Rodrigo Savage

rodrigosavage@email.arizona.edu

http://www2.engr.arizona.edu/~rodrigosavage/

805-468-5883

EDUCATIONUniversity of Arizona (UA)
PhD student in Electrical and Computer Engineering (ECE).
Research in computer architecture and computer vision
GPA: 3.33
National Autonomous University of Mexico (UNAM)
Bachelor's degree in Computer Engineering. Graduated January 2012
Cumulative GPA: 93.4/100.

WORK AND RESEARCH EXPERIENCE

- 06/11 08/11 [1] **Researcher (internship)** for the ReConfig Lab (<u>http://www2.engr.arizona.edu/~rcl/</u>), ECE Dept. at the University of Arizona under the guidance of Dr. Ali Akoglu. Proposed, designed and developed WL_Map. Presented the research work in the Undergraduate Research Opportunities Consortium (UROC) conference. Presented research in a poster session.
- 07/10-08/12 [2] **Researcher and Software Engineer** for the laboratory of programmable logic devices at UNAM. Building robots for Micro mouse, Line Maze competition as well as worked on the control of humanoids. Using **C**, and inline assembly.
- 03/08 03/09[3] Researcher and Software Engineer for the Mexican Council of Science and Technology in co-
partnership with UC Davis. 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[4] Teacher for Microsoft Research Laboratory in Mexico City, Mexico. Where I taught courses on Basic C++,
WinApi, Directx. The DirectX course was focused on 3D simulations and development of videogames.
- 06/07 07/07 [5] **Teacher** for Microsoft Research Laboratory, Mexico City, Mexico. Taught the courses on Basic flash and Actionscript. The courses were designed for 2D game developers.

Technical SKILLS

Other Skills		Programming Languages		Operating Systems		
Code Blocks	1 year	C/C++	7 years	Windows	Windows	
Make File	1 year	ASM	3.5 years		Administrator	
SSE 4.2	2 year	VHDL	1.5 year	Unix	Power User	
Direct X	3 years	C#	5.5 years	Applications		
HLSL	1.5 year	Java	5 years	Microsoft Visual Studio	6 years	
Open GL	4 years	Actionscript	2 years	3dStudioMax	4 years	
Windows Api (COM)	2 years	JavaScript, HTML, Ajax	2 years	Render Monkey	1 year	
Quartus 2.0	1 year	Python	2 years	Adobe Flash	5 years	
Max Plus 2.0	1 year	CSS, XSLT, XML	1.5 year	Dreamweaver, Fireworks,	2 years	
3d Game Studio	2 years	FLEX	1 year	Photo Shop		
CUDA	9 months	РНР	1 year	MPLAB	1 year	
		Android	1 year			

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			
Networking	2 years	Machine learning	6 months	Computer Architecture	2 year			
Operating Systems	1 year	3d CAD tools	2 years	CAD tools for FPGA	1 year			
Parallel Systems	2 years	Distributed Systems	1 year	Meta-Modeling	2 years			

MAJOR SCHOOL PROJECTS

Spring 2010 to present

Robot Code: Proposed a novel educational software in order to teach, motivate and give incite 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.

Fall 2012

SIFT GPU: Understand and analyzed the current implementation of SIFT GPU, proposed, designed and tested a new memory partition scheme, for nodes running the kernel in the GPU, in order to reduce global memory transactions, modified the Difference of Gausians (DoG) and Laplacian of Gaussian (LoG) approximation.

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, implemented a hack to extract the animation from 3d Studio Max files.

Spring 2012

Fabulous Fred Android Game: Designed and developed a fabulous Fred memory game. Used android to build a user friendly and very artistic application. The application allowed the user by the use of the touch screen device to play a new game, show top 5 players and view an interactive help that explained how to play the game.

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.

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, design 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]

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 Wiilib

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.

Summer 2005

Graphic Calculator: Used C, and flash for graphic display. Developed a 2D calculator that could read and interpret different equations and display its graph by communicating with flash.

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

[A] R. Savage, D. T. Nava, D. Hernandez, RobotCode: Interactive Graphical Robotic Programming Language, Thesis

[A1] R. Savage, A. Akoglu, S. Thoravi, WL_Map: A wirelength prediction based technology mapping for FPGA, to be publish for the Southern Programmable Logic Conference for SPL2012.

[A2] 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)

[A3] R. Savage, N E Chavez, Saiph Savage, M. Baranski, El lugar correcto al tiempo indicado: un novedoso asistente de viaje, CIINDET 2011 [A4] 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.

[A5] 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

[A6] 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

[A7] 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

[A9] 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

[A10] 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,

[A11] 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 Hemipariesis", *Virtual Rehabilitation*, 2008.

AWARDS AND LEADERSHIP

CONACYT scholarship 2012, includes full tuition, living expenses and insurance for a total of 5 years, for pursuing a PhD in the University of Arizona.

Travel grant from the Universidad Nacional Autónoma de México to assist and compete on UIST. 2011.

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.

Participant in RoboCup@Home League Singapore. 2010.

First place and Third place in the Robothon Competition, Seattle Wa. 2009.

Second place in the "Mexicano de Robótica" Competition Guadalajara Mexico, 2009.

Semi finals, The National Mexican Robotic Contest, maze resolution and mini baja. 2008.

Third place in the Robothon Competition, Seattle Wa. 2007.

Quarter finalist, on the RoboCup Suzhou China, in the competition of kid size humanoids. 2008.