Rubén Alcolea Núñez

Software developer

contact

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languages

Spanish mother tongue
English and French
fluency

programming

♥ C++
Java, Python &
OpenGL

education

2006–2011	**Bachelor** of Computer Sciences	University of Computer Sciences, Havana
	Bachelor Thesis: Módulo de Iluminación para Visualización Directa de Volumen	
2013	**Postgraduate course**	University of Computer Sciences, Havana
	Programación para multinúcleos	
2013	**Postgraduate course**	University of Computer Sciences, Havana
	3D Modeling and Reconstruction Course	
2013	**Postgraduate course**	University of Computer Sciences, Havana
	Introducción al sistema de composición de textos LaTeX	
2014	**Postgraduate course**	University of Computer Sciences, Havana
	General Purpose Programming on Graphics Hardware	
2014–2017	**Master** in Applied Informatics	University of Computer Sciences, Havana
	Thesis: Segmentación de Volúmenes para la Generación de Ilustraciones	
2016	**Postgraduate course**	University of Computer Sciences, Havana
	Procesamiento Digital de Imágenes Avanzado	
2018	**Postgraduate course**	University of Computer Sciences, Havana
	Programación Competitiva por Artsem Zhuk	
2019	**Postgraduate course**	University of Computer Sciences, Havana
	Programación Competitiva por Tomasz Idziaszek	

experience

2011–2018	**Research**	University of Computer Sciences, Havana
	Member of Visualization and Virtual Reality Group (ViViRG) Research Group	
2011–2022	**ACM-ICPC at UCI**	University of Computer Sciences, Havana
	Coach, problemsetter and lecturer at the Caribbean Training Camp in 2013	
2011–2022	**Supervisor**	University of Computer Sciences, Havana
	Supervisor of several Bachelor thesis	
2012–2022	**Bachelor thesis Jury**	University of Computer Sciences, Havana
	Member of Jury of several Bachelor thesis in the area of Virtual Reality	
2015–2022	**Programming professor**	University of Computer Sciences, Havana
	Professor of formal languages and compilers, data structures and algorithms	
2016	**ACM-ICPC Caribbean Final**	PUCMM University, Dominican Republic
	Cuban Observer at the Dominican Site	
2017–2020	**ACM-ICPC at the Caribbean**	University of Computer Sciences, Havana
	Problemsetter of Local and National ICPC Contests	
2018–2019	**Research**	University of Computer Sciences, Havana
	Leader of Visualization and Virtual Reality Group (ViViRG) Research Group	
2018–2022	**Software development center**	University of Computer Sciences, Havana
	Vice-director of Vertex's Center	

2019	**Research**	Leibniz Institute of Polymer Research, Dresden, Germany

Research stay focused on automatic classification and detection of microplastic particles in aquatic and environmental samples

2021–2022	**ICPC at the Caribbean**	University of Computer Sciences, Havana

Problemsetter of ICPC Caribbean Finals (Qualifier)

2021	**ICPC World Finals #44**	Moscow Institute of Physics and Technology, Russia

ICPC Latin America/Caribbean - Cuba Contest Deputy Director

2022	**ICPC World Finals #45**	University of Asia Pacific, Dhaka, Bangladesh

Coach of team "FreesTyle"

2023	**ICPC World Finals #46**	AASTMT, Sharm El-Sheikh, Egypt

Co-coach of team "FreesTyle"

2012-2022	**Design of algorithms: data structures**	University of Computer Sciences, Havana

sparse table, disjoint set union, binary indexed tree, square root decomposition, segment tree, trie, priority queues

2012-2022	**Design of algorithms: dynamic programming**	University of Computer Sciences, Havana

longest common subsequence, knapsack 0/1, coin change, matrix chain multiplication, bitmask, digit count

2012-2022	**Design of algorithms: graphs**	University of Computer Sciences, Havana

depth first search, breadth first search, single-source shortest paths: Dijkstra, Bellman-Ford, all-pairs shortest paths: Floyd-Warshall, minimum spanning trees: Prim, Kruskal, lowest common ancestor, network flow: Ford-Fulkerson, Edmonds-Karp, Dinic

2012-2022	**Design of algorithms: string processing**	University of Computer Sciences, Havana

string matching: Knuth-Morris-Pratt, hashing, suffix array, manacher

2012-2022	**Design of algorithms: number theory**	University of Computer Sciences, Havana

greatest common divisor, sieve of Eratosthenes, fast exponentiation, inclusion and exclusion principle, linear recurrences and matrix exponentiation

2012-2022	**Design patterns**	University of Computer Sciences, Havana

observer, decorator, factory, singleton, command, adapter, facade, iterator, composite, state, proxy, visitor

2011-2022	**C++ Developer**	University of Computer Sciences, Havana

Vismedic: 3D visualization system of medical images
- Designed, built and maintained efficient and reliable C++ code by employing the latest technology
- Designed and built a filtering component to improve the quality of images and reduce the noise present at the images
- Designed and built a segmentation component to identify ROI present at the images
- Designed and built a lighting component to improve the quality of visualization
- Designed and built plugins in order to support maintenance of code quality and a flexible architecture

Combiovent: Lung ventilator software to treat Covid patients at ICU
- Designed and built a patient component to manage the information of patiens used in other medical equipments
- Built a database transaction mechanism to maintain consistency and integrity of the database
- Built a recovery and fault tolerance mechanism for a SQLite database
- Designed and built a report component to display information using different styles of visualization
- Designed and built a flexible mechanism to modify the style of widgets used at the reports

- Designed and built a virtual keyboard component to allow the user enter information about patients
- Designed and built a ventilation reports component to display information about physiological parameters of patients
- Implemented performance and quality tests while identifying bottlenecks and bugs and devising solutions to these problems by employing multi-threading techniques

Qt Framework & C++
- Qt core, widgets, sql, opengl, signals and slots, custom widgets, layout management, event processing, 2d and 3d graphics
- Model-view programming, container classes, input/ouput, databases
- Internationalization, multithreading, networking, plugins, qml
- C++ STL containers and algorithms, C++20 standard

2023   **C++ Developer**   Leil Storage

SaunaFS: Backup and archive storage
- Architecting and designing software-defined storage and its monitoring/debugging tools
- Create unit tests and integration tests to verify the correctness and functionality of the code
- Document and explain the design, implementation and usage of the code
- Develop and support continuous integration and continuous deployment systems.

2023   **ICPC at the Caribbean**   Leil Storage
Chief Judge of Caribbean Judges Committee

awards

2013   **ACM-ICPC**   University of Computer Sciences, Havana
Bronze Award at the ACM-ICPC Caribbean Final as coach of team "iHistory"

applications

2011-2013   **Vismedic**   Center of Computer Sciences applied to Industry, University of Computer Sciences
Medical Visualization System for three-dimensional reconstruction of medical images

2021   **Combiovent**   Combiomed Company of Digital Medical Technology
Lung ventilator software to treat Covid patients at Intensive Care Units

communication skills

2013	**ACM-ICPC Training Camp**	University of West Indies, Trinidad and Tobago

Lecturer and problemsetter at the 1st ACM-ICPC Trinidadian Training Camp

2018	**ACM-ICPC Training Camp**	University of West Indies, Trinidad and Tobago

Lecturer and problemsetter at the 2nd ACM-ICPC Trinidadian Training Camp

2013-2019	**High School Training Camp**	University of Computer Sciences, Havana

Lecturer and problemsetter of high school training camps hosted at UCI

interests

professional: medical visualization, digital image processing, data structures and algorithms, software design, software architecture, design patterns, videogames

personal: guitar, reading, movies, music, tv series

computer skills

- **Art & Graphics:** Adobe Photoshop, Adobe Illustrator
- **Operating Systems:** Windows, Linux
- **Programming:** Qt Framework, Visual Studio, Eclipse, Codeblocks, NetBeans, Unity
- **Databases:** MySQL, Postgres, SQLite
- **Control Version System:** Subversion, Git

publications

article in peer-reviewed journal

Técnicas de visualización ilustrativa de volúmenes para la medicina
Luis Guillermo Silva, Alina Rodríguez, Rubén Alcolea, and Ramón Carrasco
XVI Convención y Feria Internacional Informática (2016). 2016

Vismedic - Illustration: sistema para la generación de ilustraciones volumétricas
Luis Guillermo Silva, Alina Rodríguez, Rubén Alcolea, and Ramón Carrasco
XVI Convención y Feria Internacional Informática (2016). 2016

Módulo de filtrado y segmentación de imágenes médicas digitales para el proyecto Vismedic
Adrián Peña-Peñate, Luis Guillermo Silva Rojas, and Rubén Alcolea Núñez
Revista Cubana de Ciencias Informáticas 10.1 (2016) pp. 13–27. Universidad de las Ciencias Informáticas, 2016

Hybrid reduced graph for SAR studies
R. Carrasco-Velar, J.O. Prieto-Entenza, A. Antelo-Collado, J.A. Padrón-García, G. Cerruela-García, Á.L. Maceo-Pixa, R. Alcolea-Núñez, and L.G. Silva-Rojas
SAR and QSAR in Environmental Research 24.3 (2013) pp. 201–214. 2013

local peer-reviewed conferences/proceedings

Visualización avanzada de volúmenes empleando hardware gráfico
Luis Guillermo Silva Rojas, Rubén Alcolea Núñez, and Yoana Rios
VI Congreso Internacional de Tecnologías, Contenidos Multimedia y Realidad Virtual, 2013

Módulo de Iluminación para Visualización Directa de Volumen
Rubén Alcolea Núñez
VI Conferencia Científica UCIENCIA, VII Taller de Visualización Gráfica y Realidad Virtual, 2012

Modelos de Iluminación para Visualización Directa de Volumen
Rubén Alcolea Núñez and Osvaldo Pereira Barzaga
VI Congreso Internacional de Tecnologías, Contenidos Multimedia y Realidad Virtual, 2011