

Curriculum Vitæ

18 October 2020

Nuno A. C. Henriques

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1 Academic history

PhD in Cognitive Science at Universidade de Lisboa. PhD's thesis entitled "SensAI+Expense Prediction of Emotional Valence Changes on Humans in Context by an Artificial Agent Towards Empathy", advisors: Helder Coelho (Ciências/ULisboa) and Leonel Garcia-Marques (Psicologia/ULisboa). Four-year research, ULisboa PhD grant between May 2016 and April 2019, Approved with Distinction by unanimous decision. Advanced Studies course (first-year lectures, grade: 16/20). Lisbon, Portugal. 2012–2013, 2016–2020.

MSc in Informatics Engineering at Faculdade de Ciências e Tecnologia / Universidade Nova de Lisboa. Master's thesis entitled "MovieGene: A multimedia production system using Evolutionary Computation", advisors: Luís Correia (Ciências/ULisboa) and Nuno Correia (FCT/NOVA). Two-year degree. Grade: 17/20 (first-year lectures); "Very Good" (second-year dissertation, top grade by unanimous decision). Lisbon, Portugal. 2005.

Graduation in Informatics Engineering at Faculdade de Ciências e Tecnologia / Universidade Nova de Lisboa. Five-year degree. Grade: 14/20. Lisbon, Portugal. 2002.

2 Activity

Chief Artificial Intelligence Officer

MettaNoon. September 2020–

Developing socially conscious opportunities to creatively apply Sensory AI, we inspire, solve problems and support humanity through revolutionary solutions and a new approach to blended capabilities.

PropTech Start-up Advisor

Unlockit. August 2020–

Unlockit is a seed-stage start-up and digital platform developed to be the only tool that real estate agents need to be more productive and provide a differentiated experience in the market.

As an advisor, I provide technological advice, mentoring, and future perspectives.

PhD student, researcher, and engineer

BioISI — Ciências/ULisboa *campus*, Lisbon, Portugal. 2012–2013, 2016–2020.

Researching about human emotions, reasoning, common sense, cognitive science using an artificial agent in geolocation context and time-based. Engineering data, selecting features, doing machine learning towards prediction of emotional valence changes on humans. Moreover, develop a distributed, fault-tolerant, mobile and cloud-based platform from scratch as a research tool to continuously, online, gather and process data.

(see section 4: p. 4, SensAI+Expanse)

IT Architect and Software Engineering Consultant

Information Systems Unit (*USI*) — Instituto de Medicina Molecular. Medicina/ULisboa *campus*, Lisbon, Portugal. September 2013–March 2015.

(see section 4: p. 5, Entitas)

Research Engineer

LabMAg — Ciências/ULisboa *campus*, Lisbon, Portugal. August 2011–December 2012.

Software architecture over ROS, navigation, behaviour, and surveillance modules for a new all-terrain robot — INTROBOT.

(see section 4: p. 5, INTROBOT)

IT Architect and Software Engineering Manager

Department of Technology (*DT*) — Tourism of Portugal. TP Headquarters, Lisbon, Portugal. April 2009–March 2011.

Main achievements: (a) One order of magnitude data centre power reduction; (b) While increasing processing power and storage; (c) Digital transformation from paper to Web apps, dozens of services for tourism agents (entrepreneurs); (d) Coach and lead by example team members on pursuing more knowledge and qualifications for better delivery; (e) Tourism rose several GDP percentual points during our watch.

Information Technology Architecture and Software Engineering Management. Governance of development teams and platforms, strategic technology consultant merging ethics and sustainability. Department portfolio of tens of projects, several platforms including Out-Systems Agile, Oracle IAM, WSO2 SOA Platform, Google Gadgets. An engineering hands-on approach to several core systems with open standards for Web service and database.

Engineering hands-on for several core systems with open standards for Web and database, such as a service bus infrastructure with several internal Cloud services (Java API).

Conceived and directly developed a core information system: Entitas. Used Java, PostgreSQL, WSO2 ESB. Introduced the concept of records with timeline, delete and undelete, so the management of entities (e.g. person, company) is unified at one repository with a Web service interface.

Development of a Google Gadget Application to serve searches with geolocation, instantly, about available Portugal tourism offer (e.g. restaurant, golf, accommodation) from an old

MSSQL database. Also, connected (developed in-house) to SMS (mobile texting) and email Web service enabling results saving to users' email and mobile phone.

(see section 4: p. 5, TP Service Bus; p. 5, Entitas; p. 5, TP IT Governance; p. 5, TP IT Architecture and Engineering)

Consultant Engineer (Web Coordinator: 2005–2007)

Rectory Informatics Office (*GIR*) — NOVA. NOVA Rectory, Lisbon, Portugal. 2005–2009.

Platform engineering, interfaces and quality assurance. Maintenance and development of the portals hosted in the common platform

(see section 4: p. 6, *NOVA Courses Catalogue*)

Web coordinator of the NOVA's *nova digital* project: implementation of a common Web content management platform. For renewal and integration of the NOVA's and FCT/NOVA's portal site, also the creation of NOVA's Bologna Process portal.

(see section 4: p. 6, *NOVA Portal*; p. 6, *FCT/NOVA Portal*; p. 5, Business Intelligence)

Engineer and Project Quality Manager

Critical Software, SA. Aerospace Sector. Portugal. August 2004–February 2005.

Several projects and responsibilities including internal advisement regarding Quality and Systems infrastructure issues.

(see section 4: p. 6, HICOD2000; p. 7, SCOS2000)

Research Engineer and Project Manager

CA³ — Soft Computing and Autonomous Agents. UNINOVA, FCT/NOVA *campus*, Caparica, Portugal. August 2003–December 2003.

(see section 4: p. 7, EO-KES)

Research Engineer

Computing and Informatics Services (*Serviço de Informática*) — FCT/NOVA *campus*, Caparica, Portugal. (*pro bono* 1995–1999) 1999–2003.

Pioneering and innovating the faculty Web services. Halt and Catch Fire moments: students Website, in-house developed search engine (twice),

Several projects and responsibilities including: jury member for computer acquisitions; systems administrator; Web sites administrator; researcher, database and project engineer on the renewal of old and development of new services to the other faculty services and departments including the faculty counsels and the directorate.

(see section 4: p. 7, PETISCO/MIAU; p. 8, FCT/UNL; p. 8, Students; p. 8, SPID; p. 8, Search Engine 2; p. 9, Search Engine 1).

Instructor and Directorate Advisor

ICTIS — Institute of Science, Technology e Innovation (*Instituto de Ciência, Tecnologia e Inovação*). FCT/NOVA *campus*, Caparica, Portugal. 1998–1999.

Instructor under the WWW (XHTML+CSS and Web concepts) theme for graduation students of the FCT/NOVA, evaluated by the class as “Very Good”. Responsible for the institute brand improvement (design, marketing and communication), development and implementation of the survey plan to evaluate instructors, students and short courses.

Consultant, Sales

INCALT, L.^{da} — High Technology Consultancy and Research (*Investigação e Consultoria em Altas Tecnologias*). FCT/NOVA campus, Caparica, Portugal. 1998–1999.

3 Specific courses

Advanced Course in Hierarchical Processing at Champalimaud Centre for the Unknown. Lisbon, Portugal. 18–20 September 2016. <http://courses.research.fchampalimaud.org/hierarchical-processing/>

Machine Learning by Stanford University on Coursera. Andrew Ng. Certificate earned on 11 December 2015. Grade: 100%. Verified certificate.

Course of Informatics and Industrial Automation (*Curso de Informática e Automação Industrial*) by FUNDETEC. Grade: “Very Good” (18/20). Lisbon, Portugal. 1993.

Intensive Course of Introduction to Nuclear and Particles Physics (*Curso Intensivo de Introdução à Física Nuclear e das Partículas*). Portuguese Physics Society (*Sociedade Portuguesa de Física*) and Faculdade de Ciências / Universidade de Lisboa. Lisbon, Portugal. 1992.

4 Projects

COVID-19 PIRA | <https://gitlab.com/nunoachenriques/covid-19-pira> | Compute a custom ad hoc personal risk and ranking metric of the regions affected by the COVID-19 disease. This is based on the assumption that active cases are exponentially relevant, reduced by the recovered ones, and increased by lack of detection tests, and all relative to population total. May 2020.

Technology: Debian GNU/Linux; Python (`bs4`, `numpy`, `pandas`, `requests`); Apache HTTP server + uWSGI+ Flask; Docker.

SensAI+Expanse | <https://gitlab.com/nunoachenriques/sensei-expanse> | Towards an artificial empathetic companion to humans. SensAI is a sensorial interaction agent as an application for Android-based mobile devices. Enables smartphone sensing in a multimodal approach including in-application diary written texts and social network posts subjected to sentiment analysis. Humans set ground truth emotional valence by means of touch screen

buttons. The agent resources are Cloud-expanded (private Cloud; 1-year Google Cloud Platform) by **Expanse** assuring data storage and machine learning towards prediction in context for all individuals. August 2017–September 2020.

Technology: Android (Java, XML); Debian GNU/Linux; Python (**hdbscan**, **matplotlib**, **numpy**, **pandas**, **psycopg2**, **scikit-learn**, **scikit-optimize**, **tensorflow**, **xgboost**); PostgreSQL; Apache HTTP server + Flask.

INTROBOT | A new multipurpose robot with autonomous and human operated navigation and surveillance capabilities. Mixed reality interface and algorithms to trail and track faces live with camera feed and GPS map. Collaboration: LabMAg, INTROSYS, UNINOVA. August 2011–September 2012.

Technology: Ubuntu GNU/Linux; ROS; OpenCV; C++; Qt; JavaScript; Google Maps; GPS; Live RT video camera.

Patent: (Section 7. “Patents”)

TP Service Bus | Tourism of Portugal applications’ hub. Critical for the organisation to assure proper interoperability between applications’ services towards an agile dashboard. July 2010–March 2011.

Technology: Debian GNU/Linux; PostgreSQL; Java; WSO2 ESB; REST; SOAP.

Entitas | Temporal (past, present, and future aware using PostgreSQL **infinity** special value), limitless and shared database of unique entities (companies and persons). Critical for the organisation to assure proper interoperability between applications entities and associated contacts. September 2009–March 2011 (Tourism of Portugal), 2014–2015 (IMM).

Technology: Debian GNU/Linux; PostgreSQL; Java; WSO2 AS; Apache HTTP server.

TP IT Governance | Open standards orientation for the development team leaders in order to assure proper interoperability between applications. Department portfolio encompass tens of projects and several platforms including OutSystems Agile, Oracle IAM, WSO2 SOA Platform, Google Gadgets. April 2009–March 2011.

Technology: Web open standards (W3C); Shared documentation and collaboration (Web 2.0); ...

TP IT Architecture and Engineering | Re-engineering the data centre and applications technology architecture to assure proper governance and energy efficiency with less resource usage footprint. April 2009–March 2011.

Technology: Blades; Virtual servers; Central storage; Fault tolerance; Documentation management; Debian GNU/Linux; Nagios monitoring; ...

Business Intelligence | Data indicators for top level management. September 2008–July 2009.

Technology: Pentaho; Tomcat; PostgreSQL; Plone/Zope; Java; Python; XML; ...

MovieCatalog | Film (DVD, DivX...) library catalogue IMDb connected. September 2008.

Technology: Python (SQLite; Threading); IMDb; XHTML+CSS.

Groups | Linking people in groups inside NOVA (authorisations federation). February 2008.

Technology: design and implementation of the database schema (PostgreSQL); development of the user interface using Microsoft Office Access (ODBC) for smooth integration with Windows. Case study: restricted NOVA forum where the authenticated access was developed and integrated using the Radius server infrastructure from the eduroam project.

Erasmus | NOVA Erasmus process on the Web. July 2007–June 2008.

Technology: design and implementation of the database schema (PostgreSQL); development of the user interface using Microsoft Office Access (ODBC) for smooth integration with Microsoft Office Word and Excel on contracts, invoices and reports generation; Web platform integration for the publication of scholarship listings.

Portal da ENSP/NOVA | New technological platform for content, design and layout management. July 2007–May 2008.

NOVA Courses Catalogue (*Guia Informativo da NOVA*) | Extract, transform and load (ETL) of the NOVA organic units information about courses, curricular units and facilities offer in the Bologna's Process scope. March 2007–July 2009.

Technology: non-invasive integration of each school autonomous academic managing systems; XML schema and communication protocol definition; development using Python for Plone integration; *design* implementation using XHTML+CSS.

NOVA Portal incl. NOVA's Bologna site | New technological platform for content, design and layout management. High availability, reliability and performance. Load balance solutions and services priority, and single sign on. Renewal of the Web services, integration with the university information and academic management systems, with a new design and identity. January 2006–July 2009.

FCT/NOVA Portal (see NOVA Portal). June 2005–May 2008.

MovieGene | A multimedia production system using Evolutionary Computation. Master thesis prototype implementation to prove the concept. 2004–2005.

Concepts: Do automatic media composition, or video editing. Described videos with low and high level semantics annotations using MPEG-7. Descriptions are individuals genes, thus, able to be evolved towards a goal defined by any user agent.

Technology: Java 1.5 (JMF, Threads, AWT and Swing). ECJ 12 evolutionary library.

HICOD2000 | Project Engineer and Quality Manager for the “High-performance CODing, protection and trading of satellite images using JPEG2000” project. Partnership with ADETTI in this international project for the European Space Agency (ESA). September 2004–March 2005

Several tasks of quality assurance and system validation which demanded solutions development for formal testing automation implementation.

SCOS2000 | Database Engineer for the design and implementation of the sub-project “MISC-Config Variables”. International project for the European Space Agency (ESA). December 2004–January 2005.

Film library | Web design, development and implementation of a film (DVD, DivX...) library catalogue IMDb connected. 2004.

Technology: Perl to process database data, connect to IMDb, and produce the catalogue using XHTML+CSS.

contact | Web design, development and implementation of an address book information system (database, logic and interface) deployed on the Web with pdf \LaTeX file generation for paper printing. 2004.

Technology: PostgreSQL, PHP, XHTML+CSS, \LaTeX .

DCR | Web design (co-author), development (author) and implementation of the information system (database, logic and interface) deployed on the Web with public and private (SSL, session and access levels) user interfaces for the Conservation and Restoration Department of FCT/NOVA. <http://www.dcr.fct.unl.pt/>. 2004.

Concept: information system modelled with concepts mapped to relational tables, about thirty, to solve the specific problem of an academic department with teachers, students and classes. Including autonomous management for each teacher and discipline record. About ten low level tables were created to support a content resource management for the documentation available to the public. A news section was also created.

Technology: user interfaces with XHTML+CSS, PHP for the middleware connecting to the PostgreSQL database and generating the Web pages with and without forms; SQL (ANSI92/99 with PostgreSQL PL/SQL) standard and consistent.

EO-KES | Information system and Web interface for the knowledge representation, using a developed ontology, over the EO (Earth Observation) satellite (ENVISAT) data from the European Space Agency (ESA). International project with partners from Spain and Italy. September 2003–December 2003.

Project Manager and Research Engineer: Development of an algorithm and the implementation of a functional prototype, using J2SE, connecting it to the Protégé and WordNet API in order to infer the goal of the human agent query in natural language. Prototype demonstrated at the Barcelona meeting with ESA and the project partners.

i9 **PETISCO/MIAU** | Large-scale information system and Web interface to serve the FCT/NOVA *campus* of ten thousand people between students, teachers, functionaries and utilities. Initial ideas and concepts, technology options, people interaction, messages and sharing. The

Graduation in Informatics Engineering final thesis was developed over PETISCO/MIAU technology and entitled “Messages” (*Mensagens*). 1999–2003.

PETISCO: development of a new paradigm, based on both functional and unification paradigms. Using Prolog in order to obtain new languages for the relational database conceptual modelling and queries, also for the middleware logic and the Web interfaces generation. These new languages promoted the ability to ask any question to the database simply using pseudo-natural language based on sentences yet with some ASCII symbols instead of the usual prepositions. An example, `name / student $ number = 7099` translates to “the name of the student whose number is 7099”.

MIAU: the Faculty information system using PETISCO technology. The main goals were assuring consistent, coherent and instantaneous information in real time processing, managing authentication and authorisation interfacing with the user. Several services were deployed for the usual academic life, such as students enrolment, grades insertion without the need of bureaucratic processes, fees or schedules management.

FCT/NOVA | Web Design (co-author), development (co-author), implementation and management for the FCT/NOVA Web service. <http://www.fct.unl.pt/>. 1999–2003.

Developing and automating more than three hundred Web pages. Also, several complementary projects were developed, such as a news service and the Faculty academic services contact and managing forms.

Students | Web Design (co-author), development (co-author), implementation and management of the FCT/NOVA students Web service. <http://students.fct.unl.pt/>. 1995–2003.

Information for the students including classes schedules, exams, news and “how to” information. This task included direct technical support regarding students’ personal Web pages.

SPID | Web Design, development and maintenance of a Web pages search engine, using FCT/NOVA *campus* (`*.fct.unl.pt` and `www.unl.pt`) Web servers as a test environment for one year. 2002.

Lexical search using two metrics. Developed with an existing *crawler*, *free software*, connecting it with the new developed parsing and metrics generation algorithm module, relational database model and Web “smart” interface enabling instantaneous searches (less than one second) among millions of relevant sorted expressions (*n-grams*).

Technology: Java (*multithreaded*), PHP, XHTML+CSS, SQL (ANSI99 with PostgreSQL PL/SQL).

2.º CeNPL | Web Design (co-author), development (co-author), implementation and management for the 2nd Logic Programming National Contest (*2.º Concurso encontro Nacional de Programação em Lógica*). 1999.

Search Engine 2 | Adaptation of the indexer (treewalk) and the client (hal) from the “Search Engine 1” connecting the two to a relational database (MySQL) using some middleware (PHP) to perform FCT/NOVA Web pages searches. 1999.

Search Engine 1 | Web design, development, implementation and management of a Web pages search engine for the Students WWW project. <http://students.fct.unl.pt/>. 1998.

Development of a three-module application: server, indexer, and client. The server is deployed with n concurrent UNIX (Linux) processes based on a shared queue of requests and deliveries.

Technology: C (shared memory, concurrent processes and semaphores), CGI, HTML.

F@CTus | Web design, development, and implementation of the Web archive for the FCT/NOVA Students Newspaper, including the digital scanning and graphical treatment of the existing paper editions. <http://students.fct.unl.pt/factus/>. 1997–1999.

5 Publications

SensAI+Expanse Emotional Valence Prediction Studies with Cognition and Memory Integration. Henriques, N. A. C., Coelho, H., & Garcia-Marques, L. (2020). arXiv preprint <https://arxiv.org/abs/2001.09746>. (Accepted as a regular paper in COGNITION 2020)

SensAI+Expanse Adaptation on Human Behaviour Towards Emotional Valence Prediction. Henriques, N. A. C., Coelho, H., & Garcia-Marques, L. (2019). arXiv preprint <https://arxiv.org/abs/1912.10084>. (Accepted as a regular paper in ADAPTIVE 2020)

An artificial empathetic entity: the interaction impact on humans. Nuno A. C. Henriques. *Advances in Artificial Intelligence. EPIA 2013*. Angra do Heroísmo, September 9–12. Local Proceedings. CMATI, Universidade dos Açores, Portugal, p. 571–578.

ARES-III: A Versatile Multi-Purpose All-Terrain Robot. Magno Guedes, Pedro Santana, Pedro Deusdado, Ricardo Mendonça, Francisco Marques, Nuno Henriques, André Lourenço, Luís Correia, José Barata and Luis Flores. *ETFA 2012 - IEEE International Conference on Emerging Technology and Factory Automation*, Krakow, Poland, 17–21 September 2012.

Creating Video Art with Evolutionary Algorithms. Teresa Chambel, Luís Correia, Jónatas Manzolli, Gonçalo Dias Miguel, Nuno A. C. Henriques, Nuno Correia. Special issue on *Digital Arts*, Computer & Graphics Journal, v.31, i.6, p. 837–847, Elsevier ISSN: 0097-8493, December 2007.

Creative Video Editing through Evolutionary Algorithms. Teresa Chambel, Gonçalo Dias Miguel, Luís Correia, Nuno A. C. Henriques, Nuno Correia, Jónatas Manzolli. In proceedings of *Artech 2006 — Third International Conference on Digital and Electronic Art*, Pontevedra, Spain, 17–18 November 2006.

MovieGene: Evolutionary Video Production based on Genetic Algorithms and Cinematic Properties. Nuno A. C. Henriques, Nuno Correia, Jónatas Manzolli, Luís Correia, Teresa Chambel. *EvoWorkshops: EvoMUSART — 4th European Workshop on Evolutionary Music and Art*, Budapest, Hungary, 10–12 April 2006, proceedings p. 707–711.

MovieGene: A multimedia production system using Evolutionary Computation. Nuno A. C. Henriques. MSc thesis. Faculdade de Ciências e Tecnologia / Universidade Nova de Lisboa. Lisbon, Portugal. 2005.

6 Communications

EPIA2013 16th Portuguese Conference on Artificial Intelligence. <http://www.epia2013.uac.pt/>. Angra do Heroísmo, Azores, Portugal. 9–12 September 2013.

EuroGP, EvoCOP, EvoWorkshops. Budapest, Hungary, 10–12 April 2006.

1st Seminar of Academic Reflection (*1.º Seminário de Reflexão Académica*), invited speaker under the theme “New technologies, New Challenges” (“*Novas Tecnologias, Novos Desafios*”). FCT/NOVA *campus*, Caparica, Portugal. 2000.

7 Patents

AUTONOMOUS ALL TERRAIN ROBOTICS VEHICLE. Santana, P. F., Flores, L. M. B. M., Flores, N. M. B. M., Guedes, M. E. da S., Deusdado, P. M. M., Henriques, N. A. da C., & Correia, L. M. P. e. (2015). EP2874037A2. European Patent Office. <https://worldwide.espacenet.com/patent/search?q=pn%3DEP2874037A2>

8 Collaborations

Alhappl. Talk (*pro bono*) to the second platoon finalists, invited by Hugo C. Sousa. 5 September 2014.

GFI Portugal. Consultant (*pro bono*), invited by Hugo C. Sousa. 17 August 2011.

ULisboa. Talk (*pro bono*) at a post-graduation class EGT about Innovation using Web2.0 at Tourism, invited by Hugo C. Sousa. ISEG. 27 April 2010.

ULisboa. Talk (*pro bono*) at an MSc class OGFI about Information Systems at Tourism, Turismo de Portugal case study, invited by Miguel Mira da Silva. Tagus Park. 17 March 2010.

Worten/SONAE. Consultant (*pro bono*), invited by José V. Almeida. November and Decem-

ber 2005.

GruVA/LabMAg — Artificial Life Group of the Laboratory of Agent Modelling at the Ciências/ULisboa. Researcher. 2005–2008.

IMG/CITI — Interactive Multimedia Group of the Centre of Informatics and Information Technology at the FCT/NOVA. Researcher. 2005–2008.

9 Instructor

Web CMS: Plone/Zope. NOVA Rectory. Several ad hoc and scheduled. 2006–2008.

Web: HTML+CSS. ICTIS, FCT/NOVA *campus*, Caparica, Portugal. 24-hour course. 1998.

10 Languages

Castellano *Muy bien hablado y leído.*

English Colloquial and technical (computer science) very well-spoken, written and read.

Português (native language) *Perfeitamente falado, escrito e lido.*

The Italian and French languages are fairly understood and read.

11 Honours and awards

PhD support grant by Universidade de Lisboa (BD2015). Lisbon, Portugal. 2016–2019.

6th Prize on the Essay Category at the “IBM Leonardo Da Vinci 95” Contest by IBM (6/200). Lisbon, Portugal. 1995.