

# Damien Jade Duff

Developer & Researcher in Artificial Intelligence  
(Course of Life)

I am a researcher and developer in machine learning, computer vision, robotics, and AI, and have moved back into industry. I have over a decade of experience in these, as project lead, researcher and educator at university, and as a consultant & engineer in industry.

## Work Experience

2018-2019: **Consultant (Machine Learning)**, [Daemon Solutions Ltd.](#)

With my experience in Machine Learning, Artificial Intelligence, Computer Vision, and related areas, I am supporting a pivot of Daemon Solutions into machine learning; we work to provide our clients with state-of-the-art solutions using modern best practices.

2013-2019: **Lecturer**, [Department of Computer Engineering, Istanbul Technical University.](#)

Lecturing in one of the top universities in Turkey while conducting research in **computer vision, machine learning, deep learning, assistive sensing, robotics, and artificial intelligence**. Initiated and lead two publicly funded research projects. Continuous improvement of course delivery, content, and concept. Active in research and administrative roles, including learning measurement and evaluation.

2018-2019: **Machine Learning Lead**, [Faultless AI.](#)

I supported this ambitious start-up using my experience in **deep learning, machine learning, computer vision**, and related areas. We are working on developing a core Industry 4.0 product which has the potential to be transformative in the industry, while rolling out tailored solutions to select customers.

2012-2013: **Postdoctoral Researcher**, [Cognitive Robotics Laboratory, Sabanci University.](#)

A Scientific and Technological Research Council of Turkey project about **3D perception and reasoning** for **robot manipulation**, and entered a mobile manipulation competition. I was the computer vision expert on our team.

2010-2012: **Lecturing and tutoring**, [Department of Computer Science, Istanbul Bilgi University.](#)

Developed new courses in robotics and computer graphics, taught academic skills.

2005-2010: **Tutoring, lecturing**, [School of Computer Science, University of Birmingham.](#)

Robot lab demonstration & lab admin, tutoring + guest lectures.

2002-2005: **Analysis, programming, and site lead**, [Talgentra NZ \(Gentrack\) Ltd, Auckland.](#)

1999-2002: **Laboratory Tutor**, Department of Computer Science, University of Auckland

1998-2001: **Labouring, Manufacturing, Office Work**, Student Job Search, Auckland

1997-2005: **Bookshop Sole Charge & Ordering**, Russell Bookshop, Russell, Northland, N.Z.

1997-1997: **Landscape Labourer**, Mike Price Landscape Developments, Kerikeri, N.Z.

1996-1997: **Building Labourer**, John Gebbie, Builder, Russell, Northland, N.Z.

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## Education

2005–2011: **PhD in Artificial Intelligence**, [University of Birmingham Intelligent Robotics Lab](#).

Improving monocular **object tracking** for **robot manipulation** scenarios by incorporating prior knowledge using rigid object simulation (**computer vision**).

### University of Birmingham graduate development courses:

Residential Researcher Teamwork.  
Project Management in Research.  
Small Group Teaching.  
Effective Researcher.  
Presentation Skills.  
Managing Research Relationships.

2004–2005: **Postgraduate Diploma in Psychology**, [University of Auckland \(Part-time\)](#).

Set up, ran and analysed the results from an EEG experiment using “dichotic pitch” to investigate brain processing of stereo sound cues.

2002–2002: **BSc Honours in Computer Science**, [University of Auckland \(First Class, A Grade\)](#).

First-class A honours is the highest achievement possible in this restricted-entry accelerated degree.

1998–2001: **BA/BSc Psychology & Computer Science**, [University of Auckland \(Conjoint\)](#).

Minoring in Mathematics and English (literature and linguistics), this was an accelerated conjoint degree with two majors and two minors.

## Other Roles

**2012:** Member, Team Efes, Robocup@Work competition, IROS, Villamoura.

**2011:** ITÜ Robot Olympiad, Invited Speaker (topic: robot learning).

**2006-2009:** University of Birmingham Young Greens Society President, Secretary.

Managed society meetings, organised public events, and engaged in and promoted dialog .

## Projects & Awards

**2017, 2018 & 2019:** Best educator award Computer Engineering Department (student selected).

**2018:** Advisor of “Best Graduation Project” poster (Pelin Hakverir).

**2018:** Nvidia GPU Academic Grant Program: 1 × TitanX GPU.

**2017-2019:** Scientific and Technological Research Council of Turkey "career" project 116E167.

116E167: **Project proposer, manager and technical lead.** "Investigation of depth reconstruction from single views and application to autonomous robots". Applying recent advances in **deep learning** as applied to the **computer vision** problem of depth from single images (a computer vision problem we are only now starting to tackle well) to real **robot** problems. Budget: 223,800 Turkish Lira.

**2014-2017:** Scientific and Technological Research Council of Turkey “starting” project 114E443.

114E443: **Project proposer, manager and technical lead.** "Spatial auditory-vision sensory substitution using range cameras". Encoding 3D surfaces as sound for sensory augmentation. Involving **3D point cloud processing, 3D real-time computer vision and signal processing.** Budget: 58,866 Turkish Lira.

**2014-2017:** University funded "scientific research" project 37964. 26,000 Turkish Lira budget.

Postdoctoral project: "Exploiting knowledge and physical dynamics for **vision and tracking**". Involving integrating object recognition with action languages for planning-driven perception; also, physics-based tracking.

**2012-2013:** Scientific & Technological Research Council of Turkey 2216 postdoc at Sabancı University.

**2012:** BRICS (Best pRactice In robotiCS) research camp travel grant.

**2012:** IEEE travel grant (Safety Search and Rescue Robotics Summer School, Alanya).

**2010:** euCognition travel grant (iCub summer school, Sestri Levante).

**2009-2010:** CogX EU FP7 (FP7-IST215181) project scholarship.

**2008-2009:** CoSy EU FP6 (FP6-004250-IP) project scholarship.

**2006-2008:** ORSAS scholarship supporting doctoral studies (UK government).

**2005-2008:** University of Birmingham School of Computer Science departmental PhD scholarship.

**2002:** First Class Honours; University of Auckland Faculty of Science Bursary.

**2002:** Full car and motorcycle driving license.

**2001:** Senior Prizes, Departments of Computer Science & Psychology, University of Auckland.

**2001:** University of Auckland, Faculty of Science Summer Scholarship.

**1996:** Dux (c.f. valedictorian), Bay of Islands College.

**1996:** Head Prefects Cup, Bay of Islands College.

**1996:** Senior Science Contribution Cup, Bay of Islands College.

**1996:** Excellence in Chemistry Cup, Bay of Islands College.

**1996:** Winner, impromptu speaking cup, Bay of Islands College.

**1995:** Distinction, Australian National Chemistry Quiz.

**1994-1995:** Highschool highest academic attainment, national exam prizes.

**1993:** Winner, junior prepared reading, Bay of Islands College.

**1993:** Surf Lifesaving Certificate level 1, NZ Lifesaving Society.

**1993:** Winner, NZ National Mental Health Awareness Week poetry competition.

## Toolbox

- Machine/deep learning algorithms:

- OpenVino, Tensorflow, MXNet, OpenCV, Pandas, Numpy/Scipy/etc., Jupyter, FastAI, Unix, DVC (object detection, text classification, recommender systems, prediction, forecasting).

*(recent industry experience)*

- Pytorch, Keras/theano, Python, NumPy/SciPy/Matplotlib, Pandas, Matlab.

*(tools used in scientific work, prototyping, analysis).*

- Cloud / sysadmin tools:

- GCP (Cloud Composer, AutoML, Dataflow, Bigquery), AWS (Lambda, IoT/Greengrass, Sagemaker, Step, CloudWatch, Forecast, Personalize).

*(recent industry experience)*

- Unix/GNU Linux, bash, Docker, SLURM.

*(used in the research projects that I lead)*

*(I use linux every day on my development/personal computer, script many things; I set up deep learning software on the UHEM and TRUBA supercomputers, and I recently set up two multi-user networked deep learning rigs, have done a little work recently on cloud-based projects)*

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- Computer vision and signal processing tools:
  - OpenCV, OpenAL, LabView, STK.  
*(coding robot, computer vision & sensory substitution applications).*
- General and other programming tools:
  - C/C++, Python, Java, Bash, Make, CMake, Visual Studio, Boost, Qt, OpenGL, Novodex/PhysX, Crystal Reports, UniBasic/Pick, SQL, PyQt, PyOpenGL, PyOpenCV, (Emacs) Lisp, Airflow, DoIt.  
*(research project coding, day-to-day coding, and industry experience).*
  - HTML, PHP, Heroku, Python Bottle, AJAX, pymunk, pygame, RoboJDE, GPSS, Unity.  
*(used in teaching & student projects).*
  - Django, Postgres.  
*(recent industry experience)*
- 3D and point-cloud processing:
  - OpenCV, Point Cloud Library.  
*(used in my real-time sensory substitution project, have made contributions to PCL).*
  - DepthSense, Kinect, ASUS Xtion.  
*(devices I have worked with)*
- AI planning & logic programming:
  - Prolog, Answer Set Programming, CCalc.  
*(tools used in scientific work, prototyping, analysis).*
- Software engineering tools (industry experience & in my research groups).
  - Git, GitHub, Bitbucket, JIRA.  
*(recent industry experience)*
  - Trello, Mercurial, Mediawiki, GitLab, Docker, Atlassian CI.  
*(used in my research groups and projects)*
  - Subversion, CVS.  
*(earlier industry experience)*
- Software tools:
  - Latex, Libreoffice, Blender 3D, Inkscape, Audacity, GIMP, Scribus, Macsyma, Sympy.  
*(used day-to-day, to prepare presentation materials, material for research projects)*
- Robotics (research – competitions – teaching).
  - ROS (extensively), YARP, move\_base, MoveIt!, Gazebo, OpenRave.  
*(most robots we work with use ROS, and I teach it to graduating students)*
  - Pioneer 3DX, TeleMe2, Turtlebot, Kuka Youbot, iCub, Hokuyo scanner, PhantomX Reactor.  
*(robots and devices I have worked with extensively)*

## Other Skills

- Probability & statistics *(used extensively in research, as a part of machine learning; I also teach probability and statistics and follow the literature on scientific method and statistics).*
- Scientific methods & experiment design *(worked in both psychology and computer engineering research).*
- Stochastic processes, artificial intelligence, optimization, computer vision, rigid body simulation *(used in my projects and teaching formally and informally).*

- Scientific and prose writing (*undergraduate degree in English, writing awards, and a scientific career; I teach technical communications to undergraduates*).
- Financial programming (*2.5 years in the software / utilities / billing industry, early 2000s*).
- Time/project management techniques (*courses taken during PhD + running publicly funded projects & research groups*).
- Practical pedagogy (*constant reading + tutoring, lecturing and informal undergraduate research groups*).
- Intermediate Turkish (*8 years in Turkey*).
- Public speaking (*lecturing for almost a decade with teaching prizes, theatre experience; I teach presentation skills*).
- EEG setup and analysis (*published graduate project*).
- Basic mechanics and electronics (*picked up in the course of working and researching with robots*).

## Publications

Pourghaemi, H., Gholamalizadeh, T., Mhaish, A., İnce, G. & Duff, D.J. (2018). **Real-time Shape-based Sensory Substitution for Object Localization and Recognition**. ACHI: Int. Conf. Advances in Computer-Human Interactions, Nice, France.

Gholamalizadeh, T., Pourghaemi, H., Mhaish, A., İnce, G. & Duff, D.J. (2017). **Sonification of 3D Object Shape for Sensory Substitution: An Empirical Exploration**. ACHI: Int. Conf. Advances in Computer-Human Interactions, Nice, France (*best paper award*).

Mhaish, A., Gholamalizadeh, T., İnce, G. & Duff, D.J. (2016). **Assessment of a Visual to Spatial-Audio Sensory Substitution System**. SIU: Signal Processing & Communications Applications Conference, Zonguldak, Turkey.

Duff, D.J. (2015). **Orientation averaging using spatial extension**. TORK: Turkish Robotics Conference, Istanbul.

Duff, D.J., Erdem, E. & Patoğlu, V. (2013). **Integration of 3D Object Recognition and Planning for Robotic Manipulation: A Preliminary Report**. ICLP Workshop on Knowledge Representation and Reasoning in Robotics, Istanbul.

Duff, D.J. (2011). **Visual motion estimation and tracking of rigid bodies by physical simulation**. PhD Thesis. University of Birmingham.

Duff, D.J., Mörwald, T., Stolkin, R., & Wyatt, J.L. (2011). **Physical simulation for monocular 3D model based tracking**. IEEE International Conference on Robotics & Automation, Shanghai, China. 5218-5225.

Duff, D.J., Wyatt, J.L., & Stolkin, R. (2010). **Motion estimation using physical simulation**. IEEE International Conference on Robotics & Automation, Anchorage, Alaska. 1511-1517.

Johnson, B.W., Hautus, M.J., Duff, D.J., & Clapp, W.C. (2007). **Sequential processing of binaural interaural timing differences for sound source segregation and spatial localization: Evidence from event-related cortical potentials**. *Psychophysiology*, 44(4), 541-551.

Duff, D.J., & Guesgen, H.W. (2002). **An evaluation of buffering algorithms in fuzzy GISs**. *GIScience*, Boulder, Colorado, 80-92.

## References

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