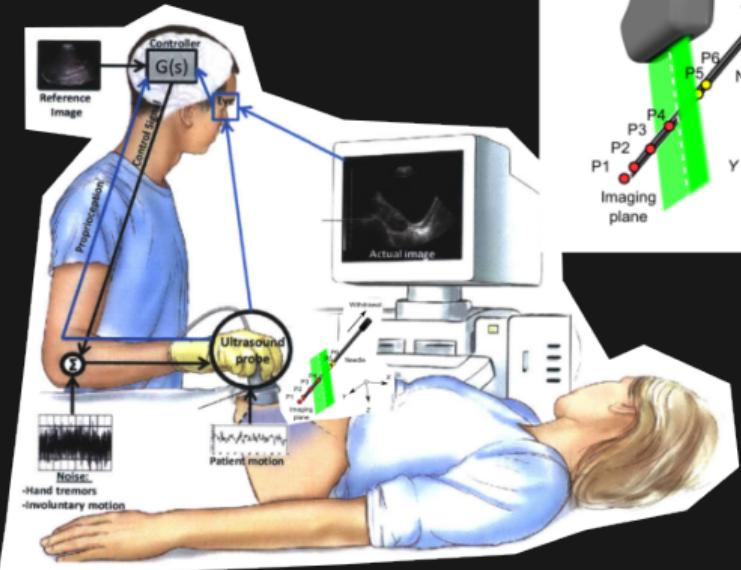


Can you identify body parts of a fetus
with Ultrasound?

[ACTIVITY]: Interactive Ultrasound Imaging



Ultrasound-guided intervention



Challenges:

- Skillfullness of sonographers
- Anatomical view changes
- Tracking needles

Takeaway messages

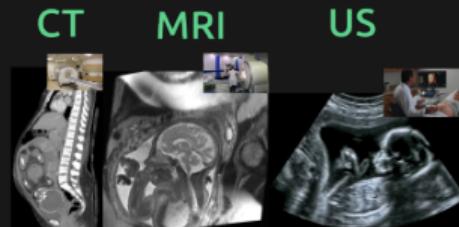
- Biomedical Engineers

- Maths and Physics
- Biology and Chemistry
- Computer Science



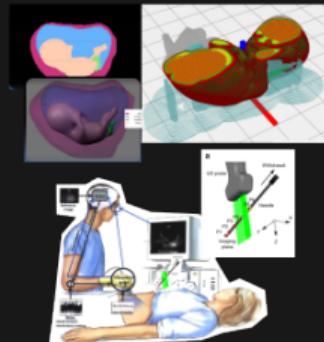
- Medical Imaging

- Computational Tomography
- Magnetide Resonance
- Ultrasound imaging



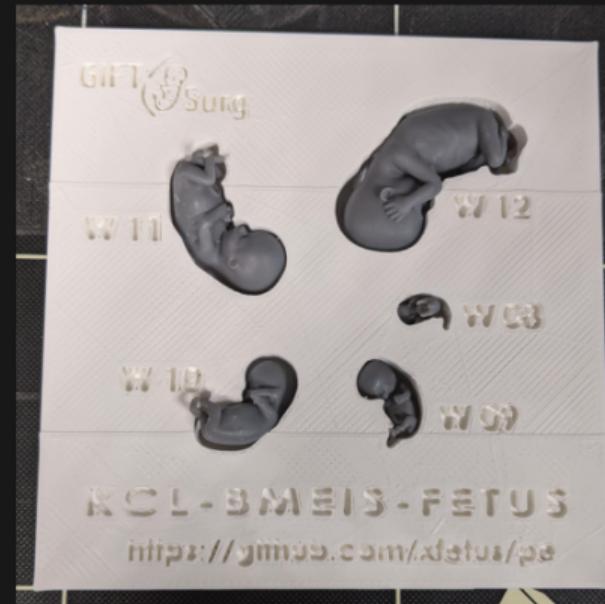
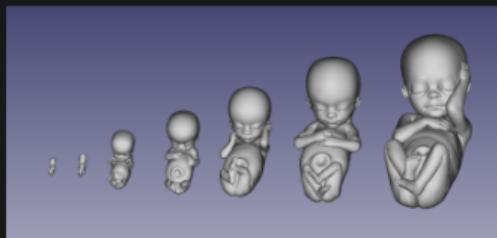
- Applications of US

- Modelling US
- 3D printing
- US-guided Interventions



[人群] ACTIVITY]: Pop Quiz and Souvenirs

Souvenirs



[ACTIVITY]: 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?

Extra Questions

- * Share an emoji that reflects how you feel about this workshop
- * What was your favourite part of the workshop?
- * What was your least favourite part of the workshop?
- * What would you change about today's workshop?

Acknowledgements

Research Students

Shu Wang	Ou Zhanhong	Tareen Dawood	Guilherme Gomes De Figueiredo	Amal Hussein	Miguel Xochicale	Christian Baker	Francois Joubert	Sunish Mathews	Fang-Yu Lin	Richard Miles	Dzhoshkun Shakir

Public Engagement Officers



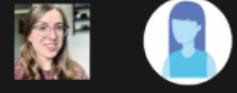
Bella
Spencer Melissa
Bovis

Clinical Fellows



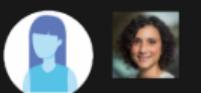
Yada
Kunpalin Brian
Dromey

Quality Management



Jacqueline
Beddoe-Rosendo Clare
Heaysman

Operations Managers



Alima
Rahman Valentina
Vitiello

Investigators



Anna
David Vercauteren Tom
Xia Wenfeng
Xia Sebastien
Ourselin

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