

## Eduardo Alberto Cuervo Laffaye

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<b><u>Research Interests</u></b>	I am interested in mobile and ubiquitous computing, distributed systems, networking, power efficiency, security and privacy. For my thesis, I focused on the challenges of improving both the battery life of mobile devices and the quality of the user experience by means of dynamic code offload. I designed, implemented and evaluated systems that addressed these challenges.	
<b><u>Education</u></b>	Aug 2006- May 2012 (Expected)	<b>Duke University</b> , Durham, NC <i>Ph.D. in Computer Science</i> Thesis Title: "Augmenting the mobile experience through code offload" Advisor: Landon Cox Committee: Alec Wolman, Bruce Maggs, Jeff Chase and Romit R. Choudhury <i>M.S. in Computer Science</i> (GPA: 3.6/4.0) Project Title: "CrowdLab: An Architecture for Volunteer Mobile Testbeds"
	May 2000- Dec 2004	<b>Monterrey Tech (ITESM)</b> , Mexico City, Mexico <i>B.S. in Computer Science</i> (GPA: 93/100) Research Projects: <ul style="list-style-type: none"><li>• XML Information Retrieval using SQL2XQuery</li><li>• Enterprise Web Technologies(IBM E-Business Applied Research Center)</li></ul>
	January- August 2004	<b>Carnegie Mellon University</b> , Pittsburgh, PA <i>Computer Science Exchange Student and Research Assistant</i> (GPA: 4.0/4.0) RA Advisor: Lorrie Cranor at the CyLab Usable Privacy and Security Laboratory: <ul style="list-style-type: none"><li>• Upgraded Privacy Bird. A P3P Client for Internet Explorer (C++)</li></ul>
<b><u>Publications</u></b>	<ul style="list-style-type: none"><li>• <b>E. Cuervo</b>, P. Gilbert, B. Wu and L. Cox, "CrowdLab: An Architecture for Volunteer Mobile Testbeds". In <i>Proc. Of the 3rd International Conference on Communication Systems and Networks (COMSNETS'11)</i>, Bangalore, India, January 2011. <b>BEST PAPER AWARD</b></li><li>• <b>E. Cuervo</b>, A. Balasubramanian, D. Cho, A. Wolman, S. Saroiu, R. Chandra, P. Bahl, "MAUI: Making Smartphones Last Longer with Code Offload". In <i>Proc. of the 7th Annual International Conference on Mobile Systems, Applications and Services (MobiSys)</i>, San Francisco, CA, June 2010.</li><li>• P. Gilbert, <b>E. Cuervo</b>, L. Cox, "Experimenting in Mobile Social Context Using JellyNets". In <i>Proc. of the 10th IEEE Workshop on Mobile Computing Systems and Applications (HotMobile)</i>, Feb 2009.</li></ul>	
<b><u>Posters and Demos</u></b>	<ul style="list-style-type: none"><li>• <b>E. Cuervo</b>, "Augmenting the mobile experience through code offload". <i>Mobicom'11 S3 Workshop, PhD Forum</i>, Las Vegas, NV, 2011.</li><li>• <b>E. Cuervo</b>, P. Gilbert, R Choudhury, L. Cox, "COPSE: Toward Concurrent Opportunistic Sensor Environments". <i>SOSP 2007</i>, Stevenson, WA.</li></ul>	
<b><u>Patents</u></b>	<ul style="list-style-type: none"><li>• A. Wolman, S. Saroiu, R. Chandra, P. Bahl, A. Balasubramanian, <b>E. Cuervo</b>, "Energy-aware code offload for mobile devices" U.S. Patent Application 12/724,428, 2010</li></ul>	
<b><u>Work Experience</u></b>	June 2011- Sept 2011	<b>Microsoft Research</b> , Redmond, WA <i>Research Intern, Mobile Assistance Using Infrastructure/Mobile Game Offload</i> Mentor: Alec Wolman
	April 2009- July 2009	<ul style="list-style-type: none"><li>• Designed and built the MAUI framework for WM 6.5 using C#</li><li>• Demonstrated a prototype at the Microsoft Research Faculty Summit 2009</li></ul>

- June 2007-  
Nov 2007      **Nokia Research Center**, Palo Alto, CA  
*Research Intern, An Architecture for Volunteer Mobile Testbeds*  
Mentor: Zhigang Liu
- Implemented / Ported Xen to Nokia N800 (C and ARM Assembler)
- May 2005 –  
May 2006      **Mexican Institute of Social Security / Softtek**, Mexico City, Mexico  
*Software Architect, Economic Services Software product line*
- Defined a high performance, developer friendly web system architecture for a product line of very large systems used nationwide
  - Designed and implemented product line subsystems (Java, Spring, Hibernate)

## Awards

- Best Paper Award, COMSNETS 2011 (Bangalore, India, January 2011)
- Best Poster, Duke CS Graduate Retreat (Haw River, North Carolina, 2010)
- College student of the year, Exp Magazine, now CNN/Expansion (Mexico City, Mexico 2004)
- School of Computer Science Dean's List (Carnegie Mellon University, Pittsburgh PA, Spring 04)
- Best Project Award, Web Application Development (CMU, Pittsburgh PA, Spring 2004)
- 1st Place, 3rd Computer Systems Final Projects Fair. (ITESM, Mexico 2003)
- 2nd Place, 2nd Computer Systems Final Projects Fair. Internet development (ITESM , 2001)

## Research Projects

### **Mobile Assistance Using Infrastructure** (Microsoft Research, Redmond, WA)

Overcoming the resource limitations of mobile devices continues to be one of the biggest challenges faced by the mobile industry. The most important of these limitations is battery capacity. To address this challenge, I built MAUI, a system that enables fine-grained energy-aware offload of mobile code to server infrastructure. MAUI makes offload decisions dynamically by periodically profiling the device, the application and the network and it automates code partitioning by taking advantage of features of managed environments. MAUI can reduce power consumption and improve performance in resource-intensive applications by an order of magnitude, while requiring only simple code annotations.

### **Mobile Game Offload** (Microsoft Research, Redmond, WA)

Games represent a significant proportion of the rapidly-expanding mobile application market. Unfortunately, mobile devices are unable to deliver the sophisticated graphics provided by other high resolution gaming devices such as consoles or high-end desktop computers. I am currently working on a system that moves away from the now popular bandwidth intensive thin-client model, where the game is executed and rendered by a remote server and the output is streamed as compressed video. MAUI++ uses the capabilities of mobile GPUs to reduce the amount of information that a server has to transfer to a mobile device. The end result is a high-quality gaming experience that matches the thin-client model, but with a significant reduction in the network bandwidth required.

### **Fidelity Aware Code Offload** (Duke University)

MAUI proposed a disconnected mode for code-offload enabled applications, in which the mobile device is able to resume execution locally after becoming disconnected from the server. This model, however, can cause applications designed to take advantage of cloud infrastructure to perform poorly in offline mode. Furthermore, applications designed to be responsive even when disconnected may not take full advantage of the infrastructure's resources. I am building a system that allows applications to adapt by means of automatically selecting between different implementations and execution parameters, each of them resulting in different levels of accuracy and performance.

### **An Architecture for Volunteer Mobile Testbeds** (Duke University)

Numerous simulation platforms and synthetic testbeds are available for researchers investigating mobile and wireless systems to run experiments, but no existing option supports experimentation “in the wild” without sacrificing features such as access to low-level wireless state and efficient scheduling of co-local experiment instances. To fill this void, I built CrowdLab, a mobile testbed platform that allows researchers to run guest virtual machines on volunteer devices ensuring efficient use of testbed resources through a new dual-mode networking abstraction and a weakly-consistent, replicated state store called a site directory.

### **Secure Password Entry on Touchscreen Devices** (Duke University)

Smartphone users commonly access cloud-based services through third-party apps. However, this often requires users to entrust third-party apps with their passwords. We built a system that helps protect passwords on touchscreen devices using a trusted custom on-screen keyboard for inputting passwords. The key challenge is detecting if a malicious app is trying to spoof a platform’s trusted interface. Our approach uses fast and robust computer-vision techniques to detect such attacks.

### **University Service**

**Pontificia Universidad Javeriana de Cali**, Colombia (September 2011)

- Master’s thesis committee member
- Thesis: “Bio-inspired sensor network routing” by Juan Carlos Blandón

**Universidad Autónoma de Occidente**, Cali, Colombia (November 2011)

- Research grant proposal peer reviewer.

### **Teaching**

**Duke University, Durham, NC**

- CPS110: Operating Systems, Teaching Assistant, Duke University (Fall 2006, Fall 2010)

**Monterrey Tech (ITESM), Mexico City, Mexico**

- Workshops on VB and C++ for Java Developers, Instructor, ITESM, Mexico City (2001-2002)

**SIIE, Mexico City**

- Instructor for Crystal Enterprise and J2EE Workshops. (Oct 2002-Dec 2002)

### **Invited talks/ Guest lectures**

**Duke University, Durham, NC**

- Guest lectures for Graduate and Undergraduate OS courses
  - Lectures: Remote Procedure Calls
  - Virtual Machines
  - “Making Smartphones last longer with code offload” (Fall 2011, Spring 2011, Fall 2011)

**Monterrey Tech (ITESM), Mexico City, Mexico**

- Guest lecture for Advanced Operating System
  - “Experiences implementing a Java RMI like RPC infrastructure” (Spring 2005)

**Telefónica, Barcelona, Spain**

- Invited talk: “Augmenting the mobile experience through code offload” (October 2011)

### **Leadership**

**Duke University , Durham, NC**

- Communications Committee Student Representative (2011)
- Graduate Recruitment Coordinator (2010)
- International House Orientation Peer (Aug 2009- Present)

**Association of Computer Science and Engineering Students, Monterrey Tech (ITESM), Mexico**

- System administrator, workshop coordinator and developer for the association applications
- Participation in the organization of two symposia and two conferences on computer science

### **Professional Activities**

- Reviewer for the IEEE Transactions on Mobile Computing
- External Reviewer for HotMobile 2012, SOCC 2011, LCN 2009 and VLDB 2008

- MobiSys 2010 Conference Report for IEEE Pervasive Computing

**Technical Skills**

**Languages**

C, C++, C#, Java, VB/VB.NET, x86/ARM Assembler, Scheme, Perl, SQL

**OSes**

Windows, Linux, Solaris, Windows Mobile 6.5, Windows Phone 7, Android, Meego

**Technologies**

VStudio, Eclipse, .NET, Silverlight, WCF, H.264, Xen, Azure, Spring, Hibernate

**Languages**

- Spanish (Native)
- English (Fluent)
- French (Basic)

## References

### **Landon Cox**

Thesis Advisor  
*Associate Professor*  
Department of Computer Science  
Duke University  
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### **Stefan Saroiu**

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*Researcher*  
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### **Alec Wolman**

Mentor at Microsoft, Thesis Committee  
*Senior Researcher*  
Mobile Computing Research Center  
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### **Victor (Paramvir) Bahl**

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