

# Finding a fETus with UltraSound (FETUS)

## Westminster Enterprise Week #2021

10th November 2021



Tareen Dawood, Shu Wang, and  
**Miguel Xochicale**

✉ miguel.xochicale@kcl.ac.uk  
😺 @mxochicale 🐦 @\_mxochicale



This slide is licensed under a Creative Commons "Attribution 4.0 International" license.

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



# Who am I?



Miguel  
Xochicale



H.S.

2000

B.Sc.

M.Sc.

T.A.

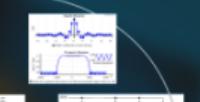
2010

Ph.D.

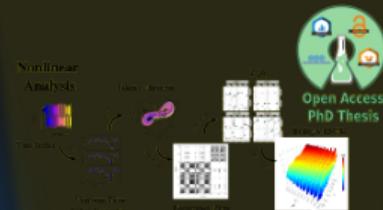
2020

2030

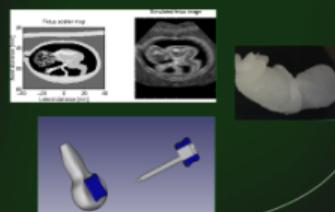
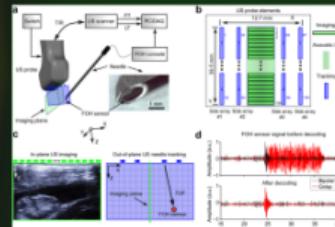
$t[\text{years}]$



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



Guangdong  
China

Shu  
Wang



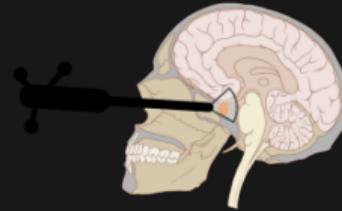
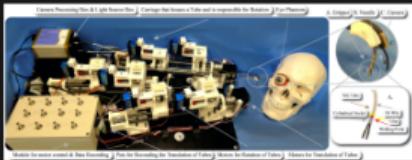
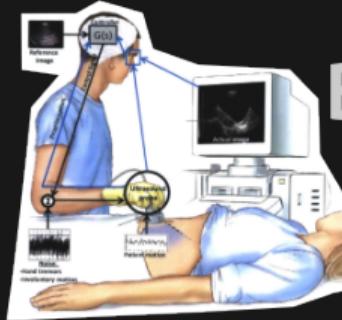
Beijing  
China



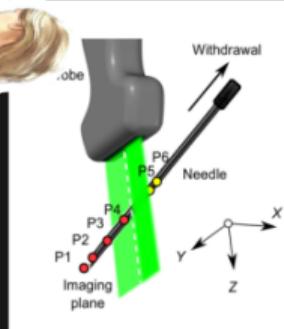
Tareen  
Dawood



# What does a Biomedical Engineer do?



# Biomedical Engineering

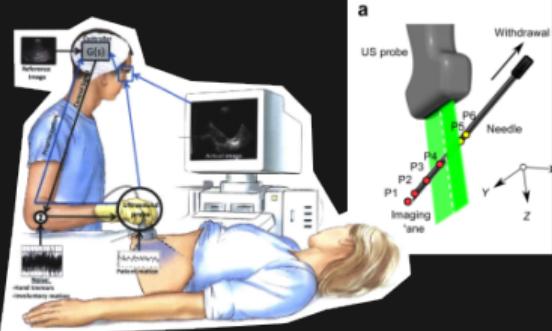


# Where we are based?



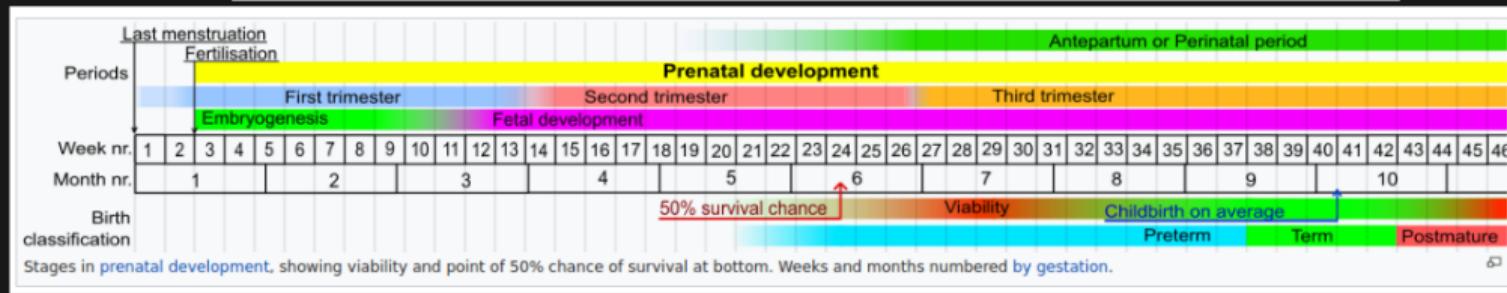
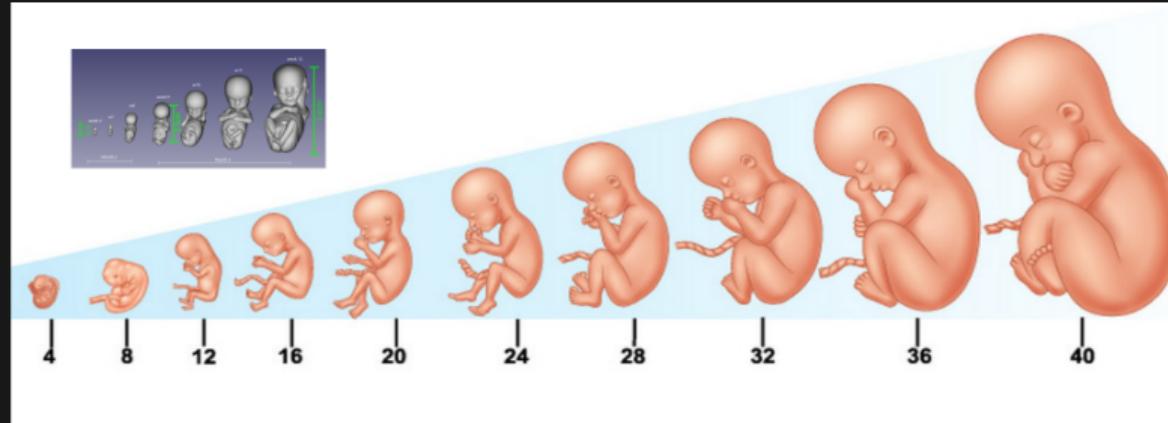
## School of Biomedical and Imaging Science

Department of Surgical and Interventional Engineering



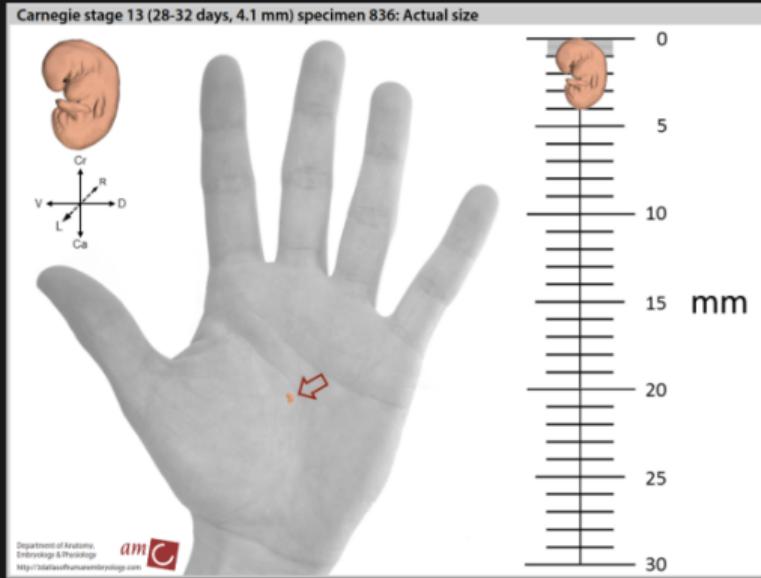
# Understanding Fetal Growth

## Understanding Fetal Growth

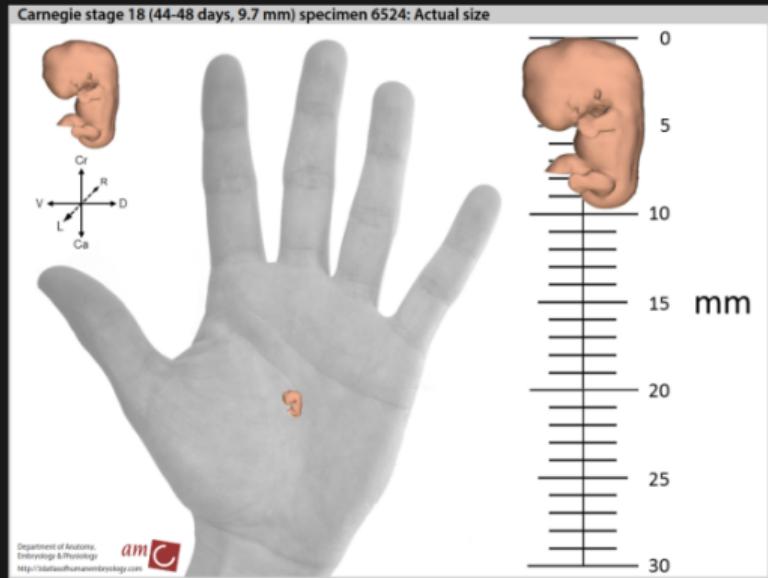


# Understanding Fetal Growth

week 5

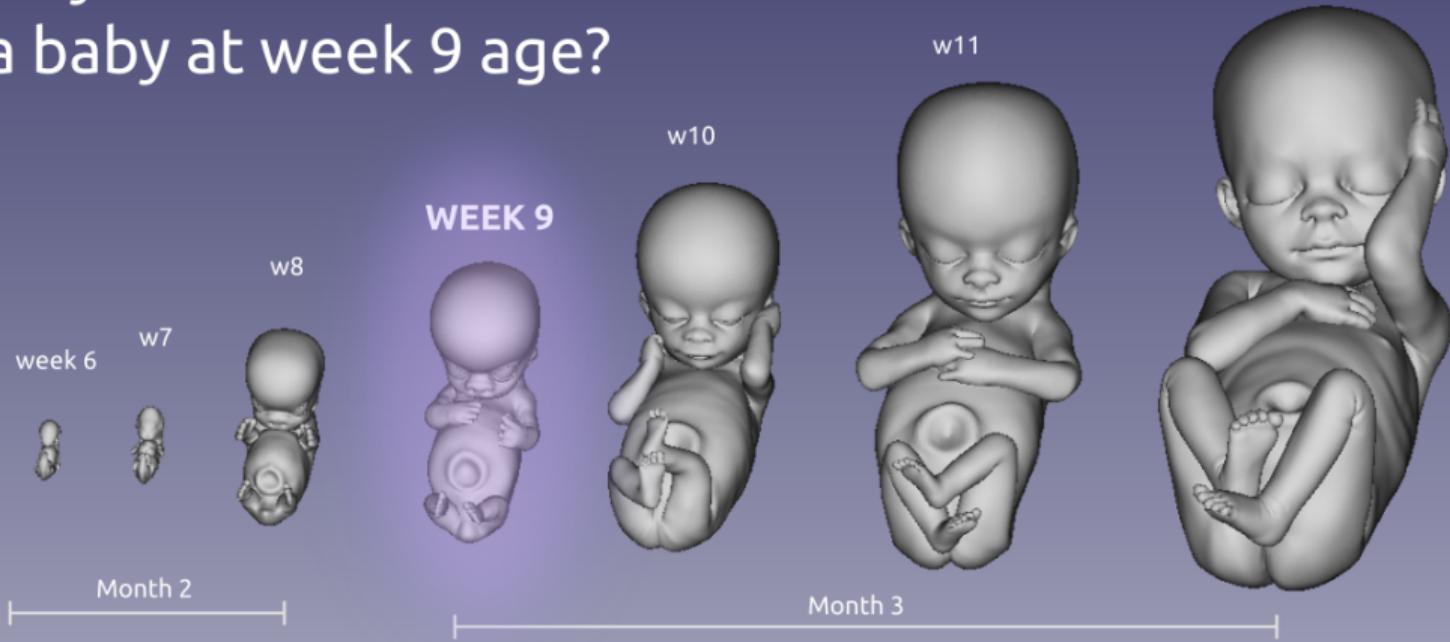


week 6

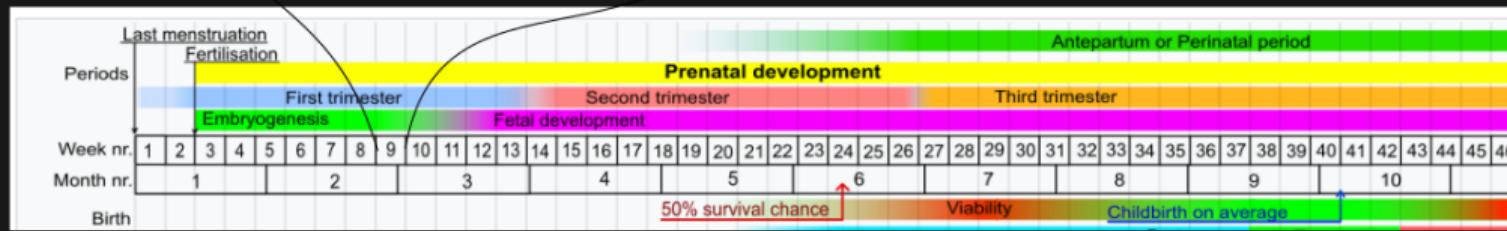
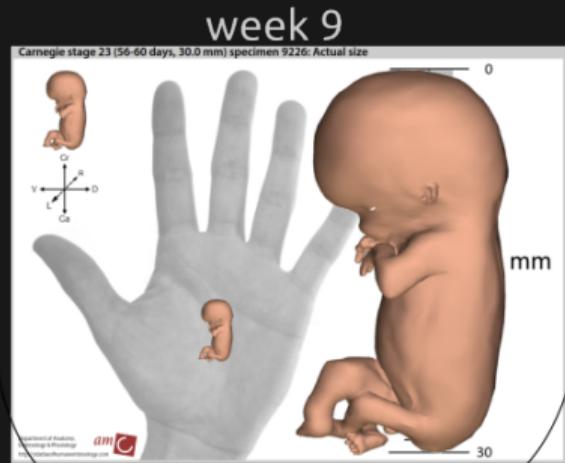


# Guessing Fetal Growth

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

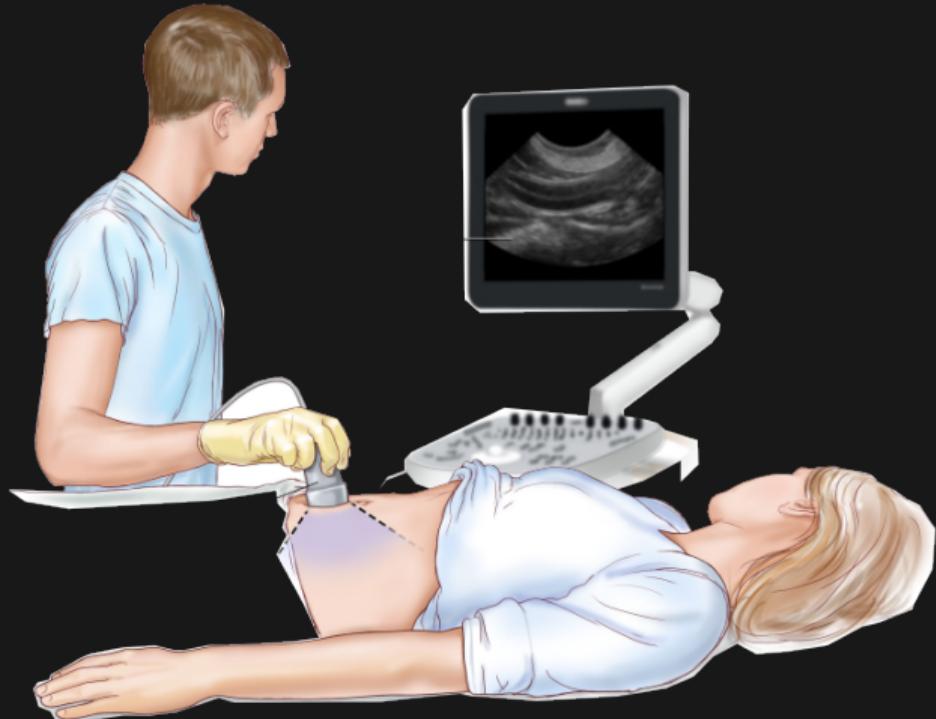


## Understanding Fetal Growth



Do you know what is the role of a  
Sonographer?

# The role of a Sonographer



Prepare Exam Room & Equipment

Use Sonography Equipment

Friendly Disposition & Good Patient Care

Maintain Confidence

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

# 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

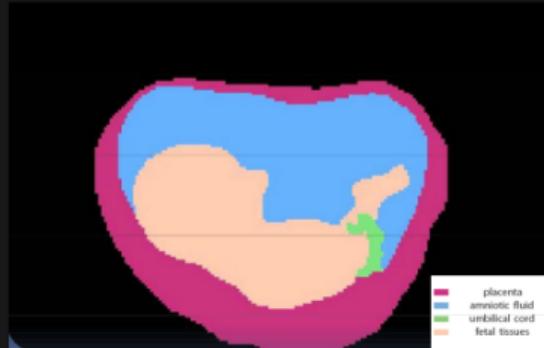
How a Biomedical Engineer would help  
a Sonographer?

# Modelling US imaging

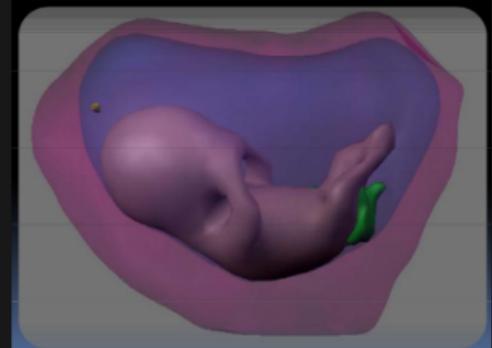
## Segmentation on 3D US data



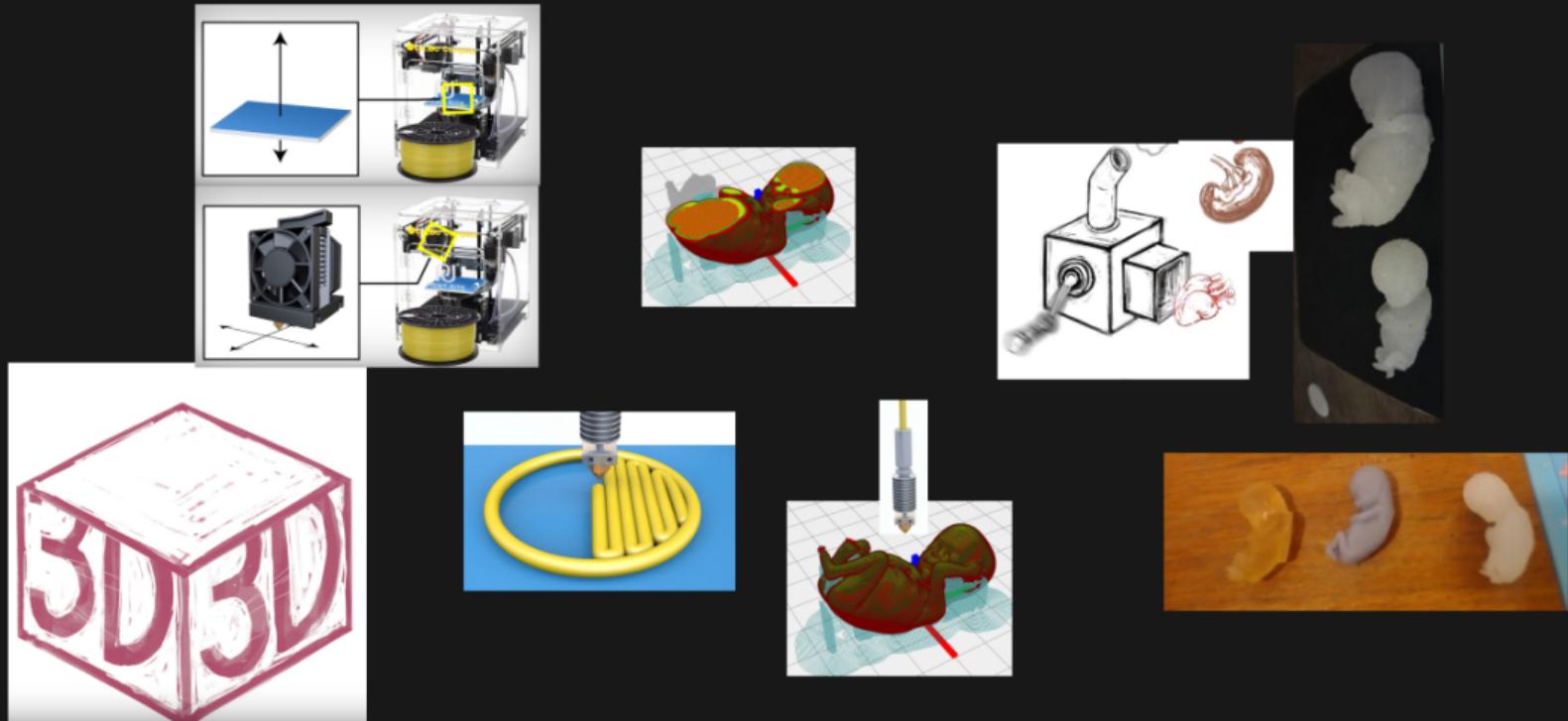
## Tissue Labelling



## Surface Reconstruction



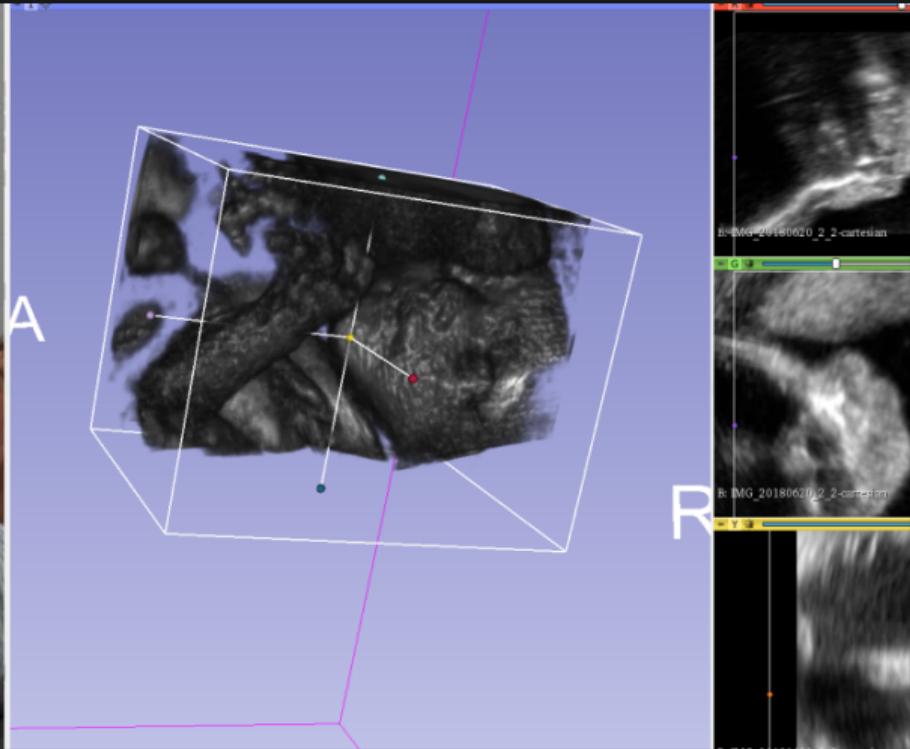
# 3D printing Fetuses



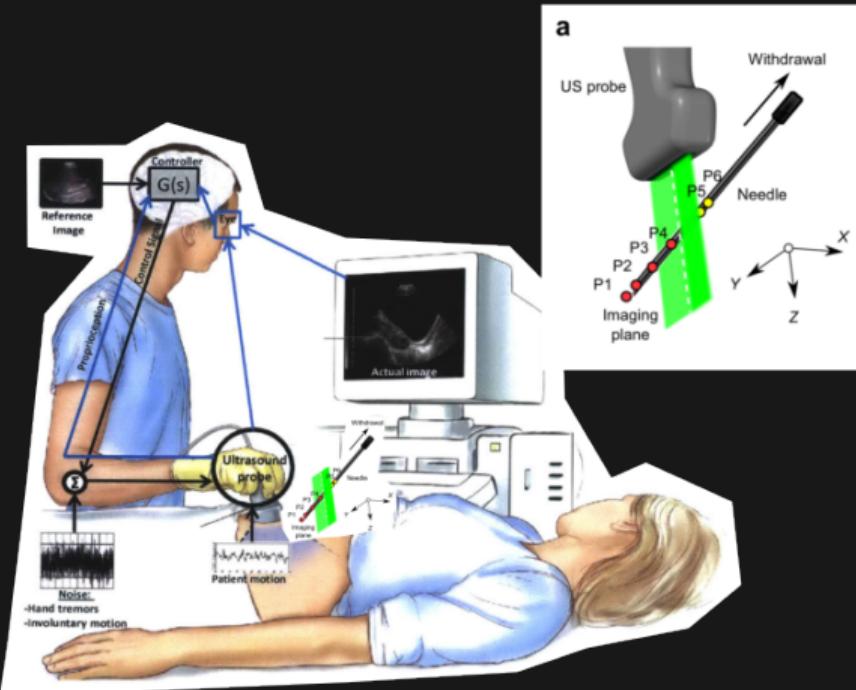
# Interactive Ultrasound Imaging DEMO

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

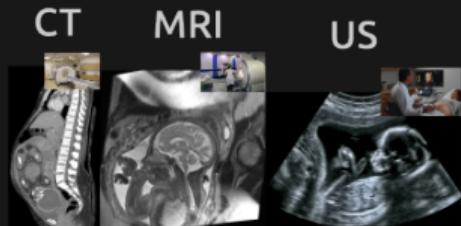
## - Biomedical Engineers

- Electronics
- Mechanics
- Computer Science
- Medical Imaging



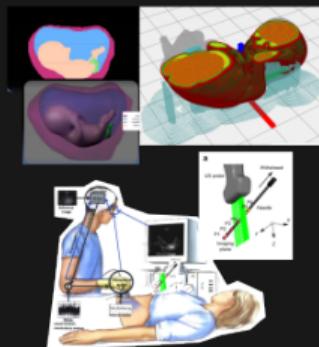
## - Medical Imaging

- Computational Tomography
- Magnetide Resonance
- Ultrasound imaging



## - Applications of US

- Modelling US
- 3D printing
- US needle tracking



# Pop Quiz and Souvenirs

## Souvenirs



## 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 (EQ)

EQ1:

Share an emoji that reflects how you feel about this workshop

EQ2/3:

What was your favourite part of the workshop? /

What was least favourite part of the workshop?

EQ4:

What do would you change about today's workshop?

# Acknowledgements



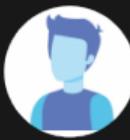
Shu  
Wang



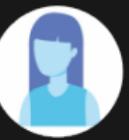
Ou  
Zhanchong



Tareen  
Dawood



Guilherme  
Gomes De Figueiredo



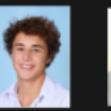
Amal  
Hussein



Miguel  
Xochicale



Christian  
Baker



Francois  
Joubert



Sunish  
Mathews



Fang-Yu  
Lin



Richard  
Miles

## Research Students

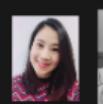
## Research Scientists



Bella  
Spencer



Melissa  
Bovis



Yada  
Kunpalin



Brian  
Dromey



Jacqueline  
Beddoe-Rosendo



Clare  
Heaysman



Alima  
Rahman



Valentina  
Vitiello



Anna  
David Vercauteren



Tom  
Wenfeng  
Xia



Sebastien  
Ourselin

## Public Engagement Officers

## Clinical Fellows

## Quality Management

## Operations Managers

## Investigators

# Finding a fETus with UltraSound (FETUS)

## Westminster Enterprise Week #2021

10th November 2021



Tareen Dawood, Shu Wang, and  
**Miguel Xochicale**

✉ miguel.xochicale@kcl.ac.uk  
😺 @mxochicale 🐦 @\_mxochicale



This slide is licensed under a Creative Commons "Attribution 4.0 International" license.

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