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CONTACT INFORMATION

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EXPERIENCE

Stanford University, Postdoctoral Scholar **11/2024 - present**

At Stanford's Artificial Intelligence in Medicine and Imaging (AIMI) Center

Supervised by Prof. Akshay Chaudhari and Dr. Sergios Gatidis

- AI for accelerating Science: Scaling clinical discoveries through mechanistic interpretability of medical foundation models
- Most promising automatically-generated paper, derived from Stanford Medicine data, awarded spotlight at Agents4Science conference (ranking #5/294 submissions)
- Transforming abstract multimodal feature spaces into sparse and interpretable concept sets by training sparse autoencoders (SAEs)
- Building multimodal foundation models combining CT images, lab values and clinical notes
- Running and finding speakers for AIMI's bi-weekly 'AI in Radiology journal club', and weekly Stanford MIMI's 'dev meeting'

EDUCATION

Imperial College London, PhD **10/2020 – 10/2024**

PhD in deep learning for medical applications

Supervised by Dr. Martin Menten and Prof. Daniel Rueckert

(within the Imperial & King's College CDT for Smart Medical Imaging)

- Thesis: Representation learning for improved diagnosis and biomarker discovery in age-related macular degeneration
- Published contrastive-learning and vision-language models in top-tier medical AI journals *npj Digital Medicine* and *Medical Image Analysis*
- Featured in RSIP Computer Vision News, November 2023 (MICCAI edition).
- Visiting researcher at AI in Medicine Lab, Technical University Munich 06/2022 – 08/2024

King's College London, MRes **09/2019 – 07/2020**

MRes Healthcare Technologies

- First Class Honours
- Clinical applications of AI, PET and MRI image reconstruction, real-time catheter segmentation (supervised by Prof. Shaihan Malik).

Imperial College London, MEng **10/2015 – 08/2019**

MEng Mathematics and Computer Science

- First Class Honours in all years.
- Won Best Group Project Prize in both 1st and 3rd years 2016, 2018
- Elected 'Maths and Comp Sci' Year Rep for two consecutive years 10/2016 – 06/2018

PUBLICATIONS

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1. **Holland R.**, *et al.* "MechSci: Scaling Clinical Science via Mechanistic Interpretability of Multimodal Medical Foundation Models", *Agents4Science* conference spotlight, rank #5/294 (2025).
 2. Ashwin Kumar, **Robbie Holland**, *et al.* "Unified Pre-training for Vision Language Models in Medical Imaging", *ML4H* (2025).
 3. **Holland R.**, *et al.* "Specialized curricula for training vision-language models in retinal image analysis", *npj Digital Medicine* (2025).
 4. **Holland R.**, *et al.* "Deep-learning-based clustering of OCT images for automated biomarker discovery in age-related macular degeneration", ARVO'23 oral presentation, *Ophthalmology Science* journal (2024).
 5. Paul Hager, Friederike Jungmann, **Holland R.**, *et al.* "Evaluation and mitigation of the limitations of large language models in clinical decision-making", *Nature Medicine* (2024).

6. **Holland R., et al.** "Clustering disease trajectories in contrastive feature space for biomarker proposal in age-related macular degeneration", *Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, ranked in top-5 most clinically applicable papers (2023).
7. Menten M. J., **Holland R., et al.** "Exploring healthy retinal aging with deep learning", *Ophthalmology Science* (2023).
8. **Holland R., et al.** "Metadata-enhanced contrastive learning from retinal optical coherence tomography images", *Medical Image Analysis* (2024).
9. **Holland R., et al.** "Automatic detection of bowel disease with residual networks", *Predictive Intelligence in Medicine (PRIME) Workshop, Medical Image Computing and Computer-Assisted Intervention (MICCAI)* (2019).

INTERNSHIPS AND
ADDITIONAL
EXPERIENCE

St Paul's Girls' School **01/2022 - 07/2022**
AI Tutor

- Developed an AI fundamentals course and taught six students for two semesters
- Ran a student project developing VAEs for British Sign Language data

G-Research **06/2018 - 10/2018**
Software Development Intern in FinTech

- Replaced a secure portal service built in .NET Core to store, distribute and encrypt highly sensitive report data
- Configured the portal service and Angular-Redux UI to run on Kubernetes clusters

NICE Systems **07/2017 - 09/2017**
Software Development Intern

- Built RESTful web services to transfer data from native SQL queries on an external database
- Updated legacy code to reduce loading times by more than half by reducing the quantity of database requests
- Researched and produced POCs of different Maps APIs for a new territory based product

Imperial College London **11/2016 - 08/2019**
Lab Demonstrator (Imperial College interview days)

- **2nd year** - Gave live demos of our C Project to prospective Imperial students
- **4th year** - Demonstrated Huawei license plate de-blurring 2nd place solution

EXTRA
CURRICULAR

Sports 09/2017-07/2018
Webmaster of IC Cross Country & Athletics Society

- Specialise in short distance athletics (24.0s 200m, 12.09s 100m)

Tae-Kwon-Do 2010-2013
- Attained first dan black belt 2013

Football (soccer) for Curley Park Rangers A team 2004-2014

Gaelic football for the Imperial College team 10/2016-07/2016

UK Maths Challenge
Won 'Best in School' award 2013
Achieved two Gold awards 2012, 2013

Music
French Horn
- Achieved Grade 7 2015
- Played for Imperial College Sinfionetta orchestra 2015-2017
- Played in opening ceremony of LIMUN in Westminster in front of sixteen hundred people 02/2017
Self taught Piano 04/2017-present