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

experience

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

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 **ICPC at the Caribbean** University of Computer Sciences, Havana
Problemsetter of ICPC Caribbean Finals (Qualifier)

2021 **ICPC Caribbean Finals** University of Computer Sciences, Havana
Coach of team "FreesTyle" qualified to the ICPC World Finals #45

2021 **ICPC World Finals #44** Moscow Institute of Physics and Technology, Russia
ICPC Latin America/Caribbean - Cuba Contest Deputy Director

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, Mo's algorithm

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 & 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++11 standard

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