







# Jacob Chalk

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## Research Focus

My research centres on multimodal video understanding, with the goal of leveraging diverse modalities to improve egocentric video understanding. Specifically, I have explored audio-visual learning for tasks such as action recognition and detection, as well as investigated how eye-gaze can predict (or prime) future object interactions. I am now extending my work into 4D video understanding, with a current focus on long-term 3D object tracking.

## Education

### University of Bristol

PhD in Computer Vision

Bristol, UK

September 2021 – Current

Thesis Title: Leveraging Multimodal Data for Egocentric Video Understanding, supervised by **Prof. Dima Damen**.

### University of Bristol

MEng in Computer Science - **First Class Honours**

Bristol, UK

September 2017 – September 2021

Dissertation Title: Video GANS for Human-Object Interactions, supervised by **Prof. Dima Damen**.

## Research Experience

### NAVER LABS Europe

Industrial Internship - Visual Representation Learning Team

Grenoble, France

February 2025 – Current

Conducting research on long-term 3D object tracking, supervised by **Diane Larlus**.

## Teaching

### University of Bristol

Teaching Assistant

Bristol, UK

September 2019 – September 2024

Software Product Engineering (2<sup>nd</sup> Year Module), Games Project (3<sup>rd</sup> Year Module), Computer Graphics (3<sup>rd</sup> Year Module)

Image Processing and Computer Vision (3<sup>rd</sup> Year Module), Applied Deep Learning (4<sup>th</sup> Year Module)

## Publications

- T. Perrett, A. Darkhalil, S. Sinha, O. Emara, S. Pollard, K. Parida, K. Liu, P. Gatti, S. Bansal, K. Flanagan, **J. Chalk**, Z. Zhu, R. Guerrier, F. Abdelazim, B. Zhu, D. Moltisanti, M. Wray, H. Doughty, and D. Damen, “HD-EPIC: A Highly-Detailed Egocentric Video Dataset” in **CVPR 2025**. [\[Page\]](#) | [\[Paper\]](#)
- C. Plizzari, S. Goel, T. Perrett, **J. Chalk**, A. Kanazawa, D. Damen, “Spatial Cognition from Egocentric Video: Out of Sight, Not Out of Mind” in **3DV 2025**. [\[Page\]](#) | [\[Paper\]](#)
- J. Chalk**, J. Huh, E. Kazakos, A. Zisserman, and D. Damen, “TIM: A Time Interval Machine for Audio-Visual Action Recognition” in **CVPR 2024**. [\[Page\]](#) | [\[Paper\]](#)
- J. Huh, **J. Chalk**, E. Kazakos, D. Damen, and A. Zisserman, “EPIC-SOUNDS: A Large-Scale Dataset of Actions that Sound.” in **ICASSP 2023**. [\[Page\]](#) | [\[Paper\]](#)

## Datasets

### HD-EPIC

Highly Detailed Egocentric Video Dataset

Released February 2025

Paper Published in CVPR 2025

HD-EPIC is an extensive dataset manually annotated with highly detailed and interconnected ground-truth labels covering: recipe steps, fine-grained actions, ingredients with nutritional values, moving objects, and audio annotations. All annotations are grounded in 3D through digital twinning of the scene, fixtures, object locations, and primed with gaze. Footage is collected from unscripted recordings in diverse home environments, making HD-EPIC the first dataset collected in-the-wild but with detailed annotations matching those in controlled lab environments. The dataset consists of 41 hours of video in 9 kitchens with digital twins of 413 kitchen fixtures, capturing 69 recipes, 59K fine-grained actions, 51K audio events, 20K object movements and 37K object masks lifted to 3D. On average, there are 263 annotations per minute across the unscripted videos. HD-EPIC also presents a challenging VQA benchmark of 26K questions assessing the capability to recognise recipes, ingredients, nutrition, fine-grained actions, 3D perception, object motion, and gaze direction.

### Roles:

- Gathered audio annotations matching a similar process to EPIC-Sounds (see below)

- Computed and visualised eye-gaze priming statistics for all 3D objects start and end locations. This involved projecting the eye-gaze direction ray into the 3D environment and measuring when the ray intersected with the objects 3D-bounding box before it was pick-up, or the end locations bounding box when placed down.
- Created eye-gaze related VQA questions, including “What is the camera wearer currently looking at?”, which involved finding the intersection between the projected gaze ray and 3D environment, as well as “What will the person interact with next?” which involved using objects whose start locations were primed with eye-gaze before being picked up to indicate it was about to be moved by the camera wearer.
- Ran LLM inference of Llama 3.2 (Vision-Instruct-90B) on the VQA questions

## EPIC-Sounds

Audio-Centric Annotated Dataset

Released January 2023

Paper Published in ICASSP 2023 & TPAMI 2025

EPIC-Sounds is an audio-only dataset, gathered across 100 hours of untrimmed audios from the videos of EPIC-KITCHENS. This dataset was motivated by the observation that audio-visual networks tend to use both temporally and semantically identical annotations for both modalities, yet audio and video can significantly differ even when describing the same action.

### Roles:

- Post-processed the labelled segments from annotators, this included:
  - Manually correcting typos in the free-form text descriptions.
  - Removing erroneous/redundant annotations.
  - Categorising the free-form descriptions into the 44 classes in the dataset.
  - Decomposing challenging segments containing multiple overlapping sounds into distinct annotations.
  - Training binary classifiers on the head classes of the dataset to clean the training set.
- Trained and ran quantitative analysis on the baseline models.
- Visualisation of the class distribution for the dataset.
- Ran analyses on the gathered data, such as the duration distribution of all classes and interplay between the visual and audio labels.
- Set and currently manage two challenges on the dataset: Audio-Based Interaction Recognition and Audio-Based Interaction Detection

## Honours and Awards

### Outstanding Reviewer

International Conference on Computer Vision

Awarded in recognition of meaningful peer review contributions.

October 2025

IEEE/CVF Conference (ICCV)

### Outstanding Reviewer

Conference on Computer Vision and Pattern Recognition

Awarded in recognition of meaningful peer review contributions.

May 2025

IEEE/CVF Conference (CVPR)

### EgoVis 2022/23 Distinguished Paper Awards

First Joint Egocentric Vision Workshop

Awarded to our 2023 ICASSP paper: “EPIC-Sounds: A large-scale dataset of actions that sound.”

June 2024

IEEE/CVF Conference (CVPR)

### EPIC-KITCHENS Challenges Winner

First Joint Egocentric Vision Workshop

Audio-Based Interaction Recognition (2<sup>nd</sup>), Audio-Based Interaction Detection (2<sup>nd</sup>), Action Detection (3<sup>rd</sup>)

June 2024

IEEE/CVF Conference (CVPR)

### Top 5 Third Year MEng Computer Science/Computer Science with Maths Student

Netcraft

Awarded to the Top-5 performing Computer Science and Computer Science with Maths students.

October 2020

University of Bristol

## Research Activities

### Presentations

- EPIC-KITCHENS Challenges. Presented at the First Joint Egocentric Vision Workshop (CVPR 2024).
- Oral Presentation for EPIC-Sounds. Presented at ICASSP 2023.

### ***Reviewing***

- 2025: CVPR, ICCV, NeurIPS, IJCV, OJSP
- 2024: ECCV, TPAMI

## **Technical Knowledge and Programming**

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### ***Programming Languages***

- Python (Strongest)
- C++ (Intermediate)
- JavaScript (Intermediate)

### ***Frameworks***

- PyTorch (Strongest)
- TensorFlow (Intermediate)

### ***Technical Fields***

- Machine Learning, particularly Deep Learning
- Computer Vision
- Data Science