

Christian Cabrera-Jojoa

Research Associate

Department of Computer Science and Technology
University of Cambridge

✉ chc79@cam.ac.uk
🌐 <https://cabrerac.github.io/>

I am a research associate in the ML@CL group at the Department of Computer Science and Technology of the University of Cambridge. I received a Ph.D. degree in Computer Science from Trinity College Dublin in 2020. My current research addresses the problems and challenges of deploying Artificial Intelligence systems in the real world. I am investigating the intersection between systems engineering, software engineering and AI to develop novel approaches for designing, building, monitoring, and adapting real-world AI-based systems.

Education

- June 2020 **Ph.D. in Computer Science**, Trinity College Dublin, Dublin, Ireland
Dissertation: [uDiscovery: An Urban-Centric Model for Service Discovery in Smart Cities](#).
Supervisor: Prof. Siobhán Clarke
Research focus on the IoT service discovery and composition problems in large, dynamic, and distributed networks.
- September 2014 **M.Sc. in Systems and Computer Engineering**, Los Andes University, Bogotá, Colombia
Master's Dissertation: [MOWL: A Domain Specific Language for Handling Modular Ontologies](#).
Research focus on knowledge management to integrate multiple knowledge models.
GPA: 4.37/5.0
- September 2011 **B.Sc. in Systems Engineering**, Universidad de Nariño, Pasto, Colombia
GPA: 4.06/5.0

Experience

- March 2021 **Research Associate**, Department of Computer Science and Technology, University of Cambridge, United Kingdom
Current
Current research on self-sustaining software systems and the problem of deploying AI-based systems in the real world as part of [the AutoAI project](#). Particularly, I am exploring and developing self-adaptive systems principles, architectures, and methods to enable the design and monitoring of AI-based systems. The ultimate goal of this research is to ensure AI-based systems perform robustly, safely, accurately, and autonomously in their deployed environment.
- October 2021 **Teaching Assistant**, Department of Computer Science and Technology, University of Cambridge, United Kingdom
Current
Advanced Data Science, Bachelors course: Designing the course material around the challenges data scientists face in reality. Supporting students' progress in laboratory sessions.
- October 2023 **Teaching Supervisor**, Department of Computer Science and Technology, University of Cambridge, United Kingdom
Current
Artificial Intelligence, Concurrent and Distributed Systems, and Concepts in Programming Languages, Bachelors courses: Teaching sessions through the term.
- May 2019 **Research Assistant (May 2019 - Jun 2020) - Research Fellow (Jun 2020 - Feb 2021)**, School of Computer Science and Statistics, Trinity College Dublin, Dublin, Ireland
February 2021
Research on the provision of context-aware, pervasive and resilient applications in large and dynamic urban environments. Particularly, exploring the *self-adaptive organisation of services information* based on RL algorithms in smart cities, and the dynamic and proactive *service placement problem* at the edge based on meta-heuristic and prediction models.

- March 2015 **Teaching Assistant**, School of Computer Science and Statistics, Trinity College Dublin, Dublin, Ireland
- February 2021 *Advanced Software Engineering*, Master's course, *What is the Internet doing to me?*, TCD elective course, *Scalable Computing*, Master's course, *Systems Programming I*, 2nd year Bachelors course, and *Programming Project*, 1st year Bachelors course.
- August 2014 **Software Project Lead**, Conecta-TE, Los Andes University, Bogotá, Colombia
- December 2014 Work on analysis, design and development of software to support educational processes.
- February 2012 **Research Graduate Assistant**, Systems Engineering Department, Los Andes University, Bogotá, Colombia
- July 2014 Research on the semantic web, learning objects, and mobile learning.
Master's thesis. Design and implementation of a domain-specific language to handle modular ontologies.
- February 2011 **Software Developer**, CJT&T Software Engineering, Pasto, Colombia
- December 2011 Work on analysis, design and development of software.

Awards, and Scholarships

Awards

- November 2018 **Ph.D. Final Year Trinity Employability Award**, in partnership with Intel. Dublin, Ireland
- November 2011 **Best B.Sc. Research Final Project**, Universidad de Nariño, Pasto, Colombia

Scholarships

- March 2015 **Ph.D. research studentship in Dynamic Service Adaptation**, Science Foundation Ireland, Dublin, Ireland

Supervision

Undergrad Students

- June 2019 **Elizabeth Rojas**, Universidad de Nariño, Colombia
- December 2019 Thesis topic: *Decision-making support tools for urban planners and authorities*.

Service to the Scientific Community

Roles in Academic Journals

- Current **Reviewer for international peer-reviewed journals**, *IEEE Transactions on Services Computing (TSC)*, and *IEEE Internet of Things Journal*
- 2023 **Co-organiser**, *The First UK AI Conference 2023 - Turing AI Fellowship Event*, UK-AI community
- 2023 **Co-organiser**, *Turing AI Fellows and Teams Hackathon*, UK-AI community
- 2022 - 2023 **Co-organiser**, *NeurIPS at Cambridge Meetup*, NeurIPS Satellite Event
- 2022 **Co-organiser**, *Challenges in Deploying and Monitoring Machine Learning Systems*, NeurIPS Virtual Workshop
- 2022 **Co-organiser**, *ATI AI Fellows day at Cambridge*, UK-AI community
- 2020-2021 **PC Member**, *International Joint Conference on Autonomous Agents and Multi-agent Systems (AAMAS)*

Publications

Peer-Reviewed Journals

- J6 **Cabrera C.**, Paleyes A., Lawrence N., [Real-world Machine Learning Systems: A survey from a Data-Oriented Architecture Perspective](#). *ACM Computing Surveys (CSUR)*, Under Review.

- J5 **Cabrera C.**, Svorobej S., Palade A., Kazmi A., Clarke S., [MAACO: A Dynamic Service Placement Model for Smart Cities](#). *IEEE Transactions on Services Computing (TSC)*, IEEE, 2023.
- J4 **Cabrera C.**, Clarke S., [A self-adaptive service discovery model for smart cities](#). *IEEE Transactions on Services Computing (TSC)*, Vol. 15, No. 1, pp. 386-399, IEEE 2022.
- J3 Tabatabaee H., Rasool S., Kazmi A., Palade A., **Cabrera C.**, White G., Clarke S., [Dynamic Service Placement in Multi-access Edge Computing: a Systematic Literature Review](#). *IEEE Access*, Vol. 10, pp. 32639-32688, IEEE 2022.
- J2 Rojas E., Bastidas V., **Cabrera C.**, [Cities-Board: A Framework to Automate the Development of Smart Cities Dashboards](#). *IEEE Internet of Things Journal*, Vol. 7, pp. 10128-10136, IEEE 2020.
- J1 Palade A., **Cabrera C.**, Li F., White G., Razzaque MA., Clarke S., [Middleware for internet of things: an evaluation in a small-scale IoT environment](#). *Journal of Reliable Intelligent Environments*, Vol. 4, pp. 3-23, SpringerLink 2018.

Peer-Reviewed Conference Proceedings

- C18 **Cabrera C.**, Paleyes A., Lawrence N., [Self-sustaining Software Systems \(S4\): Towards Improved Interpretability and Adaptation](#). *Proceedings of the International Workshop New Trends in Software Architecture (SATrends 24)*, 2024. (To appear.)
- C17 Cardozo N., Dusparic I., **Cabrera C.**, [Prevalence of Code Smells in Reinforcement Learning Projects](#). *Proceedings of the 2nd International Conference on AI Engineering: Software Engineering for AI*, 2023.
- C16 Paleyes A., **Cabrera C.**, Lawrence N., [An Empirical Evaluation of Flow Based Programming in the Machine Learning Deployment Context](#). *Proceedings of the 1st International Conference on AI Engineering: Software Engineering for AI*, 2022.
- C15 Paleyes A., **Cabrera C.**, Lawrence N., [Towards Better Data Discovery and Collection with Flow-Based Programming](#). *Neurips Data-Centric AI Workshop (DCAI)*, 2021.
- C14 **Cabrera C.**, Clarke S., [A Reinforcement Learning-Based Service Model for the Internet of Things](#). *International Conference on Service-Oriented Computing (ICSOC)*, pp. 790-799, SpringerLink 2021.
- C13 Palade A., Mukhopadhyay A., Kazmi A., **Cabrera C.**, Nomayo E., Iosifidis G., Ruffini M., Clarke S., [A Swarm-based Approach for Function Placement in Federated Edges](#). *IEEE International Conference on Services Computing (SCC)*, IEEE 2020.
- C12 **Cabrera C.**, Palade A., White G., Clarke S., [An Urban-driven Service Request Management Model](#). *IEEE International Conference on Pervasive Computing and Communications (PerCom)*, IEEE (2020).
- C11 Li F., **Cabrera C.**, Clarke S., [A WS-Agreement Based SLA Ontology for IoT Services](#). *International Conference on Internet of Things*, pp. 58-72, SpringerLink 2019.
- C10 White G., Palade A., **Cabrera C.**, Clarke S., [Autoencoders for QoS Prediction at the Edge](#). *IEEE International Conference on Pervasive Computing and Communications (PerCom)*, IEEE 2019.
- C9 **Cabrera C.**, Palade A., White G., Clarke S., [Services in IoT: A Service Planning Model based on Consumer Feedback](#). *International Conference on Service-Oriented Computing (ICSOC)*, pp. 304-313, SpringerLink 2018.
- C8 Palade A., **Cabrera C.**, White G., Clarke S., [Stigmergic Service Composition and Adaptation in Mobile Environments](#). *International Conference on Service-Oriented Computing (ICSOC)*, pp. 618-633 SpringerLink 2018.
- C7 White G., **Cabrera C.**, Palade A., Clarke S., [Augmented Reality in IoT](#). *Workshop on Context-Aware and IoT Services (CloTS) in the International Conference on Service-Oriented Computing (ICSOC)*, pp. 149-160, SpringerLink 2018.
- C6 **Cabrera C.**, Palade A., White G., Clarke S., [The Right Service at the Right Place: A Service Model for Smart Cities](#). *IEEE International Conference on Pervasive Computing and Communications (PerCom)*, IEEE 2018.
- C5 White G., Palade A., **Cabrera C.**, Clarke S., [IoTpredict: Collaborative QoS Prediction in IoT](#). *IEEE International Conference on Pervasive Computing and Communications (PerCom)*, IEEE 2018.

- C4 White G., Palade A., **Cabrera C.**, Clarke S., [Quantitative Evaluation of QoS Prediction in IoT](#). *47th Annual IEEE/IFIP International Conference on Dependable Systems and Networks Workshops (DSN-W 2017)*, IEEE 2017.
- C3 **Cabrera C.**, Li F., Nallur V., Palade A., White G., Razzaque MA., Clarke S., [Implementing heterogeneous, autonomous, and resilient services in IoT: an experience report](#). *IEEE 18th International Symposium on A World of Wireless, Mobile and Multimedia Networks (WoWMoM)*, IEEE 2017.
- C2 Palade A., **Cabrera C.**, White G., Razzaque MA., Clarke S., [Middleware for Internet of Things: A quantitative evaluation in small scale](#). *IEEE 18th International Symposium on A World of Wireless, Mobile and Multimedia Networks (WoWMoM)*, IEEE 2017.
- C1 **Cabrera C.**, Palade A., Clarke S., [An evaluation of service discovery protocols in the internet of things](#). *17th Proceedings of the Symposium on Applied Computing (SAC)*, pp. 469-476, ACM 2017.

Relevant Technical Skills

Programming Languages	Python, Java, NodeJS, C++, and C#.
Software Architecture	Data-Oriented Architectures, Service-Oriented Architectures, Data-driven Architectures, and Model-driven Architectures.
Knowledge Management	Ontologies, Knowledge Graphs, and Expert Systems.
Knowledge Management Technologies	Apache Jena, OWL/RDF-S, and Prolog
LLMs	GPT, BERT, LangChain, and Hugging Face.
ML Technologies	TensorFlow, DeepLearning4J, and Stable Baselines.

References

- Current supervisor **Prof. Neil Lawrence**, *DeepMind Professor of Machine Learning at University of Cambridge*, Department of Computer Science and Technology, University of Cambridge, William Gates Building, 15 JJ Thomson Avenue, Cambridge
Email: ndl21@cam.ac.uk
- Current supervisor **Dr. Carl Henrik Ek**, *Associate Professor at University of Cambridge*, Department of Computer Science and Technology, University of Cambridge, William Gates Building, 15 JJ Thomson Avenue, Cambridge
Email: che29@cam.ac.uk
- Ph.D. Thesis supervisor **Prof. Siobhán Clarke**, *Professor at Trinity College Dublin*, School of Computer Science and Statistics, College Green, Dublin 2, Ireland
Email: Siobhan.Clarke@scss.tcd.ie