ME ++

Data ethics for computing education through ballet & biometrics

Genevieve Smith-Nunes 6.09.22

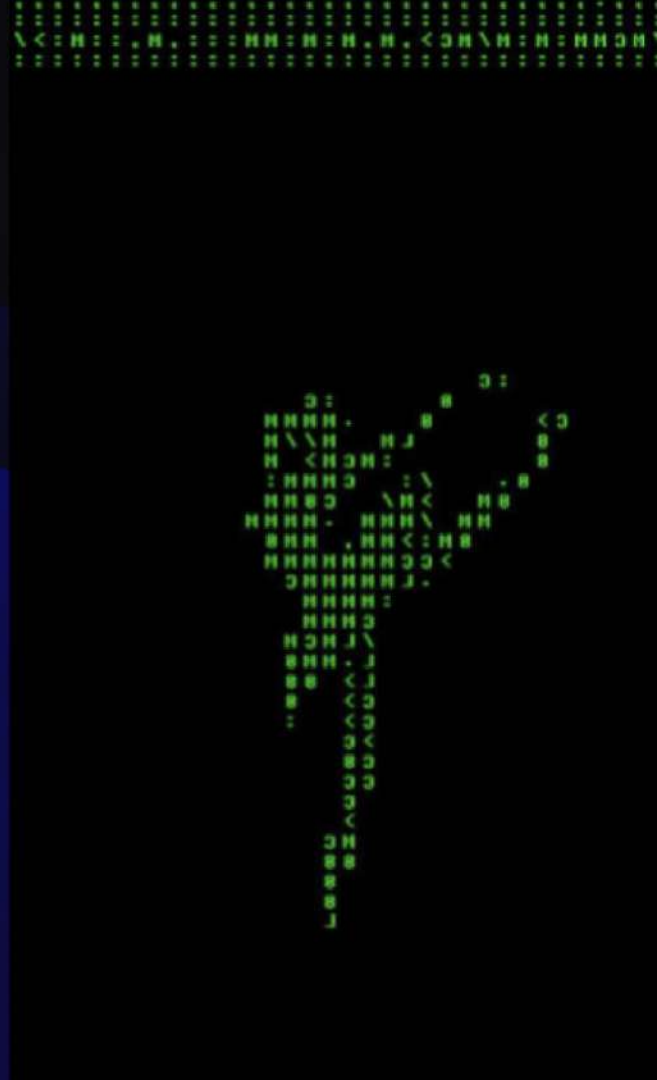
TODAY

A bit about me

Classical Ballet & Computing

Data ethics through biometrics

- Skeleton Tracking
- Brainwaves



Me

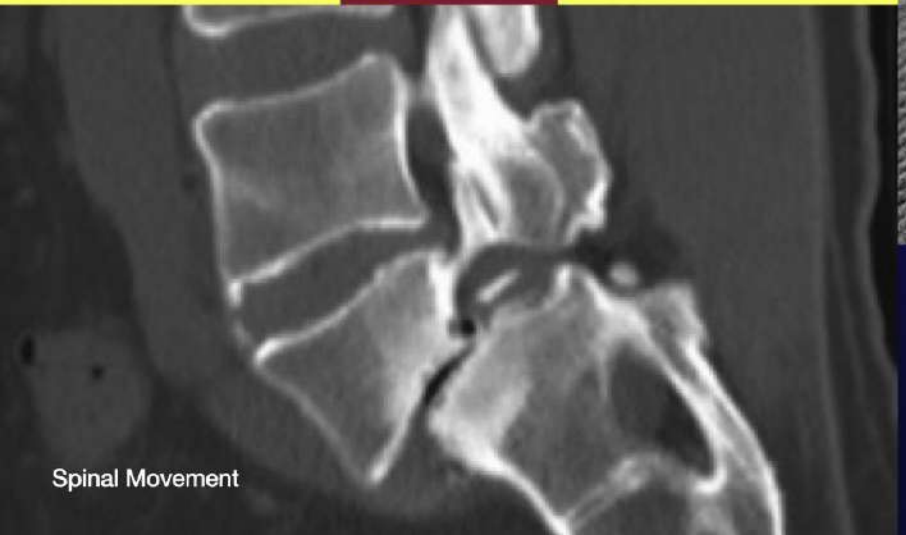
Secondary & A level Computing Teacher from 2005 until 2013

Set up ReadySaltedCode in 2012

DataDrivenDance

Lecturer in PGCE Computing & Digital Media since 2017

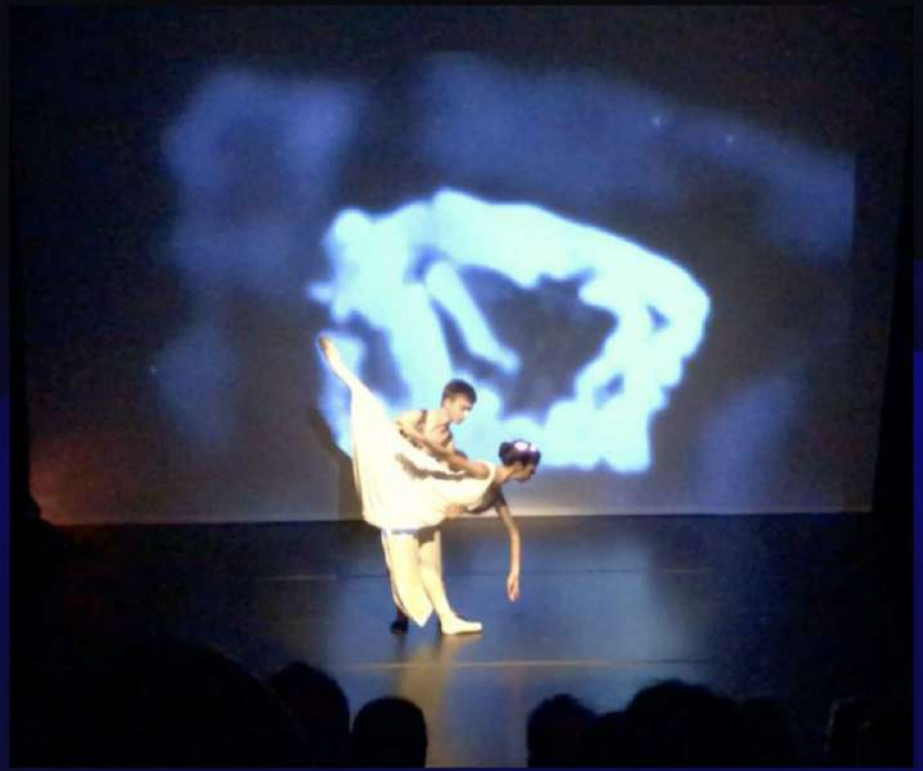
My avatar in world - Viabela iLRN Campus



GAMING & DANCE AGED 16

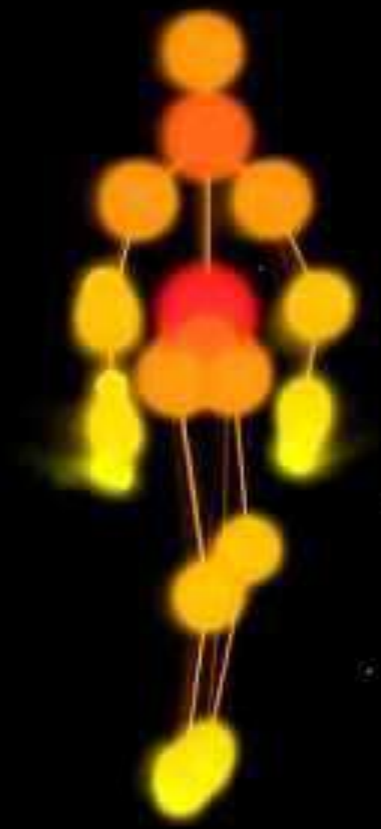
Classical Ballet & Computing

[arra]stre ballet



[PAIN]byte ballet

[arra]stre | algorithm



Binary tree structure | virtual dancer

Kinect, JSON data, javascript

Pointe Shoes

ARDUINO: Flora or Gemma

NEOPIXELS

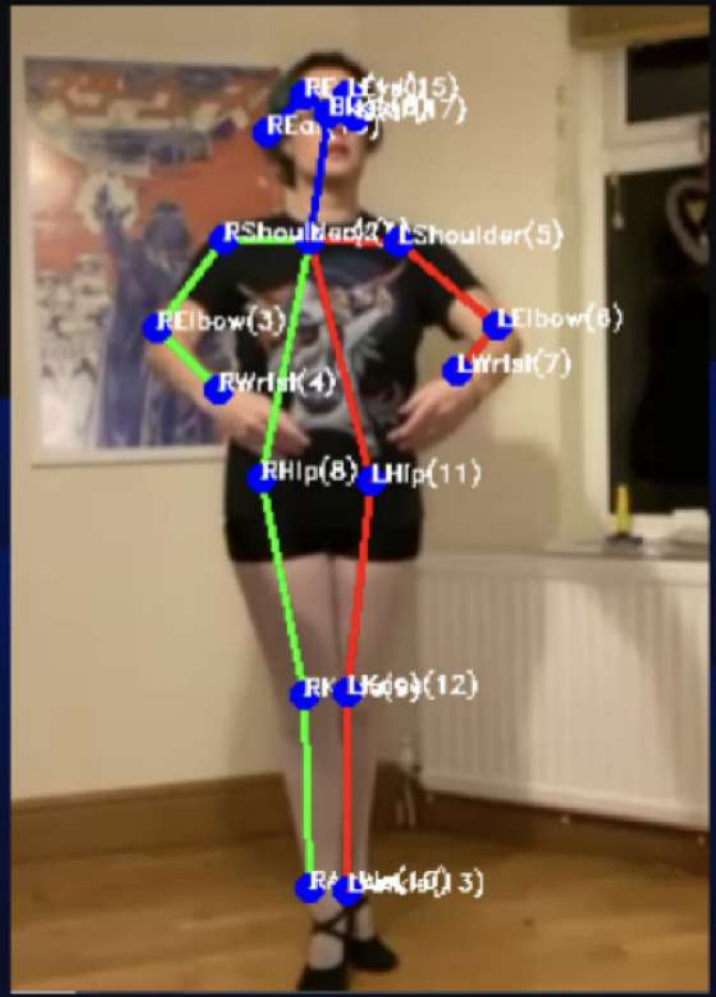
Conductive thread

Velostat Pressure switch

FROM DANCE TO XR

DANCE 〉 MOCAP

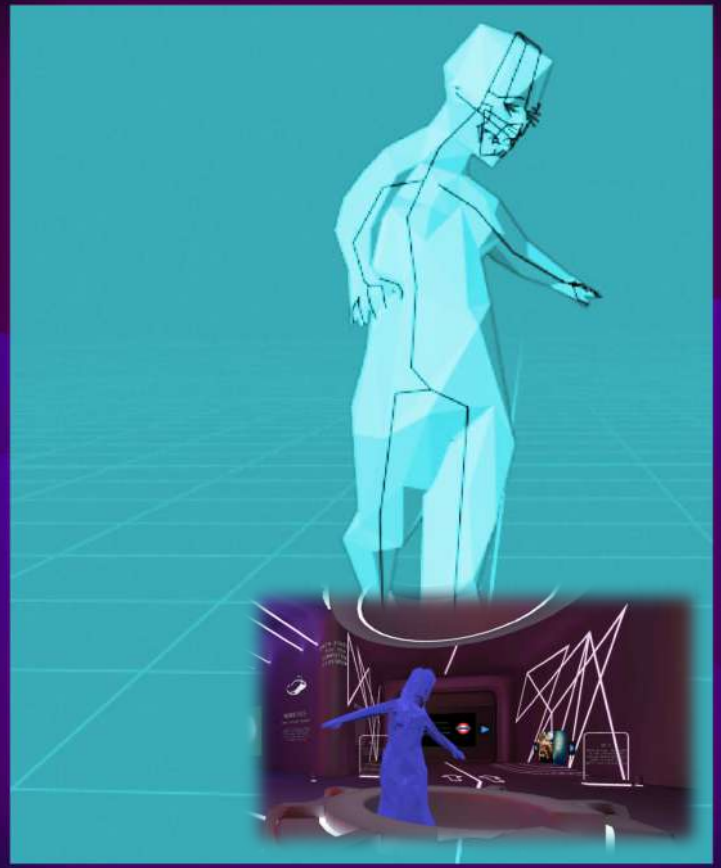
- Ordinary RGB video (e.g. webcam)
- 3D pose estimation (MocapNet2)
- Animated limb rotations



Qammaz, A., & Argyros, A. A. (2019, September). MocapNET: Ensemble of SNN Encoders for 3D Human Pose Estimation in RGB Images. In BMVC (p. 46).

3D MODELLING

- Blender and MakeHuman
- CMU+Face compatible skeleton rig
- (Optional) export with animation for use in other tools (such as the dancer behind you in the centre of the FrameVR room)



MODEL + ANIMATION 〉AUGMENTED REALITY

- Unity built-in VR/AR tooling
- Custom BVH animation software
- Installs on audience's mobile devices
- Novel performance experiences

DATA ETHICS

Data ethics?

Data ethics as a new branch of ethics that studies and evaluates moral problems related to data (including generation, recording, curation, processing, dissemination, sharing and use), algorithms (including artificial intelligence, artificial agents, machine learning and robots) and corresponding practices (including responsible innovation, programming, hacking and professional codes), in order to formulate and support morally good solutions (e.g. right conducts or right values).

Floridi, L. and Taddeo, M. (2016). What is data ethics? Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences, 374

Data ethics?

What does it have to do with the computing classroom?

The 3 guiding principles of Data Ethics Framework

Transparency

Accountability

Fairness

GOV.uk Data Ethics Framework (2020)

Computing Classrooms

Data protection
Data sharing
Privacy
Copyright / IP
Ethics
Law & Society
Accessibility
Digital Deficit
Environmental

Data literacy

Understanding data in relation to:

Access to personal data including biometrics

How
Who
Where
Why

Gov.UK (2020) Data Ethics Framework

BIOMETRIC DATA & ETHICS

Neuro ethics?

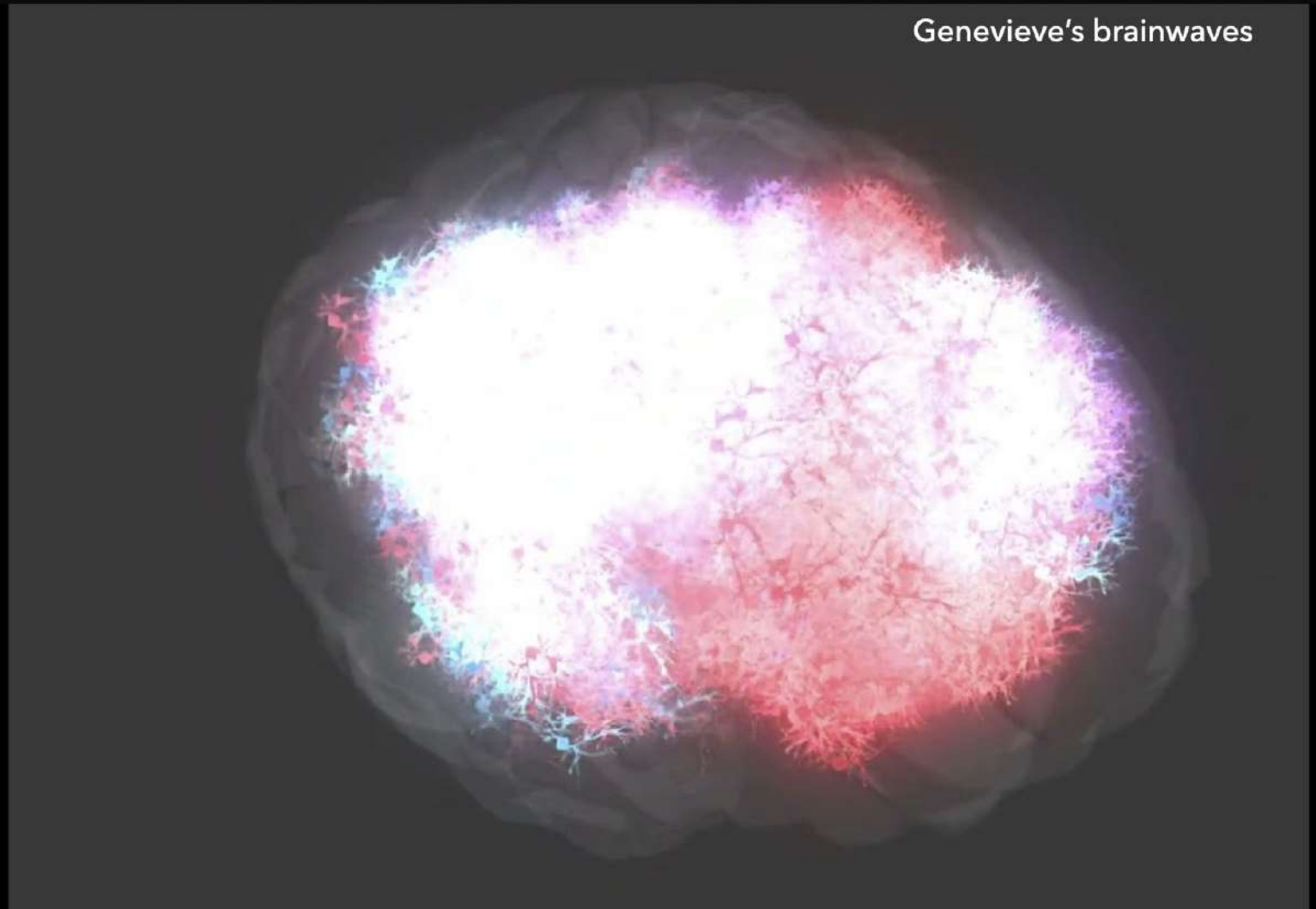
Neuroethics: The ethical issues raised by our increased and constantly improving understanding of the brain. (Salles, Evers, & Farisco, (2019)

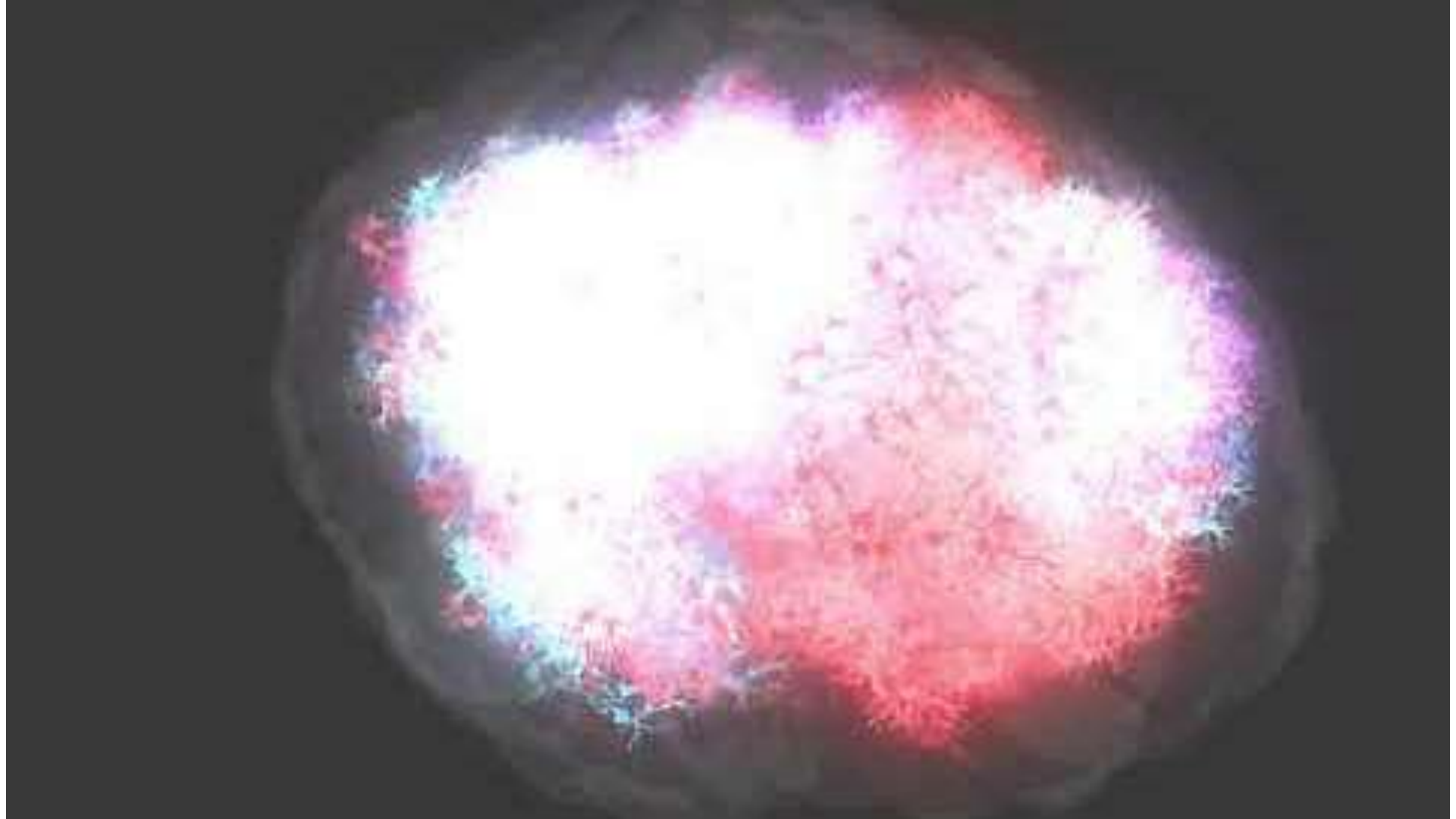
To interrogate EEG data requires an understanding of data transmission and signal processing which is fundamental to both brainwave data, a core component of computing examined courses.

Nita A. Farahany, The Costs of Changing Our Minds, 69 Emory L. J. 75 (2019). Available at: https://scholarlycommons.law.emory.edu/elj/vol69/iss1/2

Professor Nita A. Farahany ‘Cognitive Liberty’ 2014

Data visualisation using Emotiv Software

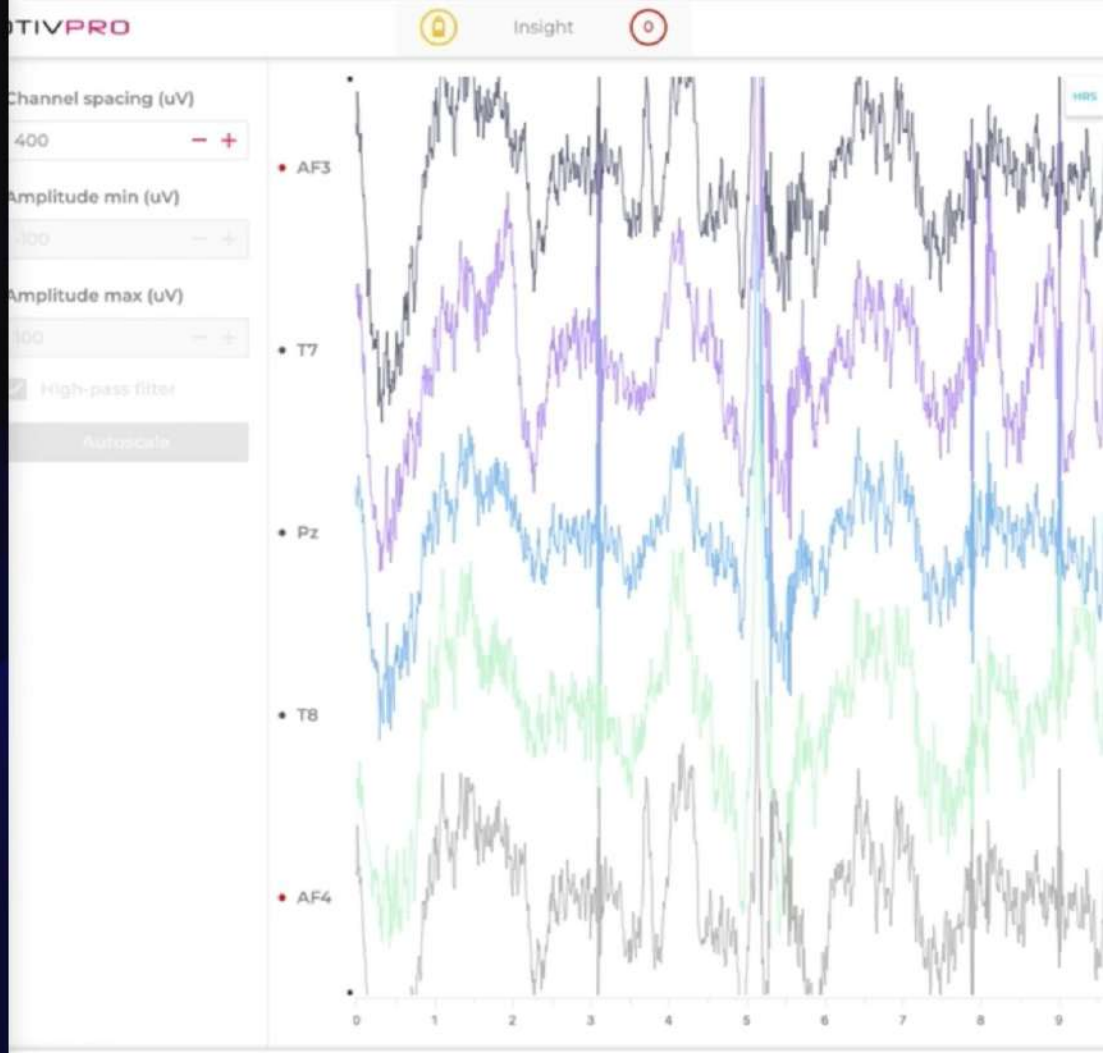


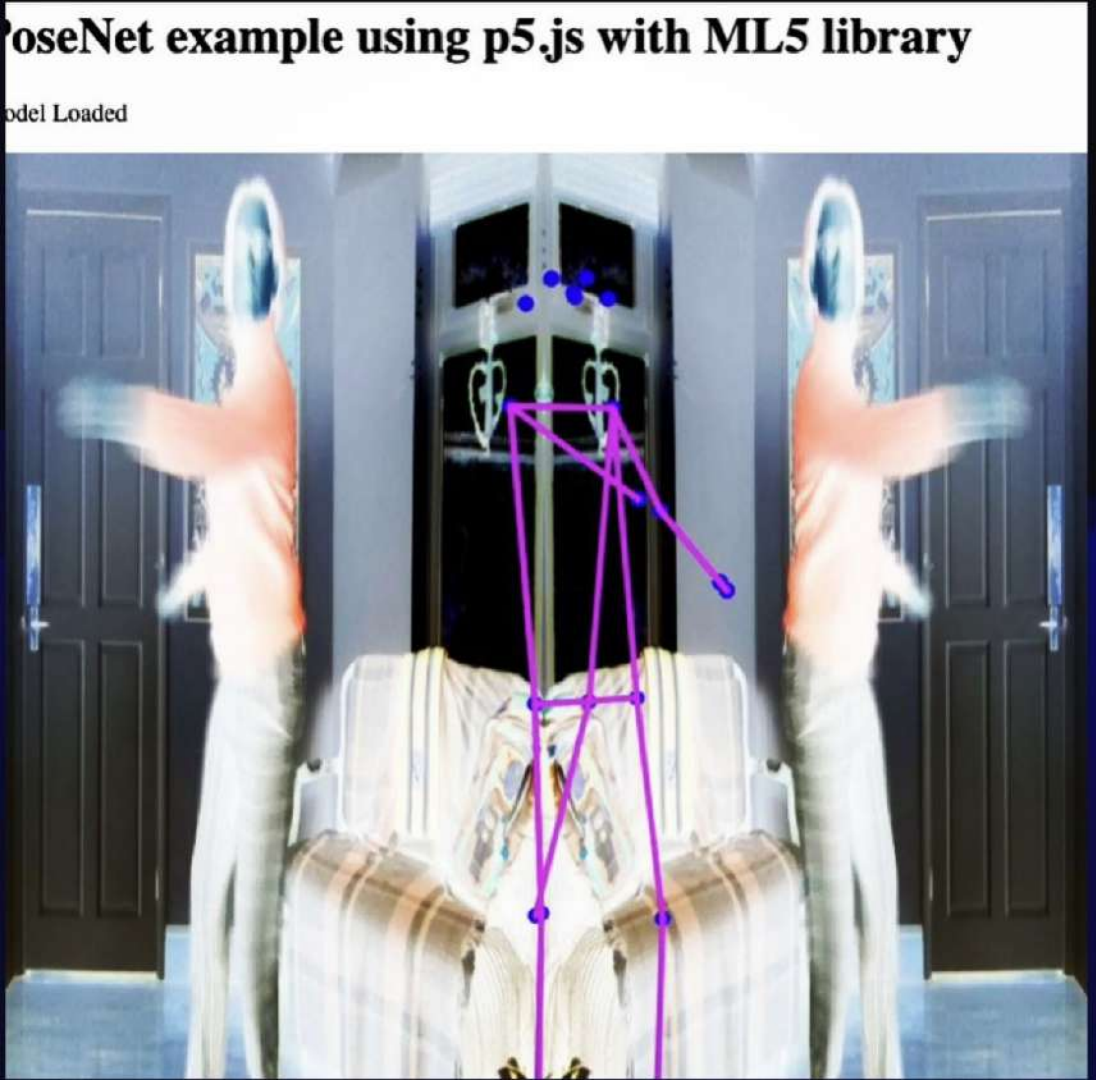


Ethical Implications

Sharing personal biometric

- Is it secure
- Are brainwaves something deeply personal?
- Can it be used in discriminatory ways?
- The data self and the human self (ME++)





HAVE A PLAY

P5.js and ML5

Using webcam and machine learning to capture real-time skeleton data

JavaScript

ML5 machine learning

Post Pose estimation (PoseNet)

It's ML

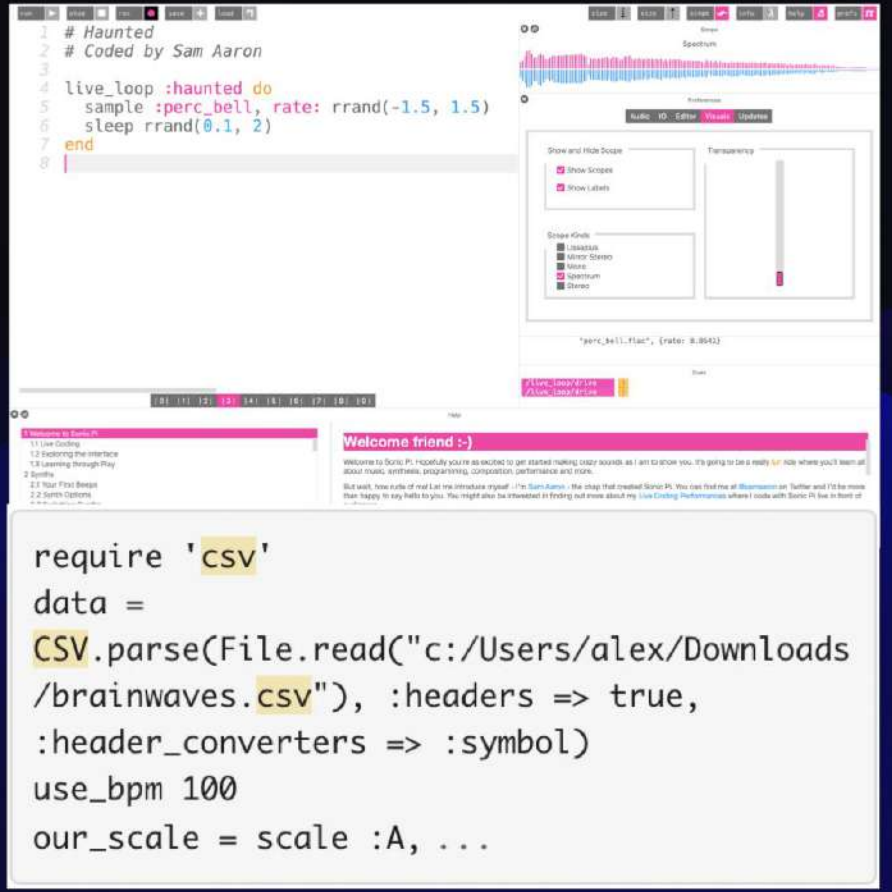
How ethical is that?

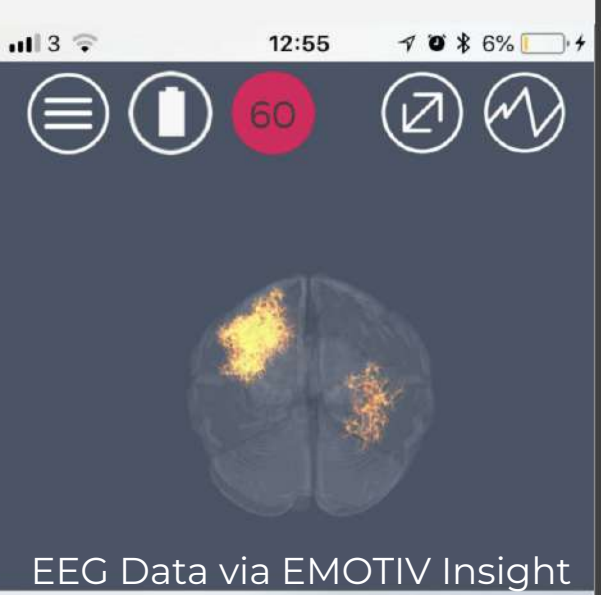
- Body type assumptions
  - 2 arms 2 legs
  - Moving in bland ways (bad for ballet)
- Has military applications
- Deepfaking
- Weird Open-ish Source

Data Sonification

Data to What?

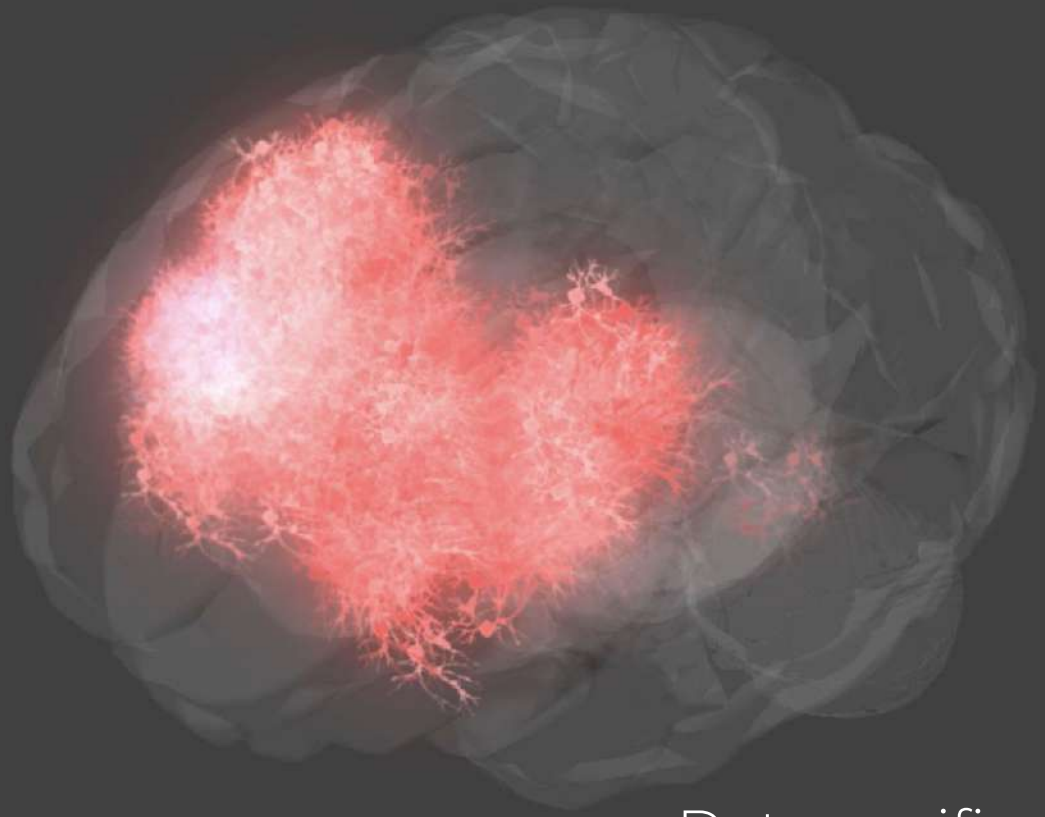
- Coding in Sonic Pi
- Meaning meaning meaning
- Representing data with sound
- … emotion with sound
- … energy with sound
- Inspiration from gaming: adaptive music





EEG Data via EMOTIV Insight

Brain as a data artefact

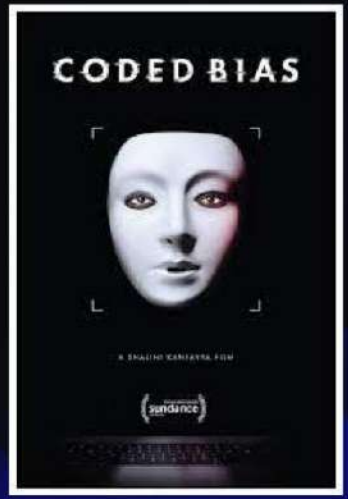


Data sonification

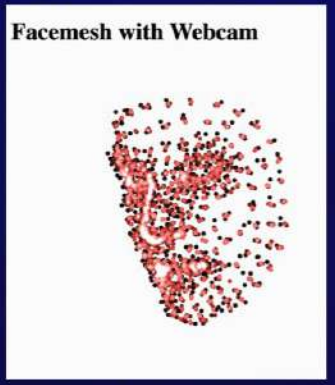
Computing Activities

Discussions using film
- Coded Bias
- The Social Network

Coding Activities
- Skeleton tracking
- Chat bots
- Image editing and filters
- Data sonification



https://www.codedbias.com/



P5.JS code (smith-nunes (2021)

It's not

quite right…

@pegleggen

TALK *soon*

DISCUSSION PROMPTS

1. What do educators need to understand about data ethics to aid in our / their teaching practice?

2. Could you explore ballet and biometrics in your own teaching / work? If so, how?