Rafael Vega

Software Engineer and Music Technologist

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I am an engineer with 16 years of experience in software development, embedded systems and electronic musical instruments. I can communicate eloquently and fluidly with people from different backgrounds and I can solve complex technical problems. I also have appreciation for aesthetics and good design and audio and music have been an interest of significance throughout my life.

SKILLS

- Fluent in Spanish and English.
- Ability to think about and offer solutions for complex technical and day-to-day problems.
- Software development for different types of platforms like web applications, desktop computers, web, mobile devices and cloud servers using languages like PHP, Objective-C, JavaScript, Python, C and C++.
- Design and administration of relational databases using MySQL and Postgres.
- Knowledge of software development practices and tools such as the Unix command line, agile development practices, git version control, build automation, continuous integration, and test driven development.
- I can communicate complex matters in a clear and simple way, even outside my areas of expertise.
- I value, admire and strive for well written and elegant code and designs.
- Capacity to write technical documentation.
- Software programming for embedded systems in C and C++ with real-time constraints, in multi-threaded environments, using operating systems or in bare-metal scenarios.
- Building, configuration, deployment and automation of Linux systems in different types of computer systems from embedded devices to clusters of web and database servers.
- Familiarity with the Linux audio stack: Audio device drivers, ALSA, Jack.
- Acquaintance with audio digital signal processing and synthesis algorithms.
- Experience with different aesthetic and technical aspects of the design of electronic musical instruments: interface design, sound design, technical implementation and manufacturing.
- Designing electronic circuits and printed circuit boards of medium and low complexity.
- Low complexity CAD and 3D modeling for engineering.
- Competence for basic workshop tasks such as prototyping using 3D printers, PCB soldering, carpentry, and using laser cutters and CNC machines.
- Amateur musician (electric guitar, electric bass, synthesizers).

EXPERIENCE

OneRPM, Bogotá - *Independent Contractor.*

2020

- I worked with Diego Maldonado at OneRPM building a web application for internal use in the company that allows for easily finding matches between heterogeneous track catalogs.
- The application was built using Python for implementing machine learning techniques to find matches in large databases quickly and was exposed as a web application using PHP, Laravel, NGinx and Linux.

Outer Space Sounds, Medellín and Barcelona - *Co-founder and technical lead.*

2015 - 2020

- I've played a key part in taking the company from a simple idea to delivering products to consumers. For this, I've given input for marketing, administrative, logistic and engineering processes. At times when the project was at risk, I took an important role in keeping the project alive by communicating with and encouraging other team members.
- I have implemented all of the software aspects of OSS's products: set up a custom Linux configuration using Buildroot, debugged a Linux audio device driver, implemented synthesis and processing algorithms, performed code optimizations to achieve better performance, wrote low-level code for a multiprocessor environment, among other tasks.
- I collaborated in very minutious sound design processes to achieve desired sound characteristics for musical instruments.
- With help of an industrial designer consultant I created the design of a synthesizer, found manufacturing providers, prototyped and took the device to successful production.
- Designed electronic circuits and software for a prototyping platform.
- I've also taken part in the development of intelligent systems for rhythm and melody generation.

Parque Explora, Medellín - *External Contractor, Luthier and Engineer.*

2017 - 2018

- Parque Explora is an interactive science museum/park. Sala Música is a permanent exhibit that opened in 2018. It receives hundreds of visitors every day.
- I took part in the conceptualization, industrial design and sound design of two electronic musical instruments that are part of the exhibit. The team at Parque Explora highlighted the fluidity of the development process and the final quality of the delivery.
- I led the technical implementation of both instruments. I designed custom PCBs, used arduino microcontrollers, raspberry pi computers, implemented custom hardware for buttons and lights, wrote high level application code and made the final assembly of the instruments.
- I brought a member of the Outer Space Sounds team to implement musical performance algorithms for one of the instruments. Cutting edge machine learning techniques were used to generate musical pieces that the instrument can perform semi-automatically.

Sicor, Integ.ro and Custo Med GmbH, Medellín and Munich (remote)
External Contractor, Software developer. 2018

- A cardiology clinic, a software development studio and a medical equipment manufacturer. These three teams have collaborated in various projects that involve novel clinical investigations and algorithms that can establish the level of cardiac risk of a patient.
- I conducted a large number of sessions with the scientific lead at Sicor to understand the math and algorithms behind their cardiac risk assessment techniques and wrote a software library in the C programming language that implements them. I also wrote an automated testing program for the library that takes data from thousands of patients and compares the outcome of the algorithms with the assessment that actual medics gave to those patients. The library went through a thorough testing process by Custo Med and was included in one of their cardiac pressure monitors.
- Before Covid-19 hit, the device -along with the library- was in the process of approval for sale by European authorities.

Linden Learning, Medellín *Technical Coordinator and Software developer. 2011 - 2013*

- I helped to hire and co-directed a team of 11 programmers. I chose development tools, established development workflows and practices and coached the team into the successful delivery of several software projects (iOs and web applications) for clients in the education and medical industries.
- I designed the technical architecture of a number of projects. In particular, I led the development of Sicor Core, a software system for a clinic with very particular information technology needs. The system has been running successfully for almost a decade and the architecture has withstood several changes and new features implemented by a number of developers.

Studiocom, Atlanta and Bogotá *Director of R&D and Mobile Applications Developer. 2008 - 2011*

- I conceptualized, designed and built prototypes that integrated emerging technologies such as internet connected embedded devices (IoT) and artificial vision algorithms and pitched their integration into digital advertising campaigns. One of these projects involved the construction of a hydraulic-mechanical system controlled by a Facebook application, it was deployed successfully and was nominated as a finalist to best contest/promotion in the OMMA awards in 2011.
- I gave the company the capacity to develop iOS applications, trained a group of programmers and we became one of the first digital media agencies to deploy to Apple's App Store. Most of our clients were fortune 500 companies that obtained hundreds of thousands of downloads for their apps. We were invited by Apple to their WorldWide Developers Conference in 2009.

Academic Experience, Medellín and Cali

2004 - 2015

- I have taught as an external professor in undergraduate electronics and sound engineering programs in Universidad Pontificia Bolivariana and Universidad Buenaventura in Medellin. I have also taken part in research groups in UPB (microelectronics) and Instituto Tecnologico Metropolitano (Computer Music). I have taught extra-curricular courses in programming for mobile devices and interactive media in Universidad ICESI in Cali. I advised a few undergraduate projects, also in ICESI. Informally, I have lead study groups in software development for audio and music.

EDUCATION

- **Master in Music Technology** - *University of Newcastle, Sydney, 2013.*
- **Electronic Engineer** - *Universidad Pontificia Bolivariana, Medellín, 2003.*

PUBLICATIONS

- Daniel Gómez, Rafael Vega, Carlos Arce-Lopera. **Design of a Customizable Timbre Space Synthesizer**. Lecture Notes in Computer Science. 10th International Symposium on Computer Music Multidisciplinary Research (CMMR) Sound, Music and Motion in Marseille. October 2013.
- Rafael Vega, Daniel Gómez. **Using the Beagleboard as Hardware to Process Sound**. 10th Linux Audio Conference, Stanford, California, USA. April 2012.
- Mauricio Vanegas, Rafael Vega, Paulo César Arbeláez. **Design Of A Human Vocal Tract Model on FPGA's**. X Workshop Iberchip, Cartagena de Indias, Colombia, March 2004.