



# Ricardo de Azambuja

## Curriculum Vitae

*"I am very tenacious, for better or worse. If my attention is engaged, I cannot disengage it. This may be a great strength, or weakness. It makes me an investigator." - Oliver Sacks*

### Education

- 2013–present **Ph.D. in Robotics/Artificial Intelligence**, *University of Plymouth*, UK, (ongoing).  
My research is focused on humanoid robots controlled by biologically inspired Recurrent Neural Networks. More specifically, I'm using a special type of Spiking Neural Network (Liquid State Machine or Reservoir Computing), the collaborative BAXTER robot and the SpiNNaker Neuromorphic Computer. I've developed my own customised Spiking Neural Network simulator, using a multithreaded C kernel with a Python interface. For this Ph.D., I have been awarded with a four years scholarship that covers tuition fees, a monthly stipend and travel costs. Currently, I'm in the thesis writing phase since I've already finished the compulsory three years of my Ph.D. research work.
- 2011–2013 **M.Sc. Electrical Engineering – Automation**, *UFRGS*, Brazil, (9.14 of 10.0).  
Two years postgraduate degree (one year taught and another year of research) with a mandatory final thesis and public oral presentation. I was also awarded with a two years full scholarship. My first year was dedicated to the following modules: Linear Systems, Stochastic Processes, Optimisation, Instrumentation, Design of Experiments and Advanced Signal Processing. During my 2nd year I've mostly worked with instrumentation (electronics) and simulation (using the softwares Matlab and Mathematica). I've also designed and built sensors and the analogue / digital circuits, including PCB, behind them. My work can be divided in Non-Destructive Testing (NDT) (where I've worked with Barkhausen Effect and Eddy currents) and Wireless Power Transmission (where I've worked on the optimization of the system). Several articles were published as the result of the research.
- 2000–2006 **Electrical Engineering**, *UFRGS*, Brazil, (8.5 of 10.0).  
In Brazil, it is an undergrad degree, recognized by the local engineering council, that takes at least five years with a mandatory final project/dissertation with a public oral presentation (defense) and also an internship (probably more like an MEng in UK). The official title is "Electrical Engineer", but we actually study a lot of analogue and digital electronics, microcontrollers, control theory, RF, digital communication, motors and drives. My final project was the development of a composite video character generator.  
<https://github.com/ricardodeazambuja/TEXvid>

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## Experience

### Academia

2016–2016 **Demonstrator**, *University of Plymouth*, Plymouth – UK.

Module's name: Advanced Robotics Design  
Helped during lab sessions where the students were developing their soft robots using Autodesk Fusion360, 3D printers, etc.

2016–2016 **Demonstrator**, *University of Plymouth*, Plymouth – UK.

Module's name: Fundamentals of robotics  
Responsible for the lab sessions where the students learn how to create simulations using VisualComponents 3D Automate and to program the Mitsubishi robots (RV-2AJ and RV-2SD). I developed the main lab manual as well as all the lab course work.

2015–2016 **Teacher Assistant**, *University of Plymouth*, Plymouth – UK.

Module's name: Robotics and Control  
I was in charge of lab sessions where the students developed simulations using VisualComponents 3D Automate and also programmed the Mitsubishi robots (RV-2AJ and RV-2SD).

2013–2015 **Demonstrator**, *University of Plymouth*, Plymouth – UK.

Module's name: Computational Intelligence, Computer Science Workshop and Introduction to Artificial Intelligence  
Supported the students during lab sessions where they developed applications using Adobe Flash and genetic algorithms.

2013–2013 **Lecturer**, *Universidade Federal do RS (UFRGS)*, Porto Alegre – Brazil.

Module's name: Power Electronics  
I worked as the module leader where I was responsible to prepare all the material, give the lectures and also the laboratory sessions.

2013–2013 **Teacher Assistant**, *Universidade Federal do RS (UFRGS)*, Porto Alegre – Brazil.

Module's name: Electrical Machines  
Responsible for the lab sessions and also the development of the experiments such as a homopolar motor.

### Business


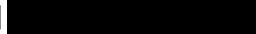




2017–current **Technical Engineer**, *Fieldwork Robotics Ltd*, Plymouth – UK.

I'm a technical engineer working part-time on the "Selective Raspberry picker Arm Prototype" (SRAP) project at University of Plymouth. This project is being run in conjunction with the spin-out company Fieldwork Robotics Ltd, under the supervision of Dr Martin F. Stoelen.

2008–2013 **Managing Owner**, *AZAMEC*, Sto. Ant. da Patrulha – Brazil.

I was the responsible person for the company IT systems and also one of the managers. My job would include the development / maintenance of the company's website, SVN, computers, Autodesk Inventor and Autocad, printers, catalogues, etc. I was the only Electrical/Electronics Engineer and I worked with our partners to define motors, drives, sensors, etc. Besides, I also worked in the high level design of mechanical equipments defining forces, accelerations, etc and checking the results through simulations. Since it was a small company, I had to tackle administrative tasks, design manuals, catalogues and videos, deal with accounting and even write contracts and review legal documents. In fact, I started working on this company (my father was the founder) when I was 13 yrs-old. At the beginning, I was the "IT guy" and I had to do everything the company needed: from creating a template on MSWord 6.0 with the company logo (designed on MSPaint!) to an Autolisp script to automatically format and print drawings using AutoCad v11. The company is no more active, but I still keep the website online as a tribute to my father (www.azamec.com).

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## Computer skills

- Programming** Currently a Python big fan (and I really love to mix iPython notebooks with Numpy, Scikit-learn, OpenCV, Multiprocessing, iPyParallel, etc), but I've already worked with C (my SNN simulator is an example), Assembly (PC and Microcontrollers), C++, Java, Javascript, PHP, AutoLisp, BASIC, QBASIC, Visual Basic, etc and I'm always keen to try a new one!
- Miscellaneous** Because of my new 3D printer I've been working with Fusion360 and Slic3r quite a lot, but I used to work with Matlab, Mathematica, MapleV, Autodesk Inventor, Solidworks, ROS, Gazebo (mostly using RethinkRobotics SDK), V-REP, SPICE, KiCad, etc. I'd also received training in R, SPSS, MS Project, CUDA, VHDL and PLC programming (IEC 61131). I'm also experienced with Office suites (including automations made with VB for Applications), Desktop Publishing and Video editing.

## Interests (I have an engineer soul and I could fill several pages...)





### Work/Research

- Robotics** I've been working with collaborative robots (BAXTER), humanoid (iCub, Pepper and Nao) and soft ones (GummiArm), but I really enjoy working with any type of robot. Actually, I like automation in general and robots are only the most flexible tools available.
- Artificial Intelligence** My PhD research is on Spiking Neural Networks (SNN) because we are in a partnership with Manchester University and they developed a Neuromorphic computer that works with SNN. However, my interests go into other types of artificial intelligence systems and I'm always happy to learn a new one. I'm sure robots need AI to be successful outside the world of simple and repetitive tasks.
- Computer Vision** Robots need to interact with the world and vision is one very powerful way to do it. I've worked with OpenCV and I'm starting with Theano/Keras for Deep Neural/Convolutional Networks since OpenCV has its limitations.
- Signal Processing** Most of my MSc studies were in this field (FFT/STFT/Wavelets/Hilbert Transform).
- Electronics** Everything depends on electronics nowadays, and I'm ready for it.
- Instrumentation** Since I like electronics and also to solve real world problems, instrumentation is a must and I've experience from my BSc. and MSc. degrees.
- 3D Printing** My father was a mechanical engineer and I've learned a little bit from him. With the popularisation of 3D printers I put to work my 3D modelling and mechanical skills.

### Hobbies

- Woodwork** In the past the only building material accessible to me was wood, so I kind of like to build rustic things, when I have free time.
- Gardening** Mostly flowers, but what I really like is to produce my own food and baby carrots are one of my favourite.
- Ping-pong** As we have two ping-pong tables at the campus and tennis courts not far away, I
- Tennis** try to play from time to time with my colleagues.

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## Oral Presentations

### International Conferences

- The 23rd International Conference on Neural Information Processing 2016  
*Graceful Degradation Under Noise on Brain Inspired Robot Controllers*
- The 2016 International Joint Conference on Neural Networks  
*Diverse, Noisy and Parallel: A New Spiking Neural Network Approach for Humanoid Robot Control*

### Hackathons

- NAO Robot Hackathon 2017  
*M.A.R.T.A. - Multi-purpose Anthropomorphic Robot for Timely Assistance*
- Robots At Your Service - European Robotics Week 2016  
*C.U.R.A. - Companion aUtonomous Robotic Assistant*

### Workshops, Seminars and Summer Schools





- NAO Robot Hackathon 2017  
*Artificial Intelligence: The API Way*
- CRNS Staff Development Day 2016  
*Artificial Intelligence: The API Way*
- A.P.R.I.L. Project Workshop 2016  
*Say hello to BAXTER! A hands-on workshop*
- NENGO Summer School (Brain Camp) 2016  
*The Neuromorphic Goose*
- CRNS Staff Development Day 2015  
*Intro to the Virtual Robot Experimentation Platform - V-REP*
- ABC Lab talks 2014  
*A framework to Real World Robotic Applications using Spiking Neural Networks*
- The 2014 CapoCaccia Cognitive Neuromorphic Engineering Workshop  
*Short presentation about my research project*

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## Publications

- [1] R. de Azambuja, V.J. Brusamarello, S. Haffner, and R. Wolff Porto. Analysis and Optimization of an Inductive Power Transfer With a Randomized Method. *IEEE Transactions on Instrumentation and Measurement*, 63(5):1145–1152, May 2014.
- [2] Valner J. Brusamarello, Yeddo Braga Blauth, Ricardo de Azambuja, Ivan Muller, and Fernando Rangel de Sousa. Power Transfer With an Inductive Link and Wireless Tuning. *IEEE Transactions on Instrumentation and Measurement*, 62(5):924–931, May 2013.
- [3] Ricardo de Azambuja, Frederico B. Klein, Martin F. Stoelen, Samantha V. Adams, and Angelo Cangelosi. Graceful Degradation Under Noise on Brain Inspired Robot Controllers. In Akira Hirose, Seiichi Ozawa, Kenji Doya, Kazushi Ikeda, Minhoo Lee, and Derong Liu, editors, *Neural Information Processing*, number 9947 in Lecture Notes in Computer Science, pages 195–204. Springer International Publishing, October 2016.
- [4] R. de Azambuja, A. Cangelosi, and S.V. Adams. Diverse, Noisy and Parallel: A New Spiking Neural Network Approach for Humanoid Robot Control. In *2016 International Joint Conference on Neural Networks (IJCNN)*, pages 1134–1142, Vancouver, July 24–29 2016.
- [5] R. W. Porto, V. J. Brusamarello, I. Muller, F. R. Sousa, and R. Azambuja. Design and Optimization of a Power Inductive Link. In *Instrumentation and Measurement Technology Conference (I2MTC), 2014 IEEE International*, pages 648–653. IEEE, 2014.
- [6] R. Azambuja, V. J. Brusamarello, S. Haffner, and R. W. Porto. Full four capacitor circuit compensation for inductive power transfer. In *Instrumentation and Measurement Technology Conference (I2MTC), 2013 IEEE International*, pages 183–187. IEEE, 2013.
- [7] R. W. Porto, V. J. Brusamarello, R. Azambuja, and O. Frison. Design and Analysis of a GMR Eddy Current probe for NDT. In *Sensing Technology (ICST), 2013 Seventh International Conference on*, pages 424–429. IEEE, 2013.
- [8] V. J. Brusamarello, Y. B. Blauth, R. Azambuja, and I. Muller. A study on inductive power transfer with wireless tuning. In *Instrumentation and Measurement Technology Conference (I2MTC), 2012 IEEE International*, pages 1098–1103. IEEE, 2012.
- [9] D. A. Sala, R. de Azambuja, V. J. Brusamarello, and A. Cangelosi. Positioning control on a collaborative robot by sensor fusion with liquid state machines. In *Instrumentation and Measurement Technology Conference (I2MTC), 2017 IEEE International*, page accepted. IEEE, accepted.
- [10] R. de Azambuja, F. B. Klein, S. V. Adams, M. F. Stoelen, and A. Cangelosi. Short-term plasticity in a liquid state machine biomimetic robot arm controller. In *2017 International Joint Conference on Neural Networks (IJCNN)*. IEEE, accepted.

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- [11] R. de Azambuja, D. H. Garcia, M. F. Stoelen, and A. Cangelosi. Neurobotic simulations on the degradation of multiple column liquid state machines. In *2017 International Joint Conference on Neural Networks (IJCNN)*. IEEE, accepted.

## Languages

Portuguese	native speaker	<i>I'd lived in Brazil until the start of my PhD.</i>
English	highly proficient in spoken and written language	<i>IELTS certificate (2012): 7.0</i>
Spanish	basic communication skills	<i>I'd been to Argentina, Uruguay and Paraguay.</i>
Italian	basic communication skills	<i>I'd been to Italy.</i>
German	very basic communication skills	<i>I'd studied it for about one year in 2000</i>
French	very basic communication skills	<i>I've started studying it in October 2016</i>

## References

Angelo Cangelosi	a.cangelosi@plymouth.ac.uk	<i>current PhD 1st Supervisor</i>
Martin Stoelen	martin.stoelen@plymouth.ac.uk	<i>current PhD 2nd Supervisor</i>
Valner Brusamarello	valner.brusamarello@ufrgs.br	<i>former MSc Supervisor</i>

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