

Rodrigo Savage

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F-1 Student Visa

EDUCATION

University of Arizona (UA)

PhD student in Electrical and Computer Engineering (ECE).

National Autonomous University of Mexico (UNAM)

Bachelor's degree in Computer Engineering. Graduated January 2012

Cumulative GPA: 93.4/100.—

WORK AND RESEARCH EXPERIENCE

- 05/14 – 8/14 [1] **Intel Corporation:** Software developer and researcher internship, worked as an Intel Collaborator, at the Intel Zonelt project. Rebuild Zonelt using the MEAN stack. Made zonelt secured and ready for deployment and mass usage.
- 05/13 – 8/13 [2] **Intel Corporation:** Software developer and researcher internship, worked as an Intel Collaborator, at the Intel Zonelt project. Designed and developed one click automatic GeoFencing using computer vision and linear regression. Wrote 2 patents for Zonelt.
- 07/10- 08/12 [4] **Laboratory of Programmable Logic Devices, ECE dept. at UNAM:** Researcher and software Engineer. Building robots for Micro mouse, Line Maze competition as well as worked on the control of humanoids. Using C, and inline assembly.
- 06/11 – 08/11 [3] **ReConfig Lab, ECE dept. at UA:** Research internship, under the guidance of Dr. Ali Akoglu. Proposed, designed and developed WL_Map. Presented research at the Undergraduate Research Opportunities Consortium (UROC) conference as well in poster session.
- 03/08 – 03/09 [5] **Mexican Council of Science and Technology (CONACYT) in partnership with UC Davis:** Software developer and researcher. Developed and designed a rehabilitation interface for stroke victims using the wiimote. Used DirectX and Streaming SIMD Extensions (SSE) from Intel to improve performance.
- 01/08 - 02/08 [6] **Microsoft Research Laboratory at UNAM:** Teacher, I taught courses on C++, WinApi, Directx. The DirectX course was focused on 3D simulations and 3d game development.
- 06/07 – 07/07 [7] **Microsoft Research Laboratory at UNAM:** Teacher, I taught courses on Flash and Actionscript. The courses were designed for 2D game development.

Technical SKILLS

Programming Languages	
C/C++	8.5 years
ASM (x86,PIC)	3.5 years
VHDL/Verilog	1.5 year
C#	5.5 years
Java	5 years

Computer Graphics	
Direct X	3 years
HLSL	1.5 year
Open GL	4 years
Windows Api (COM)	2 years
3d Game Studio	2 years

High Performance Computing	
CUDA	9 months
VTR	1 year
SSE 4.2	2.5 years
SystemC	6 months

Web Technologies Back End	
Python	3 years
NodeJS	3 years
MySQL, Oracle, MongoDB	1.5 year
MEAN stack	7 months
Socket TCP/UDP	4 years
ASP.NET MVC	1 year
Bash	1 year
PHP	1 year

Web Technologies Front End	
JavaScript, HTML5, Ajax	3.2 years
JQuery, JSON,	2 years
CSS, XSLT, XML	1.5 year
Actionscript	2 years
Angular JS	7 Months

Phone Technologies	
Android	1.5 years

Operating Systems	
Windows	Windows Administrator
Unix (Ubuntu,Debian)	Power User

Developing Tools	
MS Visual Studio	6 years
3dStudioMax	4 years
Render Monkey	1 year
Adobe Flash	5 years
Dreamweaver, Fireworks, Photo Shop	2 years
VIM	1 year
Code Blocks	1 year
Quartus 2.0	1 year
Xilinx ISE	1.5 year
Make File	1 year
CMake	2 year
Eclipse/NetBeans	5 years

Scientific Skills					
Virtual Realty	6 years	User Interface Design	3 years	Scientific Writing	3 years
Team Work	7 years	Robotics & real time systems	6 years	Computer Vision	6 months
Comp. Networking	2 years	Machine learning	6 months	Computer Architecture	2.5 year
Operating Systems	1 year	3d CAD tools	2 years	CAD tools for FPGA	2 year
Power modeling	5 months	Hardware/Software co-design	1 year	Power optimization	1 year
Parallel Systems	2 years	Distributed Systems	1 year	Meta-Modeling	2 years

MAJOR PROJECTS

Fall 2014

Summer 2013 – Summer 2014:

ZONE IT REST: By clicking a building or region on a Google maps viewport displayed on Intel Zonelt webpage, automatic GeoFencing will find the edges of a building or region by using computer vision and curve simplification algorithms. I developed an efficient algorithm for detecting points that where part of the building by using a robotics wall following algorithm to march along the edge and a curve simplification algorithm that uses linear regression to consider abrupt changes of pixels. This was done in C# and integrated as a REST service, used ASP.NET MVC as backend, used Google Maps API, jQuery and HTML5 as front end.

Spring 2013

PSoC 5 SystemC energy modeling: I created a framework that models designs done with a PSoC 5 using System C to estimate running time and power consumption for a given application. I model a neural network and showed a gain up to 7x speedup and 7x in energy savings was achieved compared to the software only implementation, our simulation results were only off by 27% from actual values.

Summer 2011

WL_Map: A wirelength prediction based technology mapping for FPGA. Technology mapping is the first stage of the process of porting an application onto a FPGA architecture. This stage is highly critical as it sets the constraints of its successor stages of clustering, placement and routing. While working in the ReConfig Lab [1] I proposed, designed and developed a novel technology mapping algorithm that uses wirelength prediction of the circuit to reduce by 13.13% the channel width with a tiny overhead of 1.6% critical path delay with respect of Emap, a power aware technology mapper. With my design, the overall size of the final circuit is reduced. For more information please refer to [A1]

Spring 2010 to 2012

Robot Code: Proposed novel educational software in order to teach, motivate and give insight of robotics and algorithms to middle and high school students, Robot Code started as a semester long project, that then evolve into my thesis project and was implemented in several high schools in Mexico City. Robot Code continues to evolve and improve constantly as new features are implemented to satisfy the needs of the students. Students using robot code competed in 2012 in the international Robot Cup Junior Rescue B competition and achieved 19th place.

Winter 2008 to summer 2010

3D Game engine: Designed and developed a 3D graphics framework which supported shaders, terrain, Efficient vector library, lists to hold all objects of the scene, simple physics and efficient collision detection by adding step and ramp functions. Developed and implemented in DirectX 9.0 c, pixel and vertex shader 2.0. SSE 2.0. Continued working in the project and in 2010, designed and implemented a real time vertex animation using vertex shader and 3ds file format, I implemented a hack to extract the animation from 3d Studio Max files.

Winter 2011

InteliMixTouchMouse: Proposed, designed and developed an innovative, mobile DJ application with an intuitive and user friendly interface. Through hand gestures, the application enabled the user to interact with the interface, and perform tasks a professional DJ would normally do on a turntable, such as mix music, play effects, play samples, among other tasks. The gestures were detected on a Microsoft Touch Mouse, using different machine learning techniques. The gesture recognition presented a high accuracy rate of 95%. Additionally our system was also able to automatically detect different material the user wore to interact with the system automatically. The type of material detected, triggered different sound effects. Used Audio DJ Studio and C#. The application was presented at the 24th ACM *User Interface Software and Technology* SYMPOSIUM, SANTA BARBARA, CA, October 16, 2011.

Fall 2011

Search on the Cloud: Proposed, designed and developed a user friendly peer to peer file sharing system. Utilized Pastry as a base for solving the lookup problem and java sockets library for the p2p communication between nodes. Proposed a novel algorithm for distributing files in the pastry ring and a distributed search modality for finding unknown files that had been previously inserted into the ring as well as an innovative secure distributed file system with the ability to assign categories for user files as group files. For more information please refer to [A2].

Winter 2009

Context switching aware Architecture: Worked on a project that improved the pipe-line architecture by eliminating the dependency of data, and the bubbles generated by jumps. Reduced the context switching time to zero; Achieved by having in each stage of the pipe-line a different process, and having a controller that moves memory to an auxiliary collections of registers while the pipe-line is still running. Tested in a FGPA, and developed using Quartus 2.0 and VHDL.

Summer 2009

Differential Par Maze Robot Solver: Designed and developed an AI robot with 2 DC motors, each with its own encoders and 7 infrared sensors. The Robot was controlled by a 16f877A PIC microcontroller. Programmed in C, and inline assembly. This robot won third place on the Robothon competition under the Line-Maze category.

Spring 2009

MS OS: Designed and developed an operating system, from scratch, that supports multitasking, scheduling, IO, and created a file system. Programmed in C with GCC, and Intel x86 assembly.

Summer 2008

Omnidireccional Maze solver Robot: Designed and implemented a prototyped AI robot with 4 Omnidireccional wheels and 12 infrared sensors for tracking the line in a maze. The robot presented 4 speed control motors, and a 16f777 pic.

Fall 2008

Wiifly: Integrated the Wii remote to a gesture therapy system of computer simulated therapy exercises. Utilized the pitch, and roll, from the Wii remote 3D accelerometer to navigate a fly-through of a Direct-X generated terrain. The application implementation cost was significantly reduced. Work Published in Virtual Rehabilitation [A11]. Used DirectX 9 SDK, HLSL, pixel and vertex shader 2.0 and Willib

Winter 2007

Efficient vector class library: Created a library to optimize vector calculations, as cross-product, dot product, and other vector and scalar operations. Used C++, inline assembly and took advantage of Streaming SIMD Extensions (SSE) from Intel.

Summer 2006

Virtual 3D tour in the Mining Palace: Used OpenGL and 3DStudio to develop a virtual environment where the user could feel as if they were navigating inside the "Palacio de Minería". A 3D map was developed, allowing the user to know perfectly where they were located. Developed 3D Agents (tour guides) to help the user reach a pin pointed location on the 3D map as well as provide information.

Fall 2004

Babel's Library: Used 3Dgame studio, 3D max, and C to develop a 3D educational game inspired by Babel's Library story from Borges. In the game, the player was trapped in a library with interlocking hexagonal rooms, to be freed, the user had to read a series of book passages and respond to related questions asked by different librarians. The librarians were each autonomous 3d agents that could interact with the user and the environment.

PUBLICATIONS

- [A1] R. Savage, D. T. Nava, D. Hernandez, RobotCode: Interactive Graphical Robotic Programming Language, Thesis
- [A2] R. Savage, A. Akoglu, S. Thoravi, WL_Map: A wavelength prediction based technology mapping for FPGA, to be publish for the Southern Programmable Logic Conference for SPL2012.
- [A3] R. Savage, D.T. Nava, N.E. Chávez, S. Savage, Search on the Cloud File System, The International Association of Science and Technology for Development to publish for the Parallel and Distributed Computing and Systems (PDCS 2011)
- [A4] R. Savage, N E Chavez, Saiph Savage, M. Baranski, El lugar correcto al tiempo indicado: un novedoso asistente de viaje, CIINDET 2011
- [A5] S. Savage, A. Forbes, R. Savage, N. Chavez, T. Hollerer, Utilizing Crowdsourced Databases for Social Media Question Asking, CSCW 2013 Workshop on Social Media Question Asking.
- [A6] S. Savage, A. Forbes, R. Savage, T. Hollerer, N. Chavez, Directed Social Queries with Transparent User Models, Adjunct Proceedings of ACM Symposium on User Interfaces Software and Technology (UIST'12) October 7-10, 2012 | Cambridge, Massachusetts.
- [A7] J. Savage, R. Savage, E. Jaimes, Obstacle Avoidance Behaviors for Small Mobile Robots Implemented in FPGAs, accepted as a poster for the TMCR 2011 conference.
- [A8] J. Savage, M. Morales, A. Kuri, R. Savage, adaptive FPGA-Based Robotics State Machine Architecture Derived with Genetic Algorithms, the 20th ACM/SIGDA International Symposium on Field-Programmable Gate Arrays
- [A9] N.E. Chavez, R. Savage, J. Savage, Laboratory Assignments to Teach the Basics of Programmable Logic Applied to Mobile Robots, 2010 International Conference on ReConfigurable Computing and FPGAs December 13-15, Cancun, Mexico
- [A10] N.E. Chavez, R. Savage, A.M. Vazquez, PILARICA: A TASK PROGRAMMABLE HEXAPOD ROBOT, 2010 International Conference on ReConfigurable Computing and FPGAs December 13-15, Cancun, Mexico
- [A11] Norma Elva Chávez, Rodrigo Savage (Mexico), Norma Saiph Savage, "Design and Implementation of a CPLD Controlled Android Capable of Performing Diverse Tasks and Avoiding Obstacles" in *ICCE-17 in Honolulu, Hawaii, USA.*, August 1, 2009
- [A12] Norma Elva Chávez, Rodrigo Savage, Ivan Guevara, "DESIGN AND IMPLEMENTATION OF AN ANDROID," in *The 52nd. IEEE International Midwest Symposium on Circuits and Systems (MWSCAS 2009)*, August 2-5, 2009,
- [A13] R. S. Leder, G. Azcarate, R. Savage, S. Savage, L. E. Sucar, D. Reinkensmeyer, Carlos Toxtli, Emilio Roth, Ariel Molina, "Nintendo Wiimote for Arm and Wrist Therapy in Stroke Survivors with Upper Extremity Hemiparesis", *Virtual Rehabilitation*, 2008.

AWARDS

- Startup weekend winner, best team award. Created Hurb. sept, 2014 Tucson Az
- 1000 Pitches best pitch winner for Consumer Products & Small Businesses, Nov 2014 Tucson AZ
- [1] CONACYT scholarship 2012, includes full tuition, living expenses for a total of 5 years, for pursuing a PhD at the University of Arizona.
- [2] Travel grant from the Universidad Nacional Autónoma de México to assist and compete on UIST. 2011.
- [3] Sponsorship from the University of Arizona and Universidad Nacional Autónoma de México to attend the UROC program, and summer of research with the University of Arizona. 2011.
- [4] Participant in RoboCup@Home League Singapore. 2010.
- [5] First place and Third place in the Robothon Competition, Seattle Wa. 2009.
- [6] Second place in the "Mexicano de Robótica" Competition Guadalajara Mexico, 2009.
- [7] Semi finals, The National Mexican Robotic Contest, maze resolution and mini baja. 2008.
- [8] Third place in the Robothon Competition, Seattle Wa. 2007.
- [9] Quarter finalist, on the RoboCup Suzhou China, in the competition of kid size humanoids. 2008.

LEADERSHIP

- Christmas-Marathon-Half-Marathon overall winner, Olympia WA, 2007.
- Rowing national champion single skull, principiantes, Cuemanco, Mexico City, 2008.
- Rowing second place double skull, principiantes, Cuemanco, Mexico City, 2009.
- Volunteer at BitBuckets 2015 as Robotics adviser for high school students, Tucson Az 2015
- Volunteer at Intel Ultimate Engineering Exp as Robotics Coach, Hillsboro OR 2013.