

Finding a fETus with UltraSound (FETUS)

Westminster Enterprise Week #2021

10th November 2021



Tareen Dawood, Guilherme Gomes De Figueiredo,
Shu Wang, and **Miguel Xochicale**

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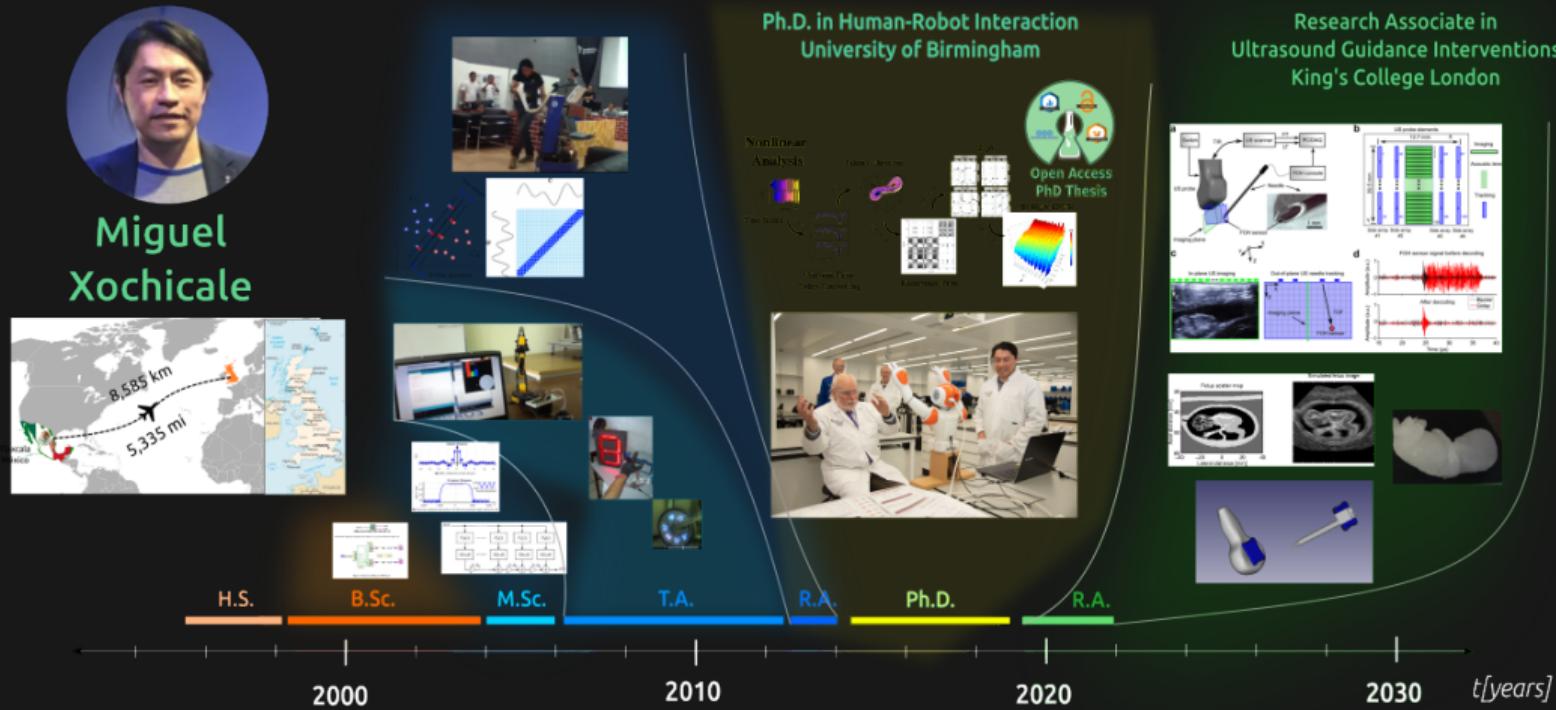
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Get source of this slide and see further references from <https://github.com/xfetus/public-engagement-project/>

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

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



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



Tareen Dawood



H.S.

B.Sc.

Internship

Working

2000

2010

2030

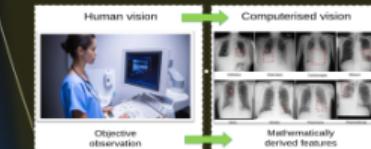
$t[\text{years}]$



Masters - Ultrasound Imaging - TB/HIV/Lymphoma Feature Detection



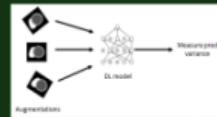
Imaging features from images to earlier detect Lymphomas



Masters Ph.D.

Ph.D. in Cardiac Imaging - Learning to Trust AI

Medical Image Analysis - Cardiac Application



Predictive Cardiac Models

Prevention, Treatment and Decision Support Tool

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

**Shu
Wang**



**Zhanchong
Ou**



Guangdong
China

**Guilherme Gomes
De Figueiredo**



Where we are based?

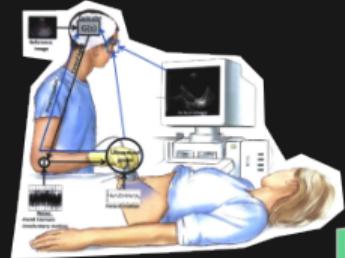


School of Biomedical and Imaging Science



KING'S
College
LONDON

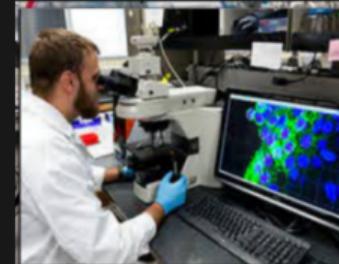
Ultrasound Imaging



Machine Learning and Deep Learning with Medical Imaging



Biomedical Imaging



Biomedical Engineering



**PET and MR Acquisition
and Reconstruction**

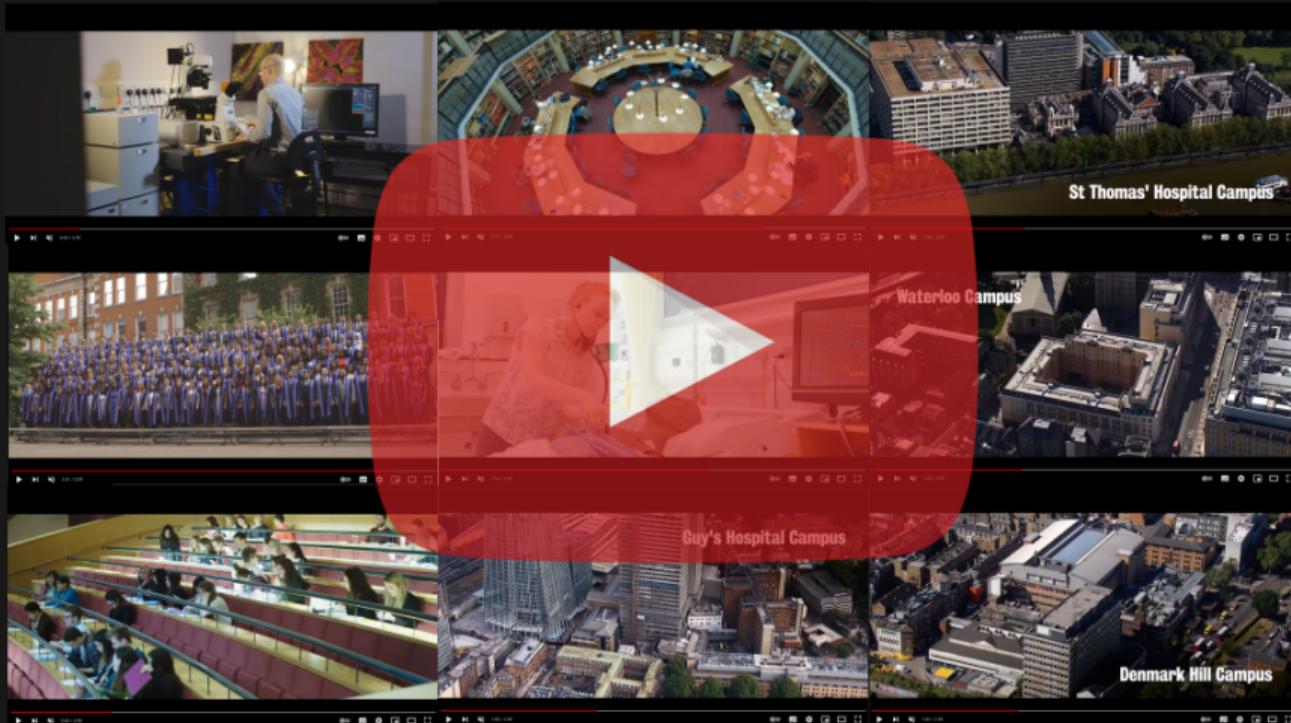


Image Computing, Analysis and Robotics



Image-guided navigation

Faculty of Life Sciences & Medicine: video



School of Biomedical Engineering & Imaging Sciences

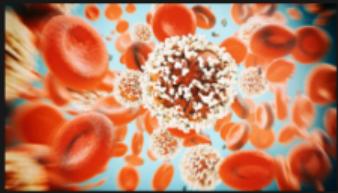
School of Immunology & Microbial Sciences



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

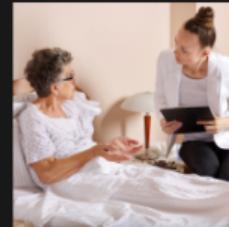
Sonographers



Radiologists



Social workers



Healthcare Professions



General Doctor
and Surgeons



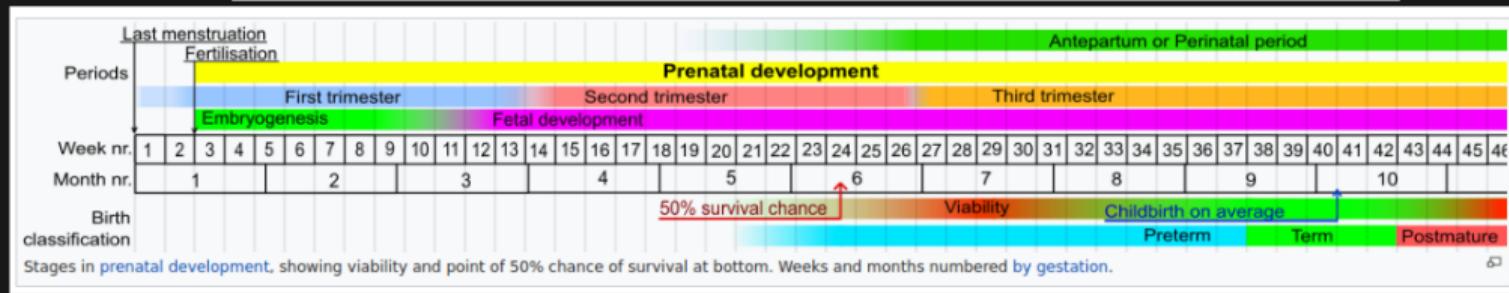
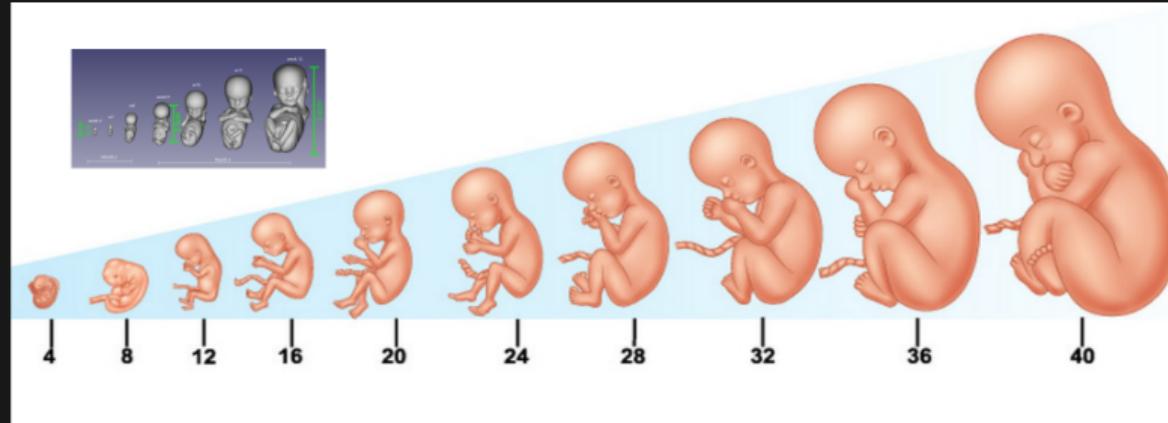
Nurses and Midwives



Physiotherapists

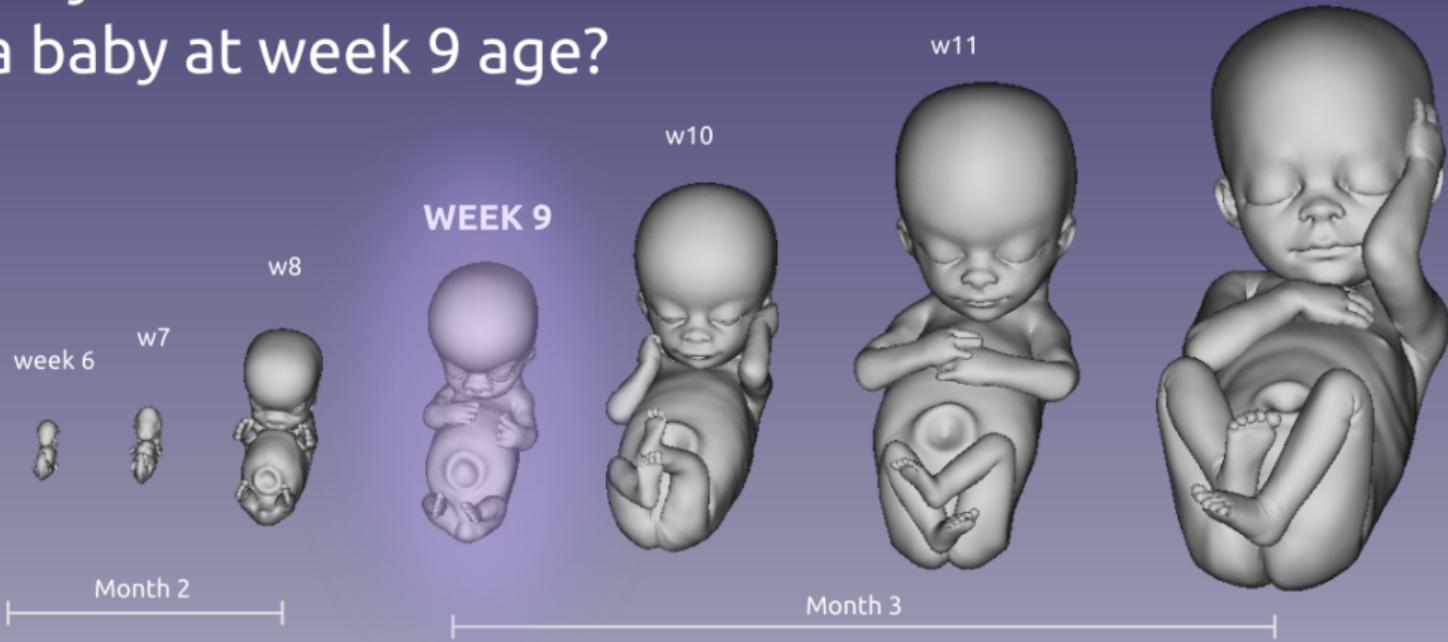
Understanding Fetal Growth

Understanding Fetal Growth



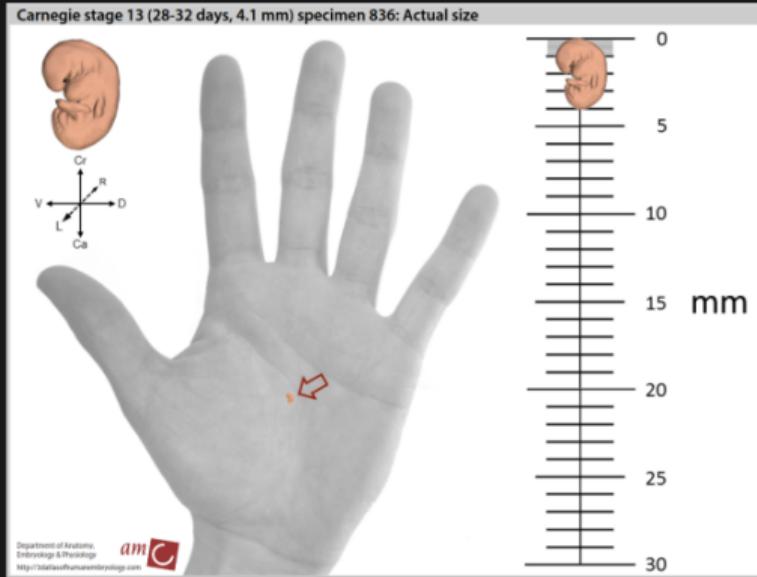
[ACTIVITY]: Guessing Fetal Growth

Can you draw the size of
a baby at week 9 age?

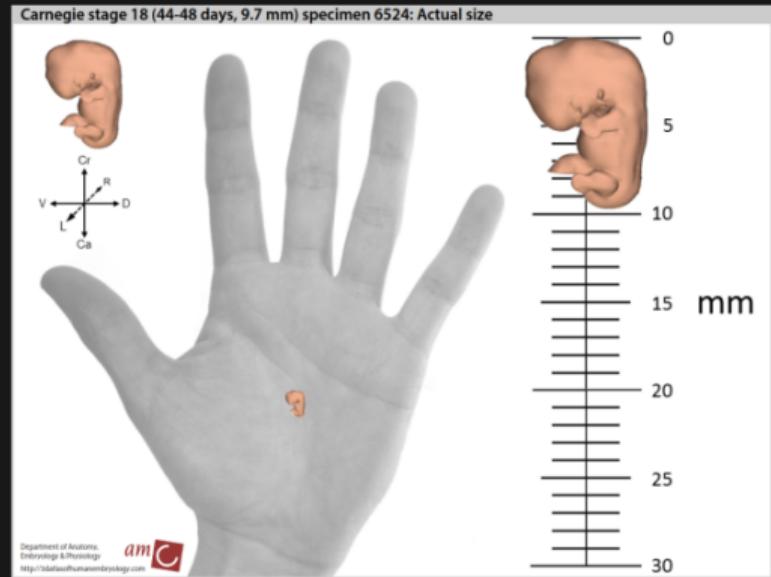


[ACTIVITY]: Understanding Fetal Growth

week 5

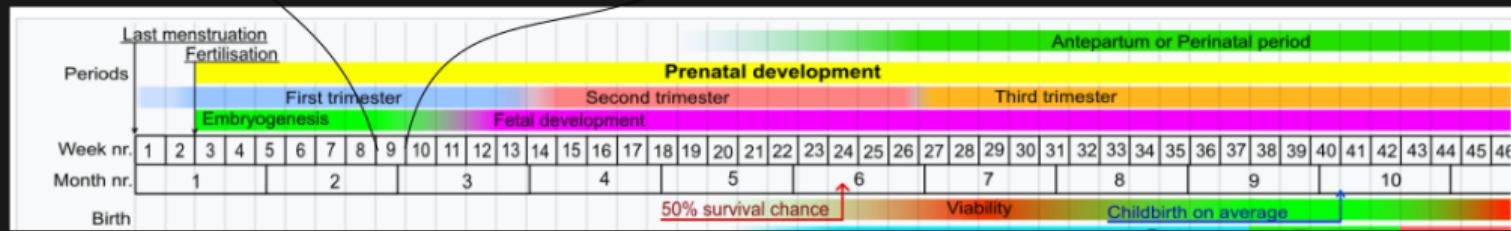
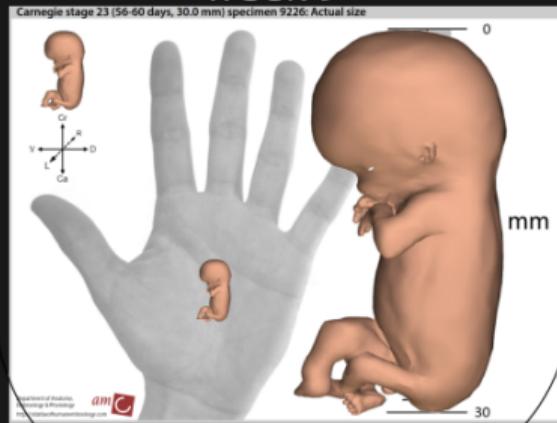


week 6



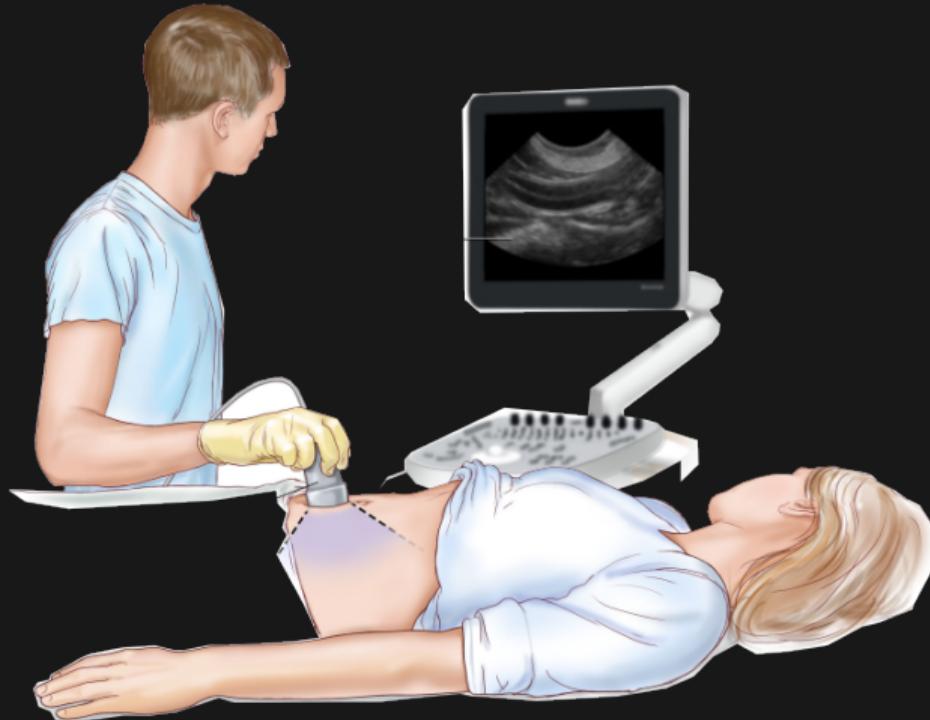
[ACTIVITY]: Understanding Fetal Growth

week 9



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

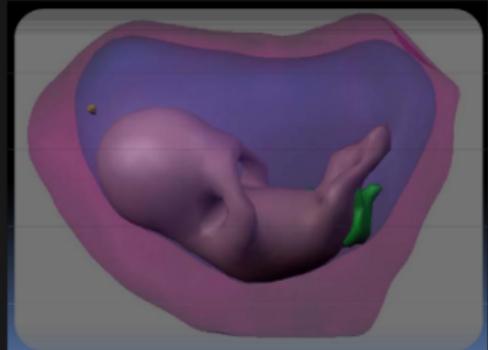
Segmentation on 3D US data



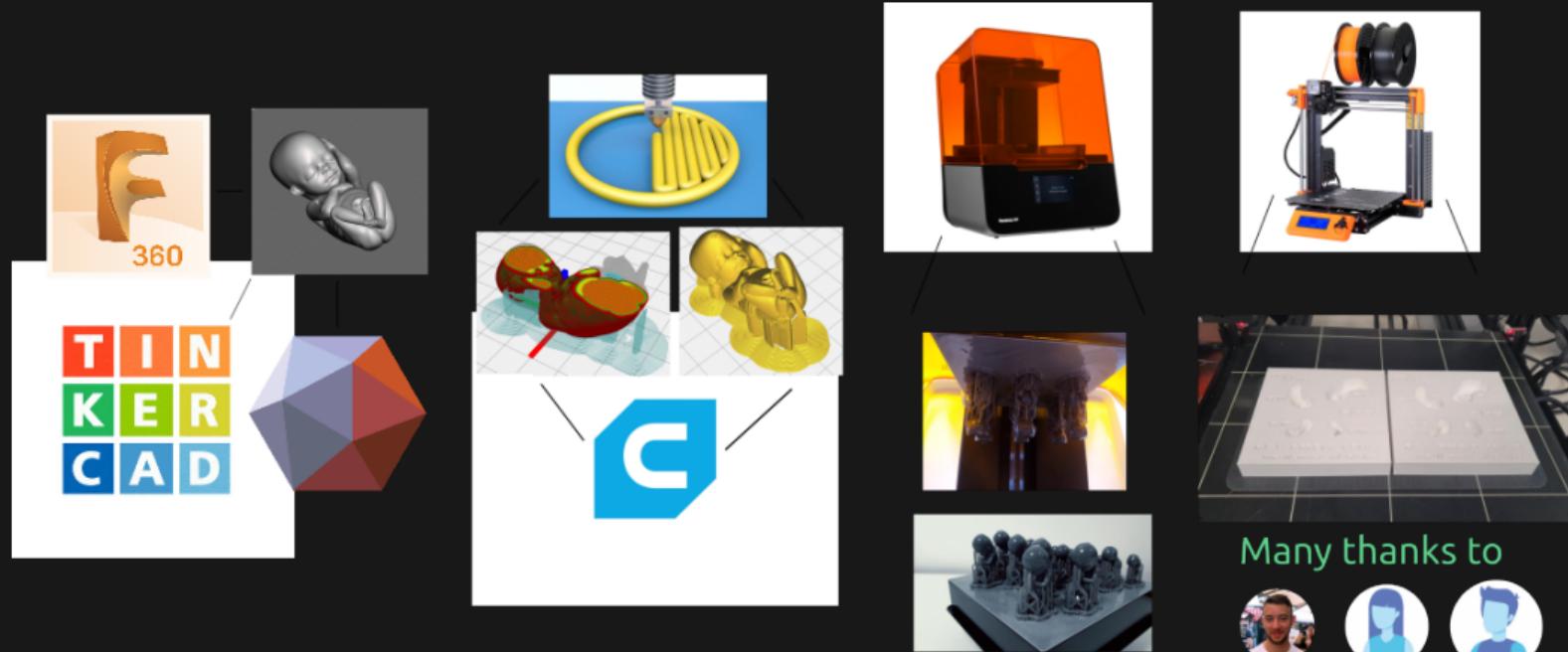
Tissue Labelling



Surface Reconstruction



3D printing Fetuses



Many thanks to



Guilherme
Gomes
De Figueiredo

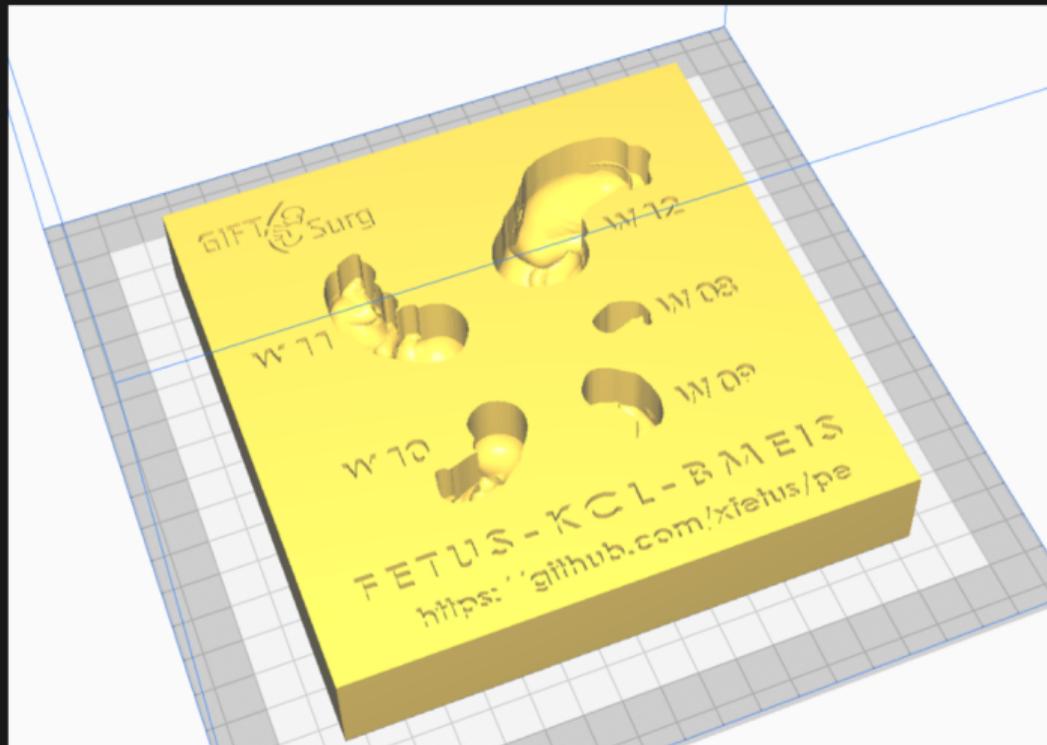


Maleeha
Al-Hamadani



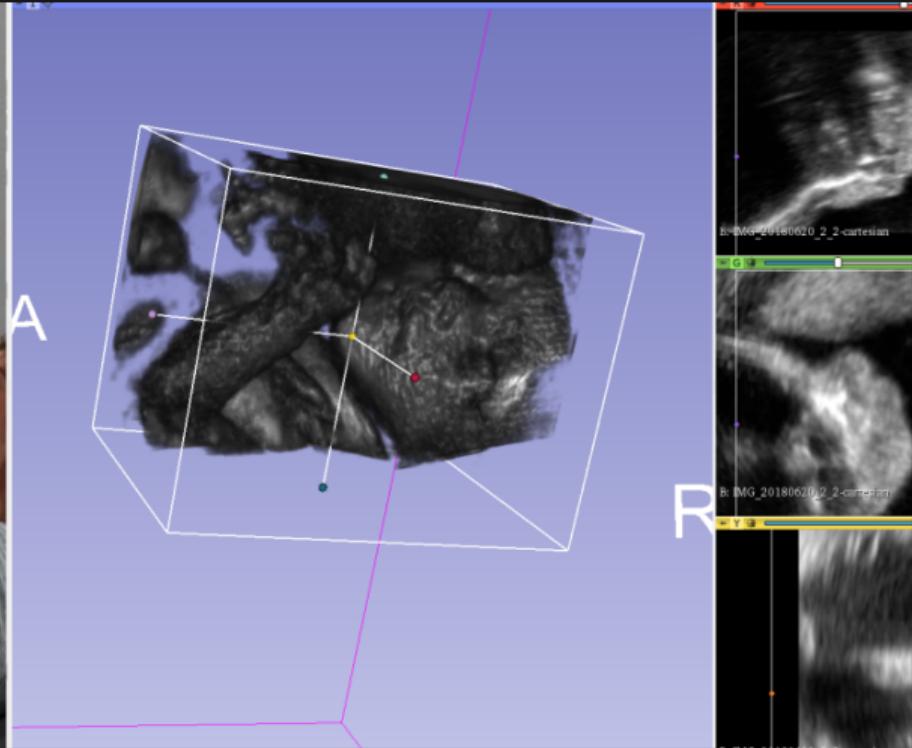
Carlo
Seneci

[ACTIVITY]: Fetal growth of 3D printed fetuses

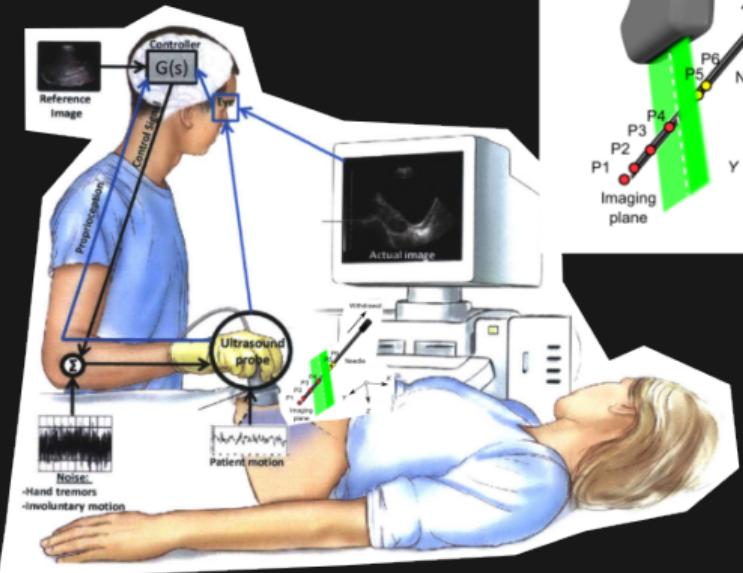


Can you identify body parts of a fetus
with Ultrasound?

[ACTIVITY]: Interactive Ultrasound Imaging



Ultrasound-guided intervention



Challenges:

- Skillfullness of sonographers
- Anatomical view changes
- Tracking needles

Takeaway messages

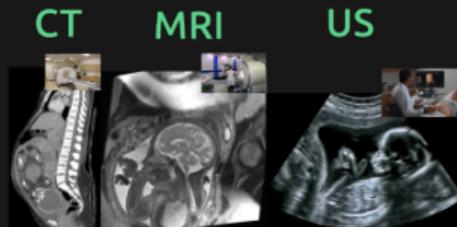
- Biomedical Engineers

- Maths and Physics
- Biology and Chemistry
- Computer Science



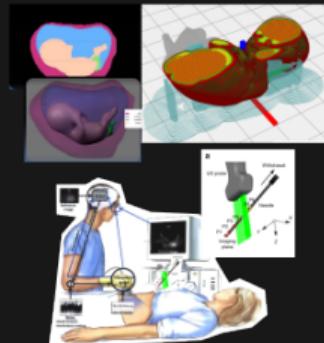
- Medical Imaging

- 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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