

Kirti Chawla

Room: 430, Seat: 009, Rice Hall
Department of Computer Science
University of Virginia, Charlottesville, VA, 22904

Email: kirti@cs.virginia.edu
Web: <http://www.cs.virginia.edu/~kc5dm>
Cell: +1 858 705 3795

RESEARCH SUMMARY

My primary research interests involve interplay between RFID, Sensors, Algorithms, Embedded Systems, and Robotics. In particular, I invent techniques, methodologies, tools, and novel prototypes with applicability to Ubiquitous Computing. I am also interested in design, implementation, performance evaluation, and optimization of experimental systems.

EDUCATION

University of Virginia, Charlottesville

Ph.D., Computer Science

Thesis: Ongoing

Advisor: Dr. Gabriel Robins

GPA: 3.84/4.00

Virginia, USA

Expected 2013

Indian Institute of Technology, Roorkee

M.Tech., Information Technology with High Distinction

Thesis: Design and Framework of Distributed Signal Processing System

Advisor: Dr. R. S. Anand

CGPA: 8.63/10

Class Rank: 4 out of 60 students

Uttaranchal, India

Spring 2003

Amravati University, Amravati

B.Engg., Computer Science & Engineering with High Distinction

Thesis: System Software Augmentations to Network Operating System

Advisor: Prof. S. B. Wankhade

Overall Percentage: 78.462/100

Final Year Percentage: 82.40/100

Class Rank: 2 out of 75 Students

Maharashtra, India

Summer 2001

TECHNICAL SKILLS

Programming Languages: C, C++, MS VC++, MS eVC++, C#, Assembly, and Shell Scripts

Operating Systems: Windows 9x/NT/2K/Vista/PocketPC/Mobile, FreeBSD, Linux, Solaris, and VxWorks

Research Platforms: RFID, WISP, Accelerometers, Bluetooth, Mobile Phones, PDAs, Motes, Robots, and Wi-Fi

Integrated Development Environment: Visual Studio, Eclipse, KDevelop, IAR Workbench, Wind River Tornado, and ARM CodeWarrior

Compiler Tools: GNU Tool Chain, GNU ARM Tool Chain, and Visual Studio Tools

Architectures: x86, ARM, StarCore DSP, TI MSP430, and PARAM 10000

Toolkits and Protocols: Rational Rose, Minitab, OpenSSL, Orange Canvas, and IPsec

RELEVANT GRADUATE COURSES

Cyber-Physical Systems, Security Seminar, Operating Systems, Design and Analysis of Programming Languages, Statistics for Engineers and Scientists, Design and Analysis of Algorithms, Computer Architecture, Principles of Cryptography, Independent Study (in Cryptography), and Theory of Computation

EMPLOYMENT

Stealth Mode Startup

Co-Founder

Product Theme: Real-time Location Systems

Research and Development Summary:

- Research and develop real-time location systems
- Identify use-cases and potential markets
- Secure intellectual property
- Recruit and nurture talented researchers and engineers

Charlottesville, USA

2011-Till Date

University of Virginia

Research Assistant, Department of Computer Science

Research Theme: RFID, Algorithms, Security, and Ubiquitous Computing

Mentor(s): Dr. Gabriel Robins

Research and Development Summary:

- Researched RFID-based object localization
- Developed algorithms for locating objects using RFID technology
- Designed robots as test harness for localization experiments
- Conceptualized RFID-based wireless glove for gesture-based computing
- Identified covert channel problem in RFID-enabled supply chains

Links:

http://www.cs.virginia.edu/~kc5dm/research/rfidloc_ijrfita2011.pdf

http://www.cs.virginia.edu/~kc5dm/research/supplychain_rfidsec2010.pdf

<http://www.cs.virginia.edu/~kc5dm/posters/PB240448.AVI>

Charlottesville, USA

2007-Till Date

Indian Institute of Technology, Kanpur

Senior Project Associate, Prabhu Goel Center for Computer and Internet Security

Research Theme: Network and Computer Security, and RFID

Mentor(s): Dr. Manindra Agrawal, and Dr. Rajat Moona

Research and Development Summary:

- Conceptualized Xilinx FPGA platform based bulk encryption device
- Visualized network topology for the device
- Implemented a prototype device and related demo/test applications
- Demonstrated Windows CNG SDK based approach to add custom ciphers
- Developed ST Microelectronics platform based RFID anti-theft device

Links:

<http://www.security.iitk.ac.in/index.php?page=contents/projects/bed/bed>

<http://www.cs.virginia.edu/~kc5dm/projects/newcrypt.pdf>

http://www.cs.virginia.edu/~kc5dm/research/antitheft_wcsn2007.pdf

Uttar Pradesh, India

2006-07

Samsung Semiconductor R & D Center, Giheung

Research Engineer, System Software Lab

Research Theme: Distributed Multiprocessor Architecture, and Security

Mentor(s): Dr. J. H. Chang

Research and Development Summary:

- Worked on ARM 926EJS, StarCore DB1400, and consumer device platforms
- Demonstrated bus-level shared memory interconnect functionality
- Investigated ciphers portability on constrained consumer devices
- Improved performance of RC4, DES, and ECC ciphers by 56 % on ARM 940T

Links:

<http://www.cs.virginia.edu/~kc5dm/projects/sharedmemory.pdf>

<http://www.cs.virginia.edu/~kc5dm/projects/sharingtaskswitch.pdf>

Suwon, South Korea

2005-06

Samsung Electronics Limited, Bangalore

Senior Software Engineer (R & D), Chip-Memory and Media Platform Group

Karnataka, India

2003-05

Research Theme: SoC based Network Routing, Embedded Systems, and Security**Program Manager:** Mr. Jailendra Kumar**Research and Development Summary:**

- Developed digital rights management framework for consumer devices
- Implemented USB host device driver for SoC based network router
- Conceptualized unified device driver for 16 and 32-bit hot-swappable cards
- Designed endian-free DES and 3DES device driver for SoC network router

PATENTS, COPYRIGHTS, CONCEPT IDEAS, PUBLICATIONS, PROJECTS and COLLOQUIUMS**Patents**

- K. Chawla, and G. Robins
Method, System and Computer Program Product for Low-Cost Power-Provident Object Localization using Ubiquitous RFID Infrastructure.
UVA Patent Foundation, University of Virginia, USA, 2010
Application Number: 61/386,646 (PCT Application Filed)
- K. Chawla, P. Gupta, and S. K. Vuppala
System and Method for Real-time Theft Detection.
SET Labs, Infosys Technologies Limited, USA and India, 2009
Application Number: 61/201,598 (Listed on USPTO)
- K. Chawla, S. Joshi, and S. K. Mishra
A Biometric Security Framework for Group Access to Digitally Enabled Applications.
Mobile Platform Group, Samsung Electronics Limited, India, 2007
Application Number: 777/CHE/2005 (Listed on BigPatents)

Copyrights

- K. Chawla, and G. Robins
An RFID-based Object Localization Framework.
United States Copyright Office, USA, 2011
Registration Number: TXu001766418/2011-07-15

Concept Ideas and Prototypes

- K. Chawla, and G. Robins
Ubi-Glove: A WISP-Based Multi-purpose Ubiquitous Computing Tool.
Engineering Open House, University of Virginia, USA, 2010
- K. Chawla, G. Robins, and L. Zhang
HIVE: Hyperlinked and Interactive RFID-Response Ecosystem.
Engineering Open House, University of Virginia, USA, 2010

Publications**Book Chapters**

- K. Chawla, and G. Robins
Addressing Covert Channel Attacks in RFID-Enabled Supply Chains.
Advanced Security and Privacy for RFID Technologies, IGI Global, USA, 2011

Journals

- K. Chawla, and G. Robins
An RFID-Based Object Localization Framework.
International Journal of Radio Frequency Identification Technology and Applications, Inderscience Publishers, USA, 2011

Conferences and Workshops

- K. Chawla, G. Robins, and L. Zhang
Efficient RFID-Based Mobile Object Localization.
Proceedings of IEEE International Conference on Wireless and Mobile Computing, Networking and Communications, Canada, 2010
- K. Chawla, G. Robins, and L. Zhang
Object Localization using RFID.
Proceedings of IEEE International Symposium on Wireless and Pervasive Computing, Italy, 2010
- K. Chawla, G. Robins, and W. Weimer
On Mitigating Covert Channels in RFID-enabled Supply Chains.
Proceedings of Workshop on RFID Security, Singapore, 2010
- K. Chawla, P. Gupta, and S. K. Vuppala
Towards Quasi-realtime Theft-evident Mechanism for Portable Artifacts using Near-field RFID.
Proceedings of IEEE International Conference on Wireless Communication and Sensor Networks, India, 2007
- K. Chawla
SIGNIFY - Design and Framework of Distributed Signal Processing System.
Proceedings of ACS/CSI International Conference on Advanced Computing and Communications, India, 2005

E-prints

- K. Chawla
A 3D RGB Axis-based Color-oriented Cryptography.
Computing Research Repository, Arxiv.org, USA, 2005
- K. Chawla
ZEUS - A Domain-oriented Fact Comparison based Authentication Protocol.
Computing Research Repository, Arxiv.org, USA, 2005

Selected Projects

- K. Chawla
Improving Group Dynamics of Mobile Robots through SensoRFID Confluence.
Department of Computer Science, University of Virginia, USA, 2010
Link: <http://www.cs.virginia.edu/~kc5dm/projects/groupdynamics.pdf>
- K. Chawla
Analyzing and Safeguarding Human-Kinesics Information in Wirelessly Instrumented Space.
Department of Computer Science, University of Virginia, USA, 2009
Link: <http://www.cs.virginia.edu/~kc5dm/projects/instrumentedspace.pdf>

- K. Chawla, and T. Siddiqua
Mutation Resistant Runtime Code using Kernel Attestation.
Department of Computer Science, University of Virginia, USA, 2009
Link: <http://www.cs.virginia.edu/~kc5dm/projects/ossec.pdf>
- K. Chawla, and T. Siddiqua
Linux Vs FreeBSD – Comparing Kernel Performance.
Department of Computer Science, University of Virginia, USA, 2009
Link: <http://www.cs.virginia.edu/~kc5dm/projects/osperf.pdf>
- K. Chawla, and T. Siddiqua
SimHAT – Simulated Hardware based Attestation Evaluation Tool.
Department of Computer Science, University of Virginia, USA, 2007
Link: <http://www.cs.virginia.edu/~kc5dm/projects/simhat.pdf>

Colloquiums

- K. Chawla
A Discourse on Flush – A Reliable Bulk Transport Protocol for Multihop Wireless Networks.
Department of Computer Science, University of Virginia, USA, 2010
- K. Chawla
Analyzing and Safeguarding Human-kinesics Information in Wirelessly Instrumented Space.
Department of Computer Science, University of Virginia, USA, 2009
- K. Chawla
How to Generate Random Numbers on RFID Tags.
Department of Computer Science, University of Virginia, USA, 2009
- K. Chawla
Mitigation of Covert Channels Embedded within RFID-enabled Supply Chains.
Department of Computer Science, University of Virginia, USA, 2008
- K. Chawla
Optimization of Exponentiation Operation.
Department of Computer Science, University of Virginia, USA, 2008
- K. Chawla
Biometrics.
Media Platform Group, Samsung Electronics Limited, India, 2005
- K. Chawla
Cryptographic Protocols.
Media Platform Group, Samsung Electronics Limited, India, 2005
- K. Chawla
Cryptographic Algorithms.
Media Platform Group, Samsung Electronics Limited, India, 2004
- K. Chawla, and S. K. Mishra
RTOS - Design and Implementation.
Media Platform Group, Samsung Electronics Limited, India, 2004

- K. Chawla
Distributed Signal Processing.
Department of Electronics and Computer Engineering, IIT Roorkee, India, 2002

ACADEMIC AND EXTRAMURAL HONORS

- *Member of the Finalist Team – University of Virginia Entrepreneurship Cup*
University of Virginia, Charlottesville, USA, 2011
- *Member of the 2nd Prize Winning Team – Best Awe-Inspiring Research Lab Competition*
Department of Computer Science, University of Virginia, Charlottesville, USA, 2011
- *Member of the Winning Team – SEAS Entrepreneurial Concept Competition*
School of Engineering and Applied Science, University of Virginia, Charlottesville, USA, 2011
- *Invited Membership – One of the Top 15% Students at the University of Virginia*
Golden Key International Honour Society, USA, 2011
- *RFID Security and Privacy Workshop – Travel Grant.*
Organized by Microsoft Research, Dartmouth College, University of Massachusetts, Amherst, and NSF, USA, 2011
Link: <http://www.rfid-cusp.org/rfidsec/index.php>
- *Cyber-Physical Systems Summer School Scholarship.*
College of Engineering, Georgia-Tech, USA, 2010
Link: <http://users.ece.gatech.edu/magnus/CPSschool.html>
- *Selected for Workshop on RFID Security – Theory and practice.*
Organized by RSA Security, Intel Research, University of Massachusetts, Amherst, and Johns Hopkins University, USA, 2008
Link: http://www.rfid-cusp.org/workshop/2008/post_workshop.html
- *Graduate Research Scholarship.*
Department of Computer Science, University of Virginia, USA, 2008-Till Date
- *Graduate Teaching Fellowship.*
Department of Computer Science, University of Virginia, USA, 2007
- *Student Host - Engineering Career Days.*
School of Engineering and Applied Sciences, University of Virginia, USA, 2007
- *Appreciation from Microsoft CNG SDK Group.*
Microsoft Corporation, USA, 2007
Link:
<http://blogs.msdn.com/karinm/archive/2007/02/02/india-is-feeling-the-wow.aspx>
<http://blogs.msdn.com/b/karinm/archive/2008/06/25/rising-star-kirti-chawla-cryptography-and-rfid.aspx>
- *Selected for Algorithms, Cryptography, and Complexity Summer School.*
Organized by Microsoft Research, IISc Bangalore, IIT Madras, and INDO-US Science and Technology Forum, India, 2006
Link: <http://math.iisc.ernet.in/~imi/sacc.htm>
- *Noteworthy Contribution Award – \$1000 with Citation (shared-prize).*
Chip-Memory Platform Group, Samsung Electronics Limited, India, 2004

- *Man of the Match – Corporate Cricket Tournament.*
Samsung Electronics Limited, India, 2004
- *Member of Senate – Placement Cell.*
Indian Institute of Technology, Roorkee, India, 2003
- *All India Rank 29 – Competitive Graduate Admission Examination.*
Indian Institute of Technology, Roorkee, India, 2001
- *Adjudged Best Amongst Outgoing Students.*
Department of Computer Science & Engineering, Amravati University, India, 2001
- *National Level Participant – Programming and Seminar Contest.*
Department of Computer Science & Engineering, Amravati University, India, 2001
- *Best Project Award.*
Department of Computer Science & Engineering, Amravati University, India, 2001

SERVICE AND PROFESSIONAL AFFILIATIONS

- *Reviewer – Journals/Conferences/Workshops.*
Ad Hoc Networks, Elsevier, 2011
Transactions on Industrial Electronics, IEEE, 2011
International Journal of Radio Frequency Identification Technology and Applications, Inderscience, 2010
Journal of Systems and Software, Elsevier, 2010
Information Systems Frontiers – Advances in RFID Technology, Springer, 2009
Research Letter in Electronics – RFID Track, Hindawi, 2008
International Workshop on RFID Technology, 2008, 2009, 2010
- *Member.*
IEEE, ACM
- *Life Member.*
Cryptology Research Society of India, Indian Statistical Institute, India
- *Co-Founder.*
Linux USER Group, Indian Institute of Technology, Roorkee, India