

Arthur Richard Wandzel

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Summary:

An experienced technical research engineer with over 7+ years of AI/ML experience in top-tier research institutions and startups. My research in academia has yielded a number of accomplishments (papers, patents, fellowships) with direct translation into industry by founding an ambitious, team-oriented, AI-insurtech company based in Singapore. Recently, I'm seeking out projects with a stronger emphasis on social impact, reflecting an exploration of how technology can augment humanity with greater agency and insights in the world.

Key Words: IOT, artificial intelligence, machine learning, data science, graph neural networks, planning under uncertainty, MDPs/POMDPs, object-based reasoning and perception, probabilistic modeling, collaborative robotics, computational learning theory, entrepreneurship, high-impact-initiatives, humanity-centered-design.

Education:

- *Brown University, Providence, RI* *Sept. 2016-May 2018*
M.S. in Computer Science (Cumulative GPA: 3.75/4.0)
- *University of Michigan, Ann Arbor, MI* *Sept. 2010-May 2015*
B.S. in Biopsychology, Cognition, and Neuroscience (Cumulative GPA: 3.69/4.0)
Dual-Minors: Computer Science and Philosophy (Mind and Meaning)

Work Experience:

- Cofounder & CTO of Draper Startup House Coding Academy (Morocco) *Dec. 2021-Present*
- Cofounder & CTO/Head of AI of JAMM Technologies. *Nov. 2020-Dec. 2021*
- Entrepreneur in Residence at Entrepreneur First (SG08 cohort). *Aug. 2020-Nov. 2020*
- Machine Learning Engineer at Omdena *Mar. 2020-June 2020*
- Researcher at the Adaptive Computing Lab at the National University of Singapore. *Aug. 2019-Aug. 2020*
- Researcher at the Human to Robots Lab at Brown University. *Aug. 2018-Aug. 2019*
- Researcher at the SOAR: Cognitive Architecture Lab at the University of Michigan. *Aug. 2015-Aug. 2016*

Awards:

- *National University of Singapore Research Fellowship* *Aug. 2019*
A grant to fund my year-long research under the project
“Integrated Planning and Learning for Robust Decision Making Under Uncertainty.”
- *Andrew W. Mellon Foundation Future of Work Seed Grant* *Mar. 2019*
A grant to start a podcast under Brown University’s Human Centered Robotics Initiative called “*Working Robots.*” This aims to host an open discussion between a layperson and a robotics / artificial intelligence expert on the subject of technology, job-loss, and automation in the changing US economy.

Patents:

- Wandzel, A. & Tellex, S. “Systems and Methods for Operating Robots Using Object-Oriented Partially Observable Markov Decision Processes,” #405505-561P01US *Oct. 2019*

Publications:

- Wandzel, A., Seungchan, K., Tellex, T., and Oh, Y. *2019*
OO-POMCP: Robust Multi-Object Planning for Object-Oriented POMDPs,
Preprint.
- Wandzel, A., Oh, Y., Fishman, M., Kumar, N., Wong L.S. L., Tellex, T. *2019*
Multi-Object Search using Object-Oriented POMDPs.
International Conference on Robotics and Automation (ICRA). Montreal, Canada.
- Jones, S. J., Wandzel, A. R., Laird, J. E. *2016*
Efficient Computation of Spreading Activation Using Lazy Evaluation.

Technical Skills:

- **Computational Theory:** PAC-learning, Rademacher complexity, VC-dimensions, MDPs/POMDPs, martingales
- **Models:** Graph Neural Networks, LSTMs, CNNs, probabilistic models (Bayesian), kalman-filters, random forest classifiers (boosting/bagging), SVMs, kernel-methods, reinforcement learning algorithms, policy gradients, value function approximation, monte carlo simulations, MCST, Bayesian optimization (research & design & implementation).
- **ML/AI Frameworks:** pytorch, tensorflow
- **Data Analysis:** regression, classification, ANOVA/T-tests, clustering, PCA, k-fold validation (analyzed large real-world datasets, tested hypothesis, developed machine learning models with regularization, benchmarking, as well as knowledge & practice of an array of methods & theory)
- **Cloud System Design:** GCP, Azure, AWS, distributed computing, parallelization, kubernetes, virtual machines, cron scheduling, error reporting & logging, microservice design, client libraries (built a fully automated video streaming pipeline in production)
- **DevOps/MLOps:** docker, terraform, github, staging and production environments, CI/CD, regression testing, experiment tracking & dataset versioning (weights & biases).
- **Backend Engineering/Web API/Security:** API gateway, Redoc, REST commands, OAuth, API key management (deployed web API (OpenAPI 2.0 standards)
- **Databases:** SQL, NoSQL (Neo4j, Big Table), query engines OLAP (Big Query), SLA, eventual consistency, sharding, horizontal and vertical scaling, distributed computing.
- **Agile Development:** scrum master, sprint & epic planning, road map design, project requirement documents (project owner / manager for a number of external and internal projects with consultants or in-house team.
- **IOT/Edge Computing/Networking/Hardware:** TCP, UDP, algorithm benchmarking, transmission rates & volumes, codecs (H264, H265, AV1), transcoding, GPU/TPUs architectures, parallelization, MQTT, HTTP/HTTPS.

AI for Social Good:

Mar. 2020-Jun 2020

Omdena: COVID-19 Understanding Policy Effects on the Economically Marginalized

Working as an ML Engineer in part-time collaboration with a world-class team of 50 AI experts to enable governments to design data-driven health and economic policies for Coronavirus that are sensitive to vulnerable populations. This is part of an 8 week AI for Social Good challenge hosted by Omdena

Work Projects:

- *Cofounder & CTO of Draper Startup House Coding Academy (Morocco)* *Dec. 2020-Present*
Draper Startup House is on a mission to empower ONE MILLION entrepreneurs worldwide by 2030 through building a global entrepreneurship ecosystem consisting of education, venture capital, and software development services. I manage a team of 2 and oversee business development, technical strategy, and product design of a 3 month, python, data science course offered in Morocco. To democratize tech-education for all!
- *Cofounder & CTO/Head of AI of JAMM Technologies (Singapore)* *Nov. 2020-Dec. 2021*
JAMM is a VC-backed AI-powered insurtech company based in Singapore. We raised \$600k+ and assembled a world-class team of 9 to build a platform for smart driving—the safer you drive the more you're rewarded. The technology is based on a dual-facing dashcamera leveraging computer vision algorithms for driver behavior understanding. I was responsible for building a fully automated cloud video streaming pipeline, the core AI/ML algorithms (design, implementation, and deployment), developing a product roadmap, budget, and timeline, and communicating key results to stakeholders (investors, customers, business leaders, researchers). Product was live on the road with over 100+ drivers in Singapore and the United Kingdom.

Research Projects:

- *Perception for Planning: Integrating Attention into Planning for Deep Robot Navigation among Crowds* *Aug. 2019-Aug. 2020*

Research Advisor: Professor David Hsu**Department of Computer Science at the National University of Singapore**

Investigating how attending to decision-relevant exo-vehicles may improve planning performance for goal-directed navigation for autonomous vehicles based on predictions from graph neural networks (GNNs).

Keywords: planning and learning, graph neural networks (GNNs), autonomous vehicles (AVs)

- *OO-POMCP: Robust Multi-Object Planning for Object-Oriented POMDPs* *Nov. 2018-Aug. 2020*

Research Advisor: Professor Stefanie Tellex**Department of Computer Science at Brown University**

Investigating the efficiency of planning by comparing factored models via applying Rademacher complexity bounds on the number of samples to evaluate q-values for online sample-based POMDP planners.

Keywords: reinforcement learning, computational learning theory, Rademacher Complexity, POMDPs

- *Multi-Object Search using Object-Oriented POMDPs* *Jan. 2017-Sept. 2018*

Research Advisor: Professor Stefanie Tellex**Department of Computer Science at Brown University**

Designed an object-oriented POMDP algorithm for tractably planning under uncertainty for a novel multi-object search task. The main contribution is to express uncertainty in terms of independent object-specific distributions where each distribution can be modified via a grounded language command (e.g. “Find the mugs in the kitchen”).

Keywords: reinforcement learning, POMDPs, object-based reasoning, collaborative robotics, planning

- *Implementing Scalable Context-Sensitive Retrieval* *May 2015-Sept. 2016*

Research Advisor: John E. Laird**Department of Computer Science at the University of Michigan**

Developed a scalable algorithm for retrieving context-relevant information from a semantic network via spreading activation. This offers a cognitive agent an ability to probabilistically reason over its current knowledge.

Keywords: semantic network, ontology, probabilistic reasoning, artificial intelligence

- *Autonomous Retrieval Cues* *May 2014-Dec. 2015*

Research Advisor: John E. Laird**Department of Computer Science at the University of Michigan**

Leveraged task structure in order autonomously store, maintain, and retrieve information so as to reduce the procedural working memory of a cognitive agent.

Keywords: autonomous agent, information retrieval, optimization, cognitive modeling

Teaching Experience:

- *Primary Instructor* *Fall 2015*

Freshman Honors Seminar: Perspectives of Consciousness (Course ID#: Honors135)

Designed and instructed a course-listed honors freshman seminar of 15 students that surveyed different approaches for studying consciousness in various fields such as Philosophy, Anthropology, Neuroscience, Cognitive Science, and Computer Science.

Organizations:

- *Editor-in-Chief of Undergraduate Research Journal* *Aug. 2012 – Aug. 2013*

Lead the organization the University of Michigan Undergraduate

Research Journal (UMURJ) in publishing an annual student journal by managing a team of editors, fund raising for costs (\$5,150 total), and designing / editing the journal.

Workshop Participation:

- *Nengo Summer School for Large-Scale Brain Modeling* June 2016
The Centre for Theoretical Neuroscience at the University of Waterloo
- *The Soar Cognitive Architecture Workshop* June 2015
Computer Science Department at the University of Michigan
- *Psychology and the Other* October 2013
Psychology Department at Lesley University
Presented poster: *An Existential Crisis—the Absentminded Man: A Survey of Existential Therapy within Modern Psychology*

Course Highlights:

Brown University, Providence, RI

Computer Science

CSCI 1550: Probabilistic Methods in Computer Science	Spring 2018
CSCI 2951: Learning and Sequential Decision Making	Fall 2017
CSCI 1420: Machine Learning	Spring 2017
CSCI 2951: Collaborative Robotics	Spring 2017

Applied Mathematics

APMA 1655: Statistical Inference I	Fall 2016
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Cognitive, Linguistics, and Psychological Studies

CLPS 1520: Computational Vision	Fall 2016
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University of Michigan, Ann Arbor, MI

Computer Science

EECS492: Intro to Artificial Intelligence	Spring 2015
EECS 281: Data Structures & Algorithms	Fall 2014
EECS499: Independent Study—	
Cognitive Inspired Information Retrieval Techniques	Fall 2014
EECS594: Intro to Adaptive Systems	Spring 2014
EECS280: Programming and Data Structures	Spring 2014
EECS203: Discrete Mathematics	Spring 2014
EECS183: Elementary Programming	Fall 2013

Statistics

STATS401: Applied Statistical Inference II	Spring 2013
STATS251: Intro. to Statistics and Data Analysis	Winter 2012

Philosophy

PHIL399: Independent Study—	
Gödel's Incompleteness Proofs in Mathematical Logic	Spring 2015
PHIL202: Intro to Symbolic Logic	Fall 2014
PHIL340: Minds & Machines	Spring 2014
PHIL383: Knowledge & Reality	Fall 2013

Biopsychology, Cognition, and Neuroscience (BCN)

PSYCH341: Advanced Lab in Cognitive Psychology	Spring 2015
PSYCH303: Research Methods in Psychology	Fall 2015
PSYCH499: Decision Processes	Fall 2013
PSYCH47: How the Mind Works:	
Intro to Modern Cognitive Science	Spring 2013
PSYCH434: Biopsychology of Learning and Memory	Spring 2013
PSYCH230: Intro to Biopsychology	Fall 2012
PSYCH245: Cognitive Neuroscience	Spring 2012

