

# Aditya Acharya

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**Research interests** Intelligent/Adaptive Systems, AI Decision Making, Human-AI Interaction, Visual Search, Machine Learning (Reinforcement Learning, and Deep Learning).

**Education**

**University of Birmingham** Birmingham, UK  
PhD in Human Computer Interaction Jan 2015 – July 2019  
*Thesis: Approximate optimal control model for visual search tasks*  
Supervisor: Professors Andrew Howes

**University of Birmingham** Birmingham, UK  
M.Sc. in Human Computer Interaction Sept 2013 – Dec 2014

**KIIT University** Bhubaneswar, India  
B.Tech. Computer Science Aug 2007 – July 2011

**Honors and scholarships**

HDR UK, Hidden Roles and Recognition Award 2022  
FCAI Fellowship (Finnish Center for AI, Finland) 2020  
Ph.D. Scholarships from HCI Centre (University of Birmingham) 2015

**Selected Publications** full list at [Google Scholar](#)

**Rediscovering Affordance: A Reinforcement Learning Perspective**  
Yi-Chi Liao, Kashyap Todi, Aditya Acharya, Antti Keurulainen, Andrew Howes, Antti Oulasvirta.  
*In ACM Conference on Human Factors in Computing Systems, 2022.*

**Touchscreen Typing as Optimal Supervisory Control**  
Jussi Jokinen, Aditya Acharya, Mohammad Uzair, Xinhui Jiang, Antti Oulasvirta.  
*In ACM Conference on Human Factors in Computing Systems, 2021.*

**An Adaptive Model of Gaze-based Selection**  
Xiuli Chen, Aditya Acharya, Antti Oulasvirta, Andrew Howes.  
*In ACM Conference on Human Factors in Computing Systems, 2021.*

**Automation reliability and decision strategy: A sequential decision making model for automation interaction**  
Aditya Acharya, Andrew Howes, Chris Baber, Tom Marshall.  
*In Human Factors and Ergonomics Society, 2018.*

## **Human Visual Search as a Deep Reinforcement Learning Solution to a POMDP**

Aditya Acharya, Xiuli Chen, Christopher Myers, Rick L. Lewis, Andrew Howes.

*In Proceedings of the 39th Annual Conference of the Cognitive Science Society.*

### Research experience

#### **University of Birmingham, Birmingham**

Researcher Fellow

Dec 2021 – Present

Goal of the research is to develop an artificial intelligence tool that will help support decision making and GP-AI interaction.

- Productionised observational research analysis as an automated analytic pipeline and deployed at the University of Birmingham. Platform currently serves over 200 active researchers and led to over 100 peer reviewed publications.
- Awarded by HDR, UK (2022) for developing algorithms to automate Real World Evidence research.
- Developed a data driven MDP model using transformer architecture to simulate GP behaviour for medication intervention, and conducted a qualitative study to evaluate GP-patient versus agent-patient interaction.
- Research Outcome: [here](#)

#### **Aalto University, Helsinki**

Postdoctoral Researcher

Jan 2020 – Nov 2021

Goal of the research is to design research study and develop intelligent agent-based simulators to understand user's intent.

- Developed a novel deep reinforcement learning model to simulate human-like typing on smartphone for touchscreen keyboard usability and design of intelligent text entry solutions, resulting in press recognition of the work in [New Scientist](#).
- Explained and matched experimental observations to theoretical models using fitted statistical simulations and analytic solutions.
- Contributed to 3 scientific publications of own work and within the team.
- Research Outcome: [here](#)

## Alan Turing Institute, London

Research Associate

Nov 2018 – Dec 2019

Goal of the research is to develop game-theoretic and optimal control models for user mobility choice, drawing on existing literature for traffic control and fleet-allocation.

- Liaised with the government and research organisations to scope out the data requirements and processed it for quantitative research questions.
- Designed and developed an AI Toolkit prototype for assessing and presenting a wide range of mobility data, from traffic flow and congestion to user choice model. This work led to additional £500, 000 grant funding extension.
- Research Outcome: [here](#)

## Teaching experience

### University of Birmingham

Birmingham, UK

Teaching Assistant

2014 – 2017

Worked as a Teaching Assistant in the Team project and Evaluation Methods and Statistics modules. The role involves managing and advising a small group of students on their java based project work. Also, writing and organising statistical experiments and lab sessions for Evaluation Methods and Statistics.

## Industry experience

### Aricent Group

Bangalore, India

Software Engineer

2011 – 2013

- Designed, developed, and deployed a Java-based real-time web analytics portal for an on-demand data streaming, b2b and b2c applications.
- Deployed, debugged and maintained complex, distributed software stacks and optimised the stacks for best computational performance and stability.

## Open Source Projects

**Lead Developer and Researcher:** AI Typist Project.

**Contributor:** Artificial User Project, Toyota Mobility Project.

## Skills

### Programming

Proficient in: Python, R, PyTorch, Jax, SQL (Postgres), Docker, Git.

Familiar with: Java, Rust, Unity, AWS.

## **Statistics**

T-test, ANOVA, regression analysis, survival analysis.

## **Analytical**

control theory, markov decision process, bandits, stochastic simulations, computational (cognitive) modelling, causal inference, hypothesis testing, Bayesian optimisation

## **Reinforcement Learning**

- Implemented and applied/adapted state-of-the-art algorithms (e.g., DQN, DDPG, PPO, SAC) for decision making tasks.
- Utilised libraries like PyTorch, Ray/RLLib, Gym, PettingZoo, Stable Baselines, Weights & Biases to develop complex RL environments, train agents in distributed clusters and track experiments.
- Implemented and applied/adapted Meta-RL (MAML) for a faster task adaptation in agent-based modelling.
- Implemented decision transformer model for longitudinal data driven behaviour modelling.

## **Deep Learning and Computer Vision**

- Implemented a multi-tasking with ensembled models image classifier for diabetic-retinopathy detection.
- Human-Like visual search for image classification.
- Real-time pedestrian detection, and human pose estimation.

## **Causal Inference**

- Implemented propensity score matching to reduce confounding in observational studies.
- Applied cox-regression for time to event analysis and meta-learners to estimate average treatment effect.

Professional  
Activities

**Technical Program Committee Member**

- Cognitive Science Society (2017)
- ACM Computational Interaction Summer School (2018)

**Reviewer – Conferences and Workshops**

- Cognitive Science Society (2017, 2018)
- Human Factors and Engineering Systems (2018)
- Interactive, Multimedia, Wearable and Ubiquitous Technologies (2019)
- CHI: ACM Conference on Human Factors in Computing Systems (2018, 2019, 2021)