

ARLES ERNESTO RODRÍGUEZ PORTELA

+57 3133731086

aerodriguezp@unal.edu.co

<https://github.com/arleserp/>

<https://www.scopus.com/authid/detail.uri?authorId=57143332700>

EDUCATION

Universidad Nacional de Colombia

Ph.D. in Engineering - Computer Systems

2012- 2019

GPA 4.6/5.0

Universidad Nacional de Colombia

Magister in Computer Systems Engineering

2009 – 2012

GPA 4.6/50

Universidad Distrital Francisco José de Caldas

Bachelor's in computer systems Engineering

2000-2007

GPA 4.4/5.0

WORK EXPERIENCE

Fundación Universitaria Konrad Lorenz

Associate Professor

Bogotá, Colombia

February 2016 - Present

- Research in data management task, failure detection, resilience and self-organization of Simulated Distributed Environments using Artificial Life Approaches.
- Coach of competitive programming teams of the University - classified to ICPC regionals during three consecutive years (2017, 2018, 2019).
- Courses: Analysis and Design of Systems, Design of Multimedia Applications, Data Structures and Computer Programming.

Universidad Nacional de Colombia

Teaching Assistant (Scholarship for outstanding postgraduate students)

Bogotá, Colombia

August 2009-January 2016

- Computer Programming Course and Software Engineering II.
- Researcher at Research Group on Artificial Life Alife. Developer Leader and Designer of an intelligent e-learning platform, that supports the learning process by offering students and professors custom navigation between contents and materials in an interactive way (book chapters, exercises, videos). Platform also offers an online evaluation process based on Computer Adaptive Testing (CAT) that choose questions to ask a student and assigns the student grade according to the student's ability.

Telecom ParisTech

Visitor Researcher

Paris, France

January 2015 - August 2015

- Acquiring skills to model autonomic and self-organized systems.
- Simulation Design of Distributed Components using Multi-Agent Systems to Model Data Management Tasks and Local Rules to Increase Robustness and Obtain Self-healing in Distributed Environments.

Dexon Software

Senior Developer

Bogotá, Colombia

August 2006-August 2009

- Development Leader and Designer of Dexon Agent for Linux, OS X, Solaris, Android, AIX and Verix Operating Systems.
- Dexon Agent performs administration, audit and monitoring of the entire IT platform, processes and practices based on ITIL. Dexon Agent obtains hardware and software information automatically and performs remote control over assets in any geographic region, controls patches and software updates and allows centralized software distribution

RESEARCH

INFEKTA: A General Agent-based Model for Transmission of Infectious Diseases: Studying the COVID-19

Propagation in Bogotá – Colombia

Available at: <https://www.medrxiv.org/content/10.1101/2020.04.06.20056119v2>

- INFEKTA, simulates the transmission of infectious diseases, not only the COVID19, under social distancing policies.
- INFEKTA combines the transmission dynamic of a specific disease, (according to parameters found in the literature) with demographic information (population density, age, and genre of individuals) of geopolitical regions of the real town or city under study.
- Agents (virtual persons) can move, according to its mobility routines and the enforced social distancing policy, on a complex network of accessible places defined over an Euclidean space representing the town or city.
- The transmission dynamics of the COVID-19 under different social distancing policies in Bogotá city, the capital of Colombia, is simulated using INFEKTA with one million virtual persons.
- A sensitivity analysis of the impact of those social distancing policies on the disease rates (Asymptomatic, Seriously, and Critically) indicates that it is possible to establish a not so 'hard' social distancing policy to achieve a significant reduction in the disease rate.

2020

A Decentralised Self-Healing Approach for Network Topology Maintenance

Available at: <https://arxiv.org/abs/2010.11146>

- In many distributed systems, from cloud to sensor networks, different configurations impact system performance, while strongly depending on the network topology. Hence, topological changes may entail costly reconfiguration and optimisation processes. This paper proposes a multi-agent solution for recovering networks from node failures.
- To preserve the network topology, the proposed approach relies on local information about the network's structure, which is collected and disseminated at runtime.
- Two strategies for distributing topological data are studied: one based on Mobile Agents (our proposal) and the other based on Trickle (a reference gossiping protocol from the literature). These two strategies were adapted for our self-healing approach to collect topological information for recovering the network; and were evaluated in terms of resource overheads.
- Experimental results show that both variants can recover the network topology, up to a certain node failure rate, which depends on the network topology.
- At the same time, Mobile Agents collect less information, focusing on local dissemination, which suffices for network recovery. This entails less bandwidth overheads than when Trickle is used.
- Still, Mobile Agents utilise more memory and exchange more messages, during data-collection, than Trickle does. These results validate the viability of the proposed self-healing solution, offering two variant implementations with diverse performance characteristics, which may suit different application domains.

2020

Self-healing Model for Distributed Environments based on Artificial life Techniques

Doctoral dissertation - <http://bdigital.unal.edu.co/69892/>

- Failures are defined in the nodes of a network.
- Use mobile agents to synchronize and repair a complex network structure.
- Proposed algorithm can repair a network structure with a failure speed lesser than the speed of the healing process.

2012-2018

Improving data collection in complex networks with failure prone agents via local marking

Available at: <https://content.iospress.com/articles/journal-of-intelligent-and-fuzzy-systems/ifs179053>

- An improvement to selected movement algorithms to collect data in complex networks in a faster way with failure prone agents.
- Collects data fast in networks with a high standard deviation in the Betweenness Centrality.

2019

Towards a self-healing multi-agent Platform for Distributed data Management

A simulator to model data collection tasks using multi-agent systems. Presented in [PAAMS 2017](#)

Model of distributed data- collection tasks in bi-dimensional environments and in complex Networks implemented in Java. Information available at: https://link.springer.com/chapter/10.1007/978-3-319-59930-4_36 video: <https://www.youtube.com/watch?v=2uKRep5wHCA>

2017

Replication-Based Self-healing of Mobile Agents Exploring Complex Networks

A model to self-recover mobile agents performing data collection tasks in complex networks Presented in PAAMS 2017

- Propose an algorithm based on ant colony systems and local rules.
- Proposed algorithm avoids over-replication and under replication by itself.
- More information available at: https://link.springer.com/chapter/10.1007/978-3-319-59930-4_18

2017

Exploring Complex Networks with Failure-Prone Agents

A model to evaluate robustness in a data collection tasks performed by mobile agents exploring complex networks. Presented in [MICA 2016](#)

- The model determines a failure probability defined in mobile agents.
- Use different movement approaches to explore selected complex networks.
- As an important result, speed of the movement algorithm determines data collection and it depends also of the topology of the network.
- More information available at: https://link.springer.com/chapter/10.1007/978-3-319-62428-0_7

2016

AWARDS

- Honorable Mention in the South America-North Finals 2017/2018/2019 as coach.
- Distinguished Researcher Professor at Faculty of Mathematics and Engineering at Fundación Universitaria Konrad Lorenz at 2018.
- Meritorious Mention in Master Thesis – Universidad Nacional de Colombia.
- Meritorious Mention in Bachelor Thesis – Universidad Distrital Francisco José de Caldas.
- Scholarship for outstanding postgraduate students 2009-2011 Universidad Nacional de Colombia.
- Scholarship for outstanding postgraduate students 2012-2016 Universidad Nacional de Colombia.