Curriculum Vitae: Roy Want

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Research Interests

Mobile & ubiquitous computing, location & context-aware systems, indoor positioning an navigation, electronic tagging (RFID/NFC/BLE), hardware design, electronic commerce, smart cards, distributed systems, multimedia systems, cellular automata, novel UI, and MEMS.

Professional

- ACM SIGMOBILE Outstanding Contribution Award (OCA) 2019:
"For Hardware and Software Contributions to the Conception and Practice of Context-Aware Mobile Computing"
- ACM SIGMOBILE: Test-of-Time Award for “The Active Badge Location System” (June 2016)
- ACM Ubicomp 2012: Ten-year Impact Award: "The Personal Server: Changing the Way We Think about Ubiquitous Computing." Roy Want, et al., Ubicomp 2002
- ACM Fellow: 2005, and ACM (Association of Computer Machinery) member since 1996.
"Contributions to Mobile and Ubiquitous Computing"
- IEEE Fellow: 2005 and IEEE (Institute for Electrical and Electronic Engineers) member since 1991.
""Contributions to Ubiquitous Computing"
- National Academy of Engineering (NAE). Lillian Gilbreth Lectureship, Lecture: "The Personal Server (Intel Research)”, Washington DC, Oct 12th, 2003

Education

- Ph.D. Cambridge University UK, Churchill College, Computer Science, Advisor: Roger Needham, 1983-88
  - Thesis title: "Reliable Management of Voice in a Distributed System"
- BA hons. Cambridge University UK, Churchill College, Nat. Science/Computer Science, Tutor: Frank King, 1980-83
  - Dissertation title: “A Local Area Network (LAN) Based on the Domestic Mains Supply”
- High School: William Ellis Grammar School, London UK, 1972-79

Experience

- Google Inc. (2011-present)
  - **Principal Scientist**: Google Research and Android Location & Context Team
- Intel Corporation (2001-2011)
  - **Senior Principal Engineer** (SPE)
  -Assoc. Director: ILSC (2009-10) & Director (NPL) 2010-11

- Xerox - Palo Alto Research Center (PARC). Computer Science Laboratory (CSL). 1991 - 2001
  (reporting to Mark Weiser, Laboratory Manager for CSL; CTO)
  - **Principal Scientist**: Embedded Systems Group
- Olivetti Research Ltd (ORL) 1988-1991, Member of Research Staff, Cambridge, UK
  (reporting to lab director, Dr. Andy Hopper)
- Cambridge University - Research Assistant 1987-1988
- IBM Zurich: Internship summer 1986 (supervisor Dr. Robin Williamson)
- Notting Dale Technology Center, Development Eng. London UK, 1981-83 (reporting to Anthony Hoskyns)
- Notting Dale Microprocessor Training Centre, Instructor, London 1980 (reporting to John Severn)

Technical Leadership

Please refer to the Publications section for technical papers associated with the projects listed below:

[Google] Technical Lead for 802.11mc Support in Android, and Next Generation Indoor Location Protocols: Driving Android technical direction for Time-of-Flight (ToF) based indoor-location (~1m) using the IEEE 802.11mc protocol. Current work includes: launch of WiFi RTT (11mc) API in Android P (https://bit.ly/2Rmi7Uv), presented at GoogleIO'18 (https://bit.ly/2FiJ6cX); IEEE Standards development for future indoor-location protocols through the IEEE 802.11az Next Generation Positioning (NGP) [now in Android] and the 802.11bk 320 MHz Positioning Task Groups; serving as Technical Editor for both. This work enables fine-grained context-aware operation for 3+ billion devices.

[Google] Design of the Eddystone Bluetooth LE Beacon Standard and Application to the Physical Web 2013-2017: Eddystone is an Android BLE beacon standard that enables context-aware computing. In its initial release, three wireless broadcast frame types are supported 1) UUID (Unique IDs), 2) URL (web addresses), and 3) TLM (Telemetry). The UUID frames are processed by various Google services including Google Mobile Maps (GMM); URLs are also used by the Physical Web framework, and can be resolved by any service using DNS. The Android Chrome browser can also listen for these URLs and provide access to web pages associated with beacons in based on their proximity. As such these beacons can enable discovery and means to control the Internet of Things; finally, TLM packets provide telemetry for the state of a beacon i.e., signaling its battery needs to be replaced.

[Intel] Dynamic Composable Computing (DCC) 2007-2010: An exploration of mechanisms that enable collections of mobile-computers to dynamically combine their physical resources, and build logical computing-platforms on the fly. This is achieved by connecting and sharing various system components using wireless links (e.g., displays, storage, networks, processing, peripherals and sensors). A significant enabling technology for this work was the availability of UWB radios providing link speeds of 480Mbps which are comparable with wired connections, thus removing the bottleneck associated with traditional short-range wireless communication. Key ideas underpinning the research encompass: *composition* - the ability to discovery and connect together a multi-device system*; resource abstraction and sharing* - defining how hardware resources can be universally shared between devices; and *power monitoring and control* – enabling multi-device systems to use power in an optimal way, extending operating time and boosting the performance of a composed system. This work has already demonstrated how generalized composition can be a powerful tool, allowing integration of Intel's core platforms to achieve a compelling user experience.

[Intel] Recognized Authority on Radio Frequency Identification (RFID): Over the last 20 years became an authority on RFID technology, building on the "Bridging Real and Physical worlds" project at Xerox PARC in 1998. This has resulted in various invited works; a Scientific American paper in 2004 (worldwide distribution), ACM Queue special issue on "The Magic of RFID", and an invited book in the Morgan & Claypool, Synthesis Lecture Series for Mobile and Pervasive Computing, "RFID Explained: A Primer on Radio Frequency Identification Technologies". This has also led to many invited presentations and various consultancy roles.

[Intel] Personal Server (PS) 2001-6: Recognizing the limitations of small mobile computers imposed by small displays and keyboards, in 2001 the goal of this project was to overcome these limitations, drawing from improving technology trends in mobile processing power, standardized wireless networks and high-density storage. By enabling users to wirelessly interact with small mobile computers through nearby full-size displays and keyboards, they have the advantage of a small pocket-sized computer without being encumbered by the interface requirements

required by enterprise applications, originally designed for desktop monitors. In the PS system, displays attached to computers in the infrastructure are used as thin-clients to access services on the personal server device. This approach reverses the traditional client/server role for mobile devices, and demonstrated a novel mobile architecture with features that made it easy to use, secure, and power efficient. It also demonstrated the ability to integrate the Personal Server with the Digital Home environment, streaming audio and video for long periods of time while employing effective power-management. To gain experience with the personal server concept, the Stargate embedded research platform was designed and became widely adopted by the sensor-network and robotics academic community. It is based on the XScale processor with the flexibility & resources to run the Linux OS, incorporate high-density storage and utilize multiple radio-standards. The Stargate design was later licensed to Crossbow (ICAP portfolio company), selling over 5000 units from 2002-2007, and has become the mobile research platform of choice for numerous groups, indicated by the volume of conference whitepapers that reference it. In the technology transfer phase of the Personal Server project, the system was also ported to a *commercial cell phone* (the Motorola e680), demonstrating the technology concept was ready for commercial applications and could be delivered in the popular smart phone format. Some of the major contributions of this project were 1) ease-of-use: wireless connection by using a PS based camera-phone to take a photo of a 2D barcode displayed on a PC; 2) access control: through a photo based challenge/response protocol 3) low-power design: using WiFi & Bluetooth in a multi-radio configuration applying a power/bandwidth optimization policy to switch between them; 4) standardization: The first DLNA compatible media-server to run on a cell phone over Bluetooth/PAN; 5) full computing access using a logical frame-buffer: an extension to VNC to provide either, local access to data on a cell-phone-sized screen or, a full-size virtual OS desktop (rendered in memory with no physical display) accessed wirelessly from a nearby PC with a full-sized monitor. The Personal Server has been used to show futuristic path-finding concepts in both Intel's CCF program and in Intel Labs, *Carry Small, Live Large* focus area.

[PARC] Embodied UIs for Mobile Devices 1997-2000: The first use of non-traditional sensor-based UIs *(also referred to as Embodied UIs)*: A project with an objective to improve the user interfaces of mobile devices (e.g., cell phones, PDAs, e-books, tablet computers), using sensors integrated into the exterior housing of the device. It also demonstrated the opportunity for location-based data-services by combining a wireless tablet with an RFID tag reader. The prototype tablet could acquire data from nearby tags, and present related information based on interactions with the world-wide-web, simply by being in the locality of RFID tags placed throughout the PARC building. This work resulted in the first publications to discuss the merits of sensor and tag based UIs for mobile devices. The *Embodied UI work was compelling enough that it* persuaded Fuji-Xerox (FX) to commission the PARC Embedded System's group to design and build a novel PDA, called Hikari, incorporating a 2D-tilt based user-interface to control menus and data selection. Fifty units were delivered to Fuji Xerox for product evaluation. Today, sensor based UIs are an integral part of the two major mobile OS platforms: iOS and Android.

[PARC] MEMS processes & displays 1999: An exploration of standard MEMS processes to create mechanical bi-stable displays. This work was based on the MCNC MUMPS process. A MEMS based pixel was designed and built that used a rectangular silicon flap, hinged on one edge, black on one side and white on the other. The color of the pixel presented being determined by whether the flap lay to the left or right. Using an ITO glass sheet above the structure, a potential could be applied between it and the Si substrate, attracting the flap to the vertical position. Removing the potential, and reapplying it to one of two electrode plates on either side of the hinge, the flap could be directed to fall dark, or light, side up. Working models of the pixels were demonstrated.

[PARC] ParcTab 1991-5: The first context-aware mobile computer system: A project established to explore mobile system concepts around the notion of ubiquitous computing, leading to the design of the first context-aware mobile computer. The system was designed around a network of Infrared base-stations, supporting a microcellular communication node in each room, and mobile devices carried by users, called ParcTabs. The ParcTab communicated through a custom diffuse infrared network, and served as a pen input & display device, providing a remote IO capability for applications running on servers attached to the wired network. In this system, the mobile processing limitations characteristic of small embedded microprocessors in the early 90's, were mitigated by the high performance of the network accessible workstations. ParcTab was designed to be location-aware; allowing applications to determine their location (micro-cell), and the other devices that were located nearby. This gave rise to the first context-aware mobile applications. For example, file browsers customizing their file-view based on their location and who else was nearby; and activating services by proximity, such as printing and environmental light and temperature controls. All mobile hardware, base-station infrastructure and software components used in the system were designed in-house. ParcTab was shown at Expo'92 and later used in collaborations with CMU, EuroPARC, the University of Washington and University of Toronto.

[Olivetti Research] The Active Badge Location System 1988-91: The first in-building wireless location system based on electronic badges, which resulted in a seminal reference for location-based and context-aware services. The core of the system was designed around a building-wide network of detectors that received periodic diffuse infrared emissions from small wearable electronic-badges ("Active Badges"). Both detectors and badges employed unique IDs and the system was able to collect and integrate this information at a server, providing an operator with a map showing user locations, and the closest phones nearby. The system was originally deployed as a receptionist's aid at Olivetti Research in the UK. A network service interface was also available allowing the development of networked location-based services. Over 1000 active badges were built and distributed to support research programs at the MIT Media Lab, EuroPARC, Olivetti CA, DEC SRC, DEC WRL and Xerox. An ACM TOIS'92 paper on this topic is now widely cited. The Active Badge system became a product for Olivetti North America in 1993.

[Olivetti Research] Pandora [Audio] 1990: Pandora, a multimedia terminal designed in early 1990, enabled the exploration of network video and audio services using a high-speed Local Area Network (LAN). The system, based on the Cambridge Fast Ring (CFR) 100Mbps network, had an order of magnitude more channel capacity than was available in commercial LAN products at that time, and through its slotted-ring design, inherently provided fair bandwidth-sharing at the physical layer. The Pandora audio module provided both a POTS telephone handset interface and a hands-free capability. Pandora was one of the first systems to be widely deployed, providing both audio & video telephony, and media storage services using a local area network.

[Cambridge University] Integrated Services Local Area Network Development (ISLAND) 1983-87: The ISLAND project supported Want's PhD thesis, "Reliable Management of Voice in a Distributed System". This work set out to understand the design of distributed systems that could provide voice services with similar reliability attributes as found in commercial telephone systems. This thesis examines the design issues at various levels of the system stack from physical to application layer and compares the LAN-based distributed approach with PABX solutions. Using trace parameters from a prototype implementation, the research evaluated how increasing service availability can be used to increase system responsiveness while improving service availability. This was achieved through the use of service replicas operating in parallel. A prototype was implemented and served as an experimental phone system at Cambridge University Computer laboratory from 1986-1988.

[IBM] Hardware support for protocol design 1986: an internship project that evaluated the design of general purpose hardware architectures to mitigate software bottlenecks during the execution of a protocol stack. The research was informed by traces and analysis of a layer-4 implementation of the OSI protocol stack. A notable outcome of the work was a hardware design for network flow-control and sequence number management.

[NTSC] ISIS project 1981-83: a project funded by London's Education Board to enhance learning in the High School Physics and Chemistry curriculum using classroom computers to control and monitor standard laboratory experiments. The goals of this project were achieved through the design and implementation of ISIS, a physical interface providing analog and digital IO capabilities that could be queried, or controlled, by a computer. A unique feature of ISIS was its integration with the BASIC programming language. Variables with special properties were integrated to mirror the state of ports accessible through physical connections e.g., assigning #O1=3.5, would set output O1 to 3.5 Volts. Likewise the potential across an input could be read by simply printing the state of a variable, e.g. PRINT #V1. Four systems were designed and built for evaluation.

[NDMTU] Industry Microprocessor Training 1980: developed course materials, documentation, code and hardware test modules, for a hands-on microprocessor training course targeted at process control engineers. Students learned how to write programs designed for real-time control, and validated the lessons by creating applications to control and monitor a collection of motors, actuators, sensors, switches, indicators and displays.

Publications

IEEE 802.11 Standards

- **IEEE 802.11bk (320MHz Positioning)** *"IEEE Standard for Information Technology--Telecommunications and Information Exchange between Systems - Local and Metropolitan Area Networks--Specific Requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY)*

Specifications Amendment 3: 320MHz Positioning", published 5th September, 2025 (Technical Editor)

- **IEEE 802.11az (Next Generation Positioning (NGP))**, "IEEE Standard for Information Technology--Telecommunications and Information Exchange between Systems Local and Metropolitan Area Networks--Specific Requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications Amendment 4: Enhancements for Positioning", published 3rd March 2023, (Technical Editor)

Conference Papers

- "Wi-Fi One-Sided RTT for Precise Indoor Localization", *Ali A. Abdallah, Roy Want, Etienne Le Grand, Google*, September 8-12, Baltimore Inner Harbor, Maryland, ION GNSS+, 2025.

- "*Multi-User Operation in mmWave Wireless Networks*" IEEE International Conference on Communications (ICC), Kyoto, Japan 5-9th June 2011. DOI/10.1109/icc.2011.5903192

- "*Directional CSMA/CA Protocol with Spatial Reuse for mmWave Wireless Networks", Gong, M.X. Akhmetov, D. Want, R. Mao, S., IEEE GLOBECOM 2010, 6-10 December, Miami Florida, DOI/10.1109/GLOCOM.2010.5684226*

- CSMA/CA MAC Protocol for Multi-User MIMO Wireless LANsIEEE GLOBECOM 2010, Miami, Florida, 6-10th December, 2010, DOI: 10.1109/GLOCOM.2010.5684351

- "What Do You Bring To the Table? Investigations of a Collaborative Workspace"**,** Trevor Pering, Kent Lyons, Roy Want, Mary Murphy-Hoye,*(Intel)*, Mark Baloga, Paul Noll, Joe Branc, Nicolas De Benoist, (*Steelcase),* ACM Ubicomp 2010, 26-29th September, Copenhagen, Denmark.

- "Training Protocols for Multi-user Wireless LANs", IEEE PIMRC 2010, Michelle Gong, Eldad Perahia, Roy Want and Shiwen Mao, September 2010. Istanbul, Turkey, 26-29th September 2010.

- "Multi-Display Composition: Supporting Display Sharing of Collocated Mobile Devices", Kent Lyons, Trevor Pering, Shivani Sud, Barbara Rosario and Roy Want, Interact'09, Uppsala Sweden, August 24th 2009

- "Context-Aware Composition", HotMobile-2009, Kent Lyons, David Munday, Jia Jia Sheng & Roy Want, Hotmobile'09, Santa Cruz, CA, Feb, 2009

- "Enabling Pervasive Collaboration with Platform Composition", Pervasive'09, Trevor Pering, Kent Lyons, Shivani Sud, Barbara Rosario, & Roy Want, Nara, Japan, May 2009

- "SwitchR: Managing Low-Power Wireless Connections in a Multi-Radio Environment", Yuvraj Agarwal, Trevor Pering, Rajesh Gupta and Roy Want; ISWC'08, Oct 2008

- "Enhancing Web Browsing Security on Public Terminals Using Mobile Composition", Richard Sharp, Anil Madhavapeddy, Roy Want & Trevor Pering, ACM MobiSys, 2008, Colorado, USA, June 17-20th.

- "Dynamically Composable Computing", R. Want, T. Pering, S. Sud, B. Rosario. HotMobile' 08. Napa Valley, February 24th, 2008.

- "*Musicology: Bringing Personal Music into Shared Spaces*", Trevor Pering, Kristen Vadas, Lamar Gardere, Evan Welbourne and Roy Want, Mobiquitous 2007 Conference, Philadelphia, Canada.

- *"The PSI Board: Realizing a Phone-Centric Body Sensor Network"*, Trevor Pering, Pei Zhang, Rohit Chaudhri, Yaw Anokawa, Roy Want: Body Sensor Networks (BSN) 2007, March 26-28, Aachen, Germany.

- "*Gesture Connect: Facilitating Tangible Interaction With a Flick of the Wrist*", Trevor Pering, Yaw Anokawa, and Roy Want, Tangible and Embedded Interaction (TEI) 2007, Feb., 15-17th, Baton Rouge, Louisiana.

- "*CoolSpots: Reducing the Power Consumption Of Wireless Mobile Devices Using Multiple Radio Interfaces*", Trevor Pering, Yuvraj Agarwal, Rajesh Gupta and Roy Want, ACM MobiSys'06, Uppsala, Sweden June 19th, 2006.

- "Face-to-Face Media Sharing Using Wireless Mobile Devices", Trevor Pering, David H. Nguyen, John Light, Roy Want. IEEE International Symposium on Multimedia, December 2005.

- "*Experimental Study on the Effects of Human and Electronic-Mechanical Interaction on RF Signal Strength for a Personal Server*", Michael Montero, Trevor Pering, Umair Udaud, Paul Wright and Roy Want, Proc. of InterPACK'05, San Francisco, California. July 17-22nd, 2005.

- "*System Challenges for Ubiquitous and Pervasive Computing*". Want, R. & Pering, T., 18th May 2005, Proceedings of the International Conference on Software Engineering (ICSE) 2005, St. Louis, MO.

- "Exploiting *radio hierarchies for power-efficient wireless discovery and connect setup",* Pering, T.; Raghunathan, V.; Want, R. In Proc. of the 18th International Conference on VLSI Design; January 2005.

- "*Experience with a low-power wireless mobile computing platform*", V. Raghunathan, T. Pering, R. Want, A. Nguyen, and P. Jensen, Proceedings of the ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED) 2004, Newport Beach, CA, pp363-368, August 9-11, 2004

- "*New Horizons for Mobile Computing*", Roy Want and Trevor Pering, PerCom'03, First IEEE International Conference on Pervasive Computing and Communication. Dallas –Fort Worth, Texas 23-26th March 2003, IEEE Computer Society, pp3-8.

- "Tilttype: Accelerometer-Supported Text Entry for Very Small Devices", Kurt Partridge, Saurav Chatterjee, Vibha Sazawal, Gaetano Borriello and Roy Want. Proceedings of the 15th annual ACM symposium on. User interface software and technology (UIST), ISBN 1-58113-488-6, Nov. 2002, pp201-204, Paris, France

- "The Personal Server: changing the way we think about ubiquitous computing", Roy Want, Trevor Pering, Gunner Danneels, Muthu Kumar, Murali Sundar and John Light. Proceedings of Ubicomp 2002: 4th International Conference on Ubiquitous Computing, Springer LNCS 2498, Goteborg, Sweden, Sept 30th-Oct 2nd, 2002, pp194-209.

- "The Unigesture Approach: One Handed Text Entry for Mobile Devices ", Vibha Sazawal, Roy Want and Gaetano Borriello, Proceedings of Mobile HCI 2002, Pisa, Italy 18-20 September 2002

- "Making Everyday Life Easier Using Dense Sensor Networks", Steven Conner, Lakshman Krishnamurthy and Roy Want, Proceedings of ACM Ubicomp, Atlanta Georgia, Oct 2001.

- "*Implementing Phicons: Combining Computer Vision with InfraRed Technology for Interactive Physical Icons*", Darnell J. Moore, Roy Want et al. ACM UIST'99, Ashville, N.C., Nov. 8-10th 1999, pp67-68.

- "*Bridging Real and Virtual Worlds with Electronic Tags*", Roy Want, Ken Fishkin, Beverly Harrison, Anuj Gujar. Proceedings of ACM SIGCHI. May 1999, Pittsburgh, pp370-377 (supporting video available).

- "*Squeeze Me, Hold Me, Tilt Me! An Exploration of Manipulative User Interfaces*". Beverly L. Harrison, Kenneth P. Fishkin, Anuj Gujar, Carlos Mochon, and Roy Want - ACM SIGCHI '98, Los Angeles, CA, April 1998 (supporting video available).

- *"Designing Audio Aura*". Elizabeth D. Mynatt, Maribeth Back, Roy Want, Michael Baer and Jason Ellis. Published in the Proceedings of the ACM SIGCHI'98, Los Angeles, CA, April 1998

- "*An Infrared Network for Mobile Computers*", Norman Adams, Rich Gold, Bill Schilit, Mike Tso and Roy Want. Usenix Symposium on Mobile Computing, April 93 Boston.

- "*The LAN as an Integrated Communications Environment*" Roy Want & Andy Hopper, Proceedings of Networks '89, (9th event) Birmingham, UK, May 1989.

- "*Protocols for Real Time Voice Communication on a Packet Local Network*", Stephen Ades, Roy Want, Roger Calnan. Proceedings

Journal & Periodicals

- "How to achieve 1-meter accuracy in Android", Frank Van Diggelen, Roy Want and Wei Wang, June 3rd, 2018, Vol. 29(7), GPS World.

- "*Bluetooth Low Energy in Dense IoT Environments*", Albert F. Harris III; Vansh Khanna; Guliz Tunca ; Roy Want ; Robin Kravets; IEEE Communications Magazine, Volume: 54, Issue: 12, December 2016 , pp 30-36; DOI: 10.1109/MCOM.2016.1600546CM.

- "Enabling the Internet-of-Things", R. Want, B. N. Schilit, and Scott Jenson, IEEE Computer, Jan 2015, Vol 48. No. 1, pp28-35.

- "*Ensemble Computing: Opportunities and Challenges*", R. Want, E. Schooler, L. Jelinke, J. Jung, D. Dahle, U. Sengupta. Intel Technology Journal (ITJ), October 2010.

- "Rapid Wireless Service Composition using Layer-2 Discovery", S. Sud, R. Want, T. Pering, B. Rosario, K. Lyons, IEEE Network Magazine 2008, August 2008.

- "An Introduction to RFID Technology", Roy Want. IEEE Pervasive Vol. 5, No. 1, pp25-33, Jan-Mar 2006.

- *"Spontaneous marriages of mobile devices and interactive spaces"*, Trevor Pering, Raffael Ballagas, and Roy Want, Communications of the ACM, Vol.48, No.9, (Sep. 2005), pp 53-59, SI:"RFID - tagging the world"

- "*The Magic of RFID*", Roy Want, ACM Queue Magazine, pp41-48, Vol. 2, No.7 Oct 2004

- "*RFID: The Key to Automating Everything*", Roy Want, Scientific American, Jan 2004, pp56-65

- "*Comparing Autonomic and Proactive Computing*", Roy Want, Trevor Pering, and David Tennenhouse, IBM Systems Journal Vol. 42 No.1, Jan. 2003

- "*Photographic Authentication for Untrusted Terminals*", Trevor Pering, Murali Sundar, John Light and Roy Want, IEEE Pervasive Computing, March 2003, Vol.2, No 1, pp30-36

- "*Disappearing Hardware*", Roy Want, Trevor Pering, Gaetano Borriello & Keith Farkas. IEEE Pervasive Computing, Vol. 1. Issue #1, April 2002 pp36-47.

- "*Survey on Information Appliances*", Roy Want & Gaetano Borriello, IEEE Computer Graphics and Applications, May/June 2000, pp24-31. Vol. 20, No. 3, pp21-23.

- "*Embedded Computation Meets the World-Wide-Web*", Gaetano Borriello and Roy Want, Communications of the ACM, May 2000, Vol. 43 No.5. pp59-66.

- "*Ubiquitous Electronic Tagging*", IEEE Distributed Systems Online, September 2000, Vol. 1, No.2, Roy Want and Dan M. Russell.

- "*Embodied User Interfaces for Really Direct Manipulation*", Communications of the ACM, Sept. 2000, Vol.43 No.9, pp75-80, Ken Fishkin, Anuj Gujar, Beverly Harrison, Tom Moran and Roy Want.

- "*An Overview of the Parctab Ubiquitous Computing Experiment*", IEEE Personal Communications, December 1995, Vol. 2. No.6, pp28-43 Roy Want, Bill Schilit, Norman Adams, Rich Gold, David Goldberg, Karin. Petersen, John Ellis, Mark Weiser.

- "*Active Badges and Personal Interactive Computing Objects*", Roy Want and Andy Hopper. IEEE Transactions on Consumer Electronics. Vol. 38. No.1, Feb 92. pp10-20.

- "*The Active Badge Location System*", Roy Want, Andy Hopper, Veronica Falcao & Jon Gibbons, ACM Transactions on Office Information Systems (TOIS) Vol. 10. N0. 1, Jan 1992 Pages 91-102 [refereed].

- "*Protocols for Real Time Voice Communication on a Packet Local Network*", Stephen Ades, Roy Want, Roger Calnan. Proceedings of IEEE ICC86 Conf. Toronto, Canada.

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- "*An Introduction to Ubiquitous Computing*" by Roy Want, CRC Press, Taylor & Francis group publishing. Book Chapter 1, "Ubiquitous Computing Fundamentals". **ISBN** 978-1420093605, Oct, 2010.

- "*RFID Explained: A primer on Radio Frequency Identification Technologies*", Morgan & Claypool Publishers, Synthesis Lectures on Mobile and Pervasive Computing, 15 Oct 2006, [paperback, p1-100], **ISBN:** 1598291084

- "*Privacy, Security and Trust Issues Raised by the Personal Server Concept*", John Light, Trevor Pering, Murali Sundar and Roy Want pp49-59 Chapter "Privacy, Security and Trust within the Context of Pervasive Computing", 2005, Springer **ISBN** 0-387-23461-6.

- *"Pervasive Computing: Third International Conference, PERVASIVE 2005",* Munich, Germany, May 8-13, 2005, Proceedings (Lecture Notes in Computer Science) by Hans W. Gellersen (Editor), Roy Want (Editor), Albrecht Schmidt,. Springer; 1st edition (June 23, 2005), **ISBN** 978-3540260080

- "ACM MobiSys 2004 Proceedings of 2nd Annual International Conference on Mobile Systems, Applications and Services" Editors Roy Want and Doug Terry. Boston, Massachusetts, June 6-9, 2004: **ISBN:** 1-58113-793-1.

- "*SpotON: An Indoor 3D Location Sensing Technology Based on RF Signal Strength*," Jeffrey Hightower, Roy Want, and Gaetano Borriello, UW CSE 00-02-02, University of Washington, Department of Computer Science and Engineering, Seattle, WA, Feb. 2000. (pdf)

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- "*Reliable Management of Voice in a Distributed System*", Roy Want, thesis and Tech. Report, UCAM-CL-TR-141, 1988. Available through the University of Cambridge Computer Laboratory Bookshop, UK

Articles & Editorials

- "Pervasive Computing at the Edge". Paramvir Victor Bahl, Ramon Caceres, Nigel Davies, and Roy Want, IEEE Pervasive Computing, Volume 19, Issue 4•Oct.-Dec. 2020, pp 8-9 • DOI: 10.1109/MPRV.2020.3032205.

- "Accurate Indoor Location for the IoT", Roy Want, Wei Wang, Stan Chesnutt, *Computer* magazine (IEEE Computer Society), August 2018, Vol.51(8), pp66-70, DOI: 10.1109/MC.2018.3191259

- “Multidevice Interaction”, Guest Editor Introduction, Roy Want, Trevor Pering and Yuvraj Agarwal, IEEE Computer, December 2016, pp16-20; **DOI**: 10.1109/MC.2016.370.

- "Activating the Internet of Things", Guest Editor Introduction, Roy Want & Schahram Dustdar, IEEE Computer, Vol 48, No. 9., pp17-20, Sept 2015.

- “*The Power of Smartphones*”, Roy Want, IEEE Pervasive Computing, vol. 13-03 (2014), pp. 76-79

- “*Bluetooth LE Finds its Niche*”, Roy Want, Bill Schilit, Dominik Laskowski, IEEE Pervasive Computing, vol. 12-04 (2013), pp. 12-16.

- "Interactive Digital Signage", IEEE Computer, May 2012, Guest editor introduction, Roy Want and Bill N. Schilit, Vol. 45, No. 5. pp21-24, doi:10.1109/MC.2012.169.

- "*Argos: Building a Web-Centric Application Platform on Top of Android*", Rich Gossweiler, Colin McDonough, James Lin, and Roy Want; IEEE Pervasive Computing, Smart Phone Dept, Vol. 10, No. 4, Oct-Dec 2011, pp10-14.

- "*Near Field Communication (NFC)*", Roy Want, IEEE Pervasive Computing, Smart Phone Dept, Vol. 10, No. 3, Jul-Sep 2011, pp4-7.

- “iPhone: Smarter than the Average Phone”, IEEE Pervasive Computing, Smart Phone Dept, Vol. 9, Jul-Sep, 2010, pp6-9.

- "Summary of ISWC 2008", Roy Want, Kent Lyons, IEEE Pervasive Computing Vol. 8, No.1, Jan-Feb, 2009

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- “*Creating and Protecting Digital Worlds*”. IEEE Computer” Bill Schilit and Roy Want, pp119-121, Feb. 2005.

- “*Energy Harvesting and Conservation*”, IEEE Pervasive Computing (to appear), Guest Editors’ Introduction, Roy Want, Keith I. Farkas, and Chandra Narayamaswami, pp14-17, Jan – Mar 2005.

- “*Personal Server: A Radical Computer Design Supporting the Digital Media Revolution”,* Roy Want and Trevor Pering, Fiber Optic Product News, Aug 2004.

- “Enabling Ubiquitous Sensing with RFID”, Roy Want, IEEE Computer, Apr 2004, Vol. 37. No.4. pp84-86

- "Wearable Computing for the Masses", Appliance Design Issue #2 - special issue on wearable appliances, July 2002, pp10-13.

- "*Expanding the Horizons of Location-Aware Computing*", Guest editors' Introduction, Roy Want & Bill Schilit, IEEE Computer, August 2001, pp31-34

- "*Information Appliances*", Guest editor's Introduction, Roy Want & Gaetano Borriello. IEEE Computer Graphics and Applications CG&A, May/June 2000, Vol. 20, No. 3, pp21-23.

- "*Remembering Mark Weiser*", IEEE Personal Communication Systems (PCS), February 2000. pp8-10, Roy Want

- "*The Habits of Highly Successful Portable Document Readers*", Roy Want and Beverly L. Harrison, IEEE Computer, January, 1999 pp.70

- "*Audio Aura: lightweight Audio Augmented Reality*". Elizabeth D. Mynatt, Maribeth Back, Roy Want & Ron Frederick Published in the Proceedings of the Fourth International Conference on Auditory Display (ICAD), Palo Alto, CA, November 1997, pp105-107, html.

Workshop Papers (published)

- "*Beacon Trains: Blazing a Trail Through Dense BLE Environments*"; Robin Kravets, Albert F Harris, II, Roy Want; ACM CHANTS'16, Proceedings of the Eleventh ACM Workshop on Challenged Networks, New York, NY, USA; 3rd October, 2016; pp 69-74; **DOI**: 10.1145/2979683.2979687.

- "*Building an On-ramp for the Internet of Things*", S. Jenson, R. Want, B. N. Schilit, R Kravets, IoT-Sys workshop at ACM MobiSys'15 in Proceedings, May 19th-22nd 2015, Florence, Italy.

- "*The Smart Phone and New Opportunities for Near Field Communication (NFC)*", Roy Want HPCA-18, SoC Hetrogeneous Architectures and Workloads (SHAW-3), 26th February 2012, New Orleans, Lousiana.

- "*Smart Phones: Devices, Accelerators and Applications*", Roy Want HPCA-16, SoC Accelerators Workshop (SAW-1), 10th January 2010, Bangalore, India

- "*Smart Phones: Devices, Accelerators and Applications*", Roy Want IEEE HPCA-16, SoC Accelerators Workshop (SAW), 10th January 2010, Bangalore, India

- "*The Personal Server: Personal Content for Situated Displays*" Trevor Pering John Light, Murali Sundar, Gillian Hayes, Vijay Raghunathan, Eric Pattison and Roy Want. p97-99, Adjunct Proceedings ACM Ubicomp 2003, Oct 12-15, 2003, Seattle Washington, USA

- "*Activating Everyday Objects*", Roy Want, Mark Weiser, Beth Mynatt. July 30th & 31st 1998, Proceedings of the 1998 DARPA/NIST Smart Spaces Workshop", NIST, Gaithersburg, Maryland, pp7-140 to 7-143.

- "*Context-Aware Computing Applications*", Bill Schilit, Norman Adams, Roy Want, 1st Annual Workshop on Mobile Computing Systems and Applications (WMCSA) , Dec 1994, Santa Cruz

- "*The ParcTab Mobile Computing System*", Fourth Workshop on Workstation Operating Systems (WWOS), October 14-15, 1993, Napa California, Bill Schilit, Norman Adams, Rich Gold, Michael M. Tso and Roy Want.

EIC Introductions & Smart Phone Dept: IEEE Pervasive Computing – R. Want

- "*So Long, and Thanks for all the Fish*", Vol. 8, Number 4, Oct-Dec, 2009, pp2-3
- "*Through Tinted Eyeglasses*", Vol. 8, Number 3, Jul-Sep, 2009, pp2-3
- "*When Cell Phones Become Computers*", Vol. 8, Number 2, Apr-Jun, 2009, pp2-3
- "*How Green is Green?*", Vol. 8, No. 1, Jan-Feb, 2009, pp2-3
- "*My Digital Shoebox*", Vol. 7, Number 4, Oct-Dec, 2008, pp2-3
- "*The Seeds of Inspiration*", Vol. 7, Number 3, Jul-Sep, 2008, pp2-3
- "*You are your Cell Phone*", Vol. 7, Number 2, Apr-Jun, 2008, pp4-6
- "*The Bionic Man*", Roy Want, Vol. 7, Number 1, Jan-Mar, 2008, pp4-6
- "*You're not Paranoid; they really are watching you*", Vol. 6, Number 4, Oct-Dec, 2007, pp4-6
- "*Carry Small, Live Large*", Vol. 6, Number 3, Jul-Sep, 2007, pp4-5
- "*Sensor Driven Computing Comes of Age*", Vol. 6, No 2, Apr-Jun, 2007, pp4-5
- "*People First, Computers Second*", Vol. 6, No. 1, Jan-Mar, 2007, pp4-5
- "*Are we there yet?",* Vol. 5, No. 4, Oct-Dec, 2006, pp4-5
- "*Build What You Use*", Vol. 5, No. 3, Jul-Sep, 2006, pp4-5
- "*Global Perspectives*", Vol. 5, No. 2, Apr-Jun, 2006, pp4-5
- "*Grasping the Torch*", Vol. 5, No. 1, Jan-Mar, 2006, pp4-6

Invited Presentations **(selected)**

- Invited Speaker, Safer Buildings Coalition (SBC), "Wi-Fi Precise Indoor Positioning in Support of Emergency Services", Highland Village, Texas, USA, April 10th, 2025.
- **Keynote Speaker**, IPIN'25: "The Golden Age of Indoor Positioning", Hong Kong, China, October 2025.

- **Keynote Speaker**, ACM HotMobile'24: "Revolutionizing Indoor Location", San Diego, USA, Feb 2024
- Invited Panelist: Marconi Society's "Decade of Digital Inclusion" Symposium. The panel, titled "An Internet Built for Personal Safety and Security: Who is Responsible and How Do We Do It?" November 2nd 2022.
- Invited Panelist: Marconi Society's "Decade of Digital Inclusion" Symposium. The panel, titled "An Internet Built for Personal Safety and Security: Who is Responsible and How Do We Do It?," November 2nd 2022.
- **Keynote Speaker**: "Smart Things Know Where They Are", 15th IEEE International Conference on Ubiquitous Intelligence and Computing (UIC), October 8th-12th 2018, Guangzhou, China.
- Invited Speaker: 11th IEEE International Symposium on Service-Oriented System Engineering (SOSE 2017). “Making the Internet of Things Great Again”, April 7th 2017.
- **Keynote Speaker**: “Enabling the Internet of Things”, MobiCASE Conference; Cambridge, England; Nov 30th – Dec 1st, 2016.
- **Test-of-Time Award**: “The Active Badge Location System”, ACM MobiSys’16, June 29th, 2016, Singapore.
- **Keynote Speaker**: “The Web of Things”, Intelligent Environments Conference, Prague, Czech Republic, 13-14 July, 2015.
- **Keynote Speaker**: “The Physical Web”, IoTSys Workshop at ACM MobiSys, May, 2015, Florence, Italy
- **Keynote Speaker**: “Pervasive Computing is the New Black”, IEEE CCNC’14, Las Vegas, January 11th, 2014
- **Keynote Speaker**: “The Golden Age of Pervasive Computing”, IEEE PerCom 2013, San Diego, March 19th, 2013.
- **Keynote Speaker**: “Mobile and Ubiquitous Computing: Past, Present and Future”, IEEE NDT 2012, April 24th 2012.
- **Invited Slenary Speaker**: IEEE Globcom 2010, “Smart Phones: A Revolution in Mobile Computing”, Miami, Florida, December 8th, 2010.
- Invited speaker: DAC Workshop, Mobile & Cloud Computing, “Always-on Considerations for Mobile Systems”, June 14th, 2010
- Invited speaker:, HPCA, Workshop on Mobile Computing, “Smart Phones – Future Devices, Usages and Applications”, Bangalore, Jan 10th 2010,
- Invited panelist: MobiSys 2009, "HotPlanet" Workshop, Krakow, Poland
- Invited panelist/speaker: "Dynamic Composable Computing", IEEE 125th Media Event Panel, March 10th 2009, New York, NY, USA
- **Keynote Speaker:**, “Life, the Universe, and the Future of Mobile Computing”, ACM MobiSys 2008, Boulder Colorado, June 19th, 2008.
- Invited speaker: "Carry Small, Live Large", TTI Vanguard "Being Everywhere" Conference, Toronto Canada, scheduled for April 29-30, 2008.
- **Keynote Speaker:** IPCCC’06, Phoenix, AZ, “The Cell Phone and the Future of Mobile Computing”, April 10th, 2006
- Invited speaker: State of the Art Session: Ubiquitous Computing, ICSE'05, May 18th 2005
- **Lillian Gilbreth lectureship**, National Academy of Engineering (NAE), Washington DC, Oct 12th, 2003 ”Personal Servers – Pushing the Limits of Personal Computing”
- Panel moderator - Intel Developers Forum Fall 2003 “WiFi: Opportunities and Challenges”, 18th Sept 2003, San Jose
- Invited speaker: Intel Developers Forum Fall 2003 - R&D Perspective - International Press Conference, 15th Sept 2003, San Jose
- **Keynote Speaker**: IEEE PerCom, “New Horizons for Mobile Computing”, March 24th, 2003, Dallas Texas.
- Invited speaker: at National Academy of Engineering (NAE), 2002 Japan/America Frontiers of Engineering Symposium, 26th October 2002, Odaiba, Tokyo, Japan

- **Keynote Speaker**: "Ten Lessons Learned about Ubiquitous Computing", Dagstugl Ubiquitous Computing Conference, 2001
- Invited Speaker: "The Personal Server - a new approach to Ubiquitous Computing", Pervasive Computing 2001, NIST, Washington DC
- Invited panelist: Mobicom 2000, Cmon'sense, moderator Deborah Estrin, Boston, August 9th 2000
- Invited panelist: Business Week e.biz live conference, San Jose, July 24th, 2000 keynote closing session, with moderator Scott Shuster and Eric Brewer (Chief Scientist Inktomi).
- Invited speaker: "There is an Electronic Tag in your Future!", at Cryptography Symposium: Life in an Era of Cryptographic Abundance, Xerox PARC June 20th 2000.
- Invited speaker: “Mobile Computing”, Asilomar Microcomputer Workshop, April 2000.
- Invited TV interview C-NET/CNBC "Beyond the PC", TV interview Richard Hart Hosting, Sat 1pm, April 8th 2000.
- Invited speaker: UIST'99, "The Design and Use of Electronic Tagging for HCI", November 1999
- **Lock-note address**, "Ubiquitous Computing", Wireless'93 Conference, San Jose
- Invited panelist: "Nomadic Information Appliances", following Globecom'92. Orlando, December 10th, 1992.
- Workshop on "Networking of Personal Communications Appliances". Invited panelist: (audio link) "Active Badge Panel" Chaired by Ken Pier, Proceedings, Conference on Organizational Computing Systems, November 5-8, Atlanta, Georgia,

Professional Service

Professional Grades, Standards, and Executive Committees

- IEEE 802.11 TGbk (320MHz Positioning) Technical Editor 2023-2025
- IEEE 802.11 TGaz (Next Generation Positioning (NGP) Standard), Secretary 2017-19, Technical Editor 2019-23
- ACM SIGMOBILE Chair 2009-2013, Executive Committee member 2013-Present
- IEEE 802.11 TGbk (320MHz Positioning) Technical Editor 2023-2025
- Editorial Boards: IEEE Computer 2015-2019, IEEE Pervasive Computing 2001-Present
- Chair ACM TechPack on Mobile Computing 2012
- Steering Committees (current): ACM HotMobile, ACM MobiSys, IEEE Pervasive Computing
- IEEE (Institute for Electrical and Electronic Engineers) member since 1991, Fellow 2005
- ACM (Association of Computer Machinery) member since 1996, Fellow 2005

Conference Program Chairs

- General Co-chair 2nd Int. Symp. on Pervasive Displays, ACM PerDis’13, Mtn View, CA, 4th June, 2013
- Technical Program Co-chair NSF Pervasive Computing at Scale (PeCS), January 2011
- Technical Program Chair ACM Hotmobile 2010, Annapolis, Maryland, USA
- Technical Program Co-chair ISWC 2008, USA
- Technical Program Co-chair Pervasive 2005, Munich, Germany
- Technical Program Co-chair, ACM Mobisys 2004 Conference, Boston, USA
- Panel Chair, Mobicom 1999, Seattle, USA

Conference Technical Program Committee Service

- Technical Program Committee ACM MobiSys Conference
    - 2017 Niagara Falls, New York, USA
    - 2011 Washington, USA
    - 2009 Krakow, Poland
    - 2008 Boulder Colorado, USA
    - 2007 Puerto Rico
    - 2006 Uppsala Sweden
    - 2005 Seattle, USA

    - 2004 Boston, USA
- Technical Program Committee IEEE/ACM SEC (Symposium on Edge Computing)
    - 2016 Washington, DC
- Technical Program Committee for ACM HotMobile
    - 2016 St. Augustine, Florida
    - 2015 Santa Fe, New Mexico
    - 2012 Jekyll Island, Georgia
    - 2011 San Diego, California
    - 2010 Annapolis, Maryland
    - 2008 Napa, California
- Technical Program Committee ACM Pervasive Displays (PerDis)
    - 2016 Oulu, Finland
    - 2015 Saarbrucken, Germany
    - 2014 Copenhagen, Denmark
- Technical Program Committee for ISWC Conference
    - 2008 Pittsburgh, USA
    - 2001 Zurich, Germany
- Technical Program Committee Pervasive Conference
    - 2005 Conference, Munich Germany
    - 2002 Zurich Switzerland
- Technical Program Committee IEEE PerCom 2004, Orlando, Florida
- Technical Program Committee Ubicomp
    - 2003 Seattle , USA
    - 2002 Gotenburg, Sweden
- Technical Program Committee for ACM MobiCom
    - 2001 Rome, Italy
    - 2000 Boston, USA

Editorial Posts

- Dept. Editor: 'The IoT Connection' Dept. IEEE Computer, Jan 2016 - Feb 2019.
- Dept. Editor: 'Smart Phone' Dept. IEEE Pervasive Computing, April 2010-2014.
- **Editor-in-Chief. IEEE Pervasive Computing**. 1st Jan 2006-2010.
- Associate Editor-in-Chief, IEEE Pervasive Computing Journal, Fall 2001-2005.

PhD Thesis Committees

- Robert K. Harle, "Maintaining World Models in Context-Aware Environments", Department of Engineering, University of Cambridge UK, October 2004.
- Bill N. Schilit, "A Context-Aware System Architecture for Mobile Distributed Computing Department of Computer Science, Columbia University, NY, May 1995.

Industry Awards

- Intel CTG Divisional Recognition Award (DRA) ; UMG customer support Q4 2009.
- Intel CTG Divisional Recognition Award (DRA); Worldmap Q2 2007.
- Intel CTG recognition award, Q1 2006 for contributions to the MPI initiative.
- Intel STO Divisional recognition award, Q1 2005 for Motorola Customer Support.
- Intel MG/CHG recognition award Q1 2005.
  for "Contributions leading to development of the CCF program", Q1 2005.
- Intel CTG Divisional recognition Award, Q4 2004;
  Personal Server Project & the porting to a Motorola XScale/Linux based cell phone.
- Xerox PARC "*Excellence in Science and Technology Award*", 7th August 2000
  for the completion of the Hikari project under contract from FX.
- Xerox PARC "*Excellence in Science and Technology Award*", September 1997 with the EUI group
  for the PDR manipulative User interface design.

- Xerox PARC "*Excellence in Science and Technology Award*", Jan 1993.
  for the design and deployment of the ParcTab system at Expo '92, Seville Spain.

Nuffield Physics Award

- CEB, Nuffield Physics - Cambridge examination board prize: July 1979, "The change in length of a nickel rod in a magnetic field (magnetostriction)".

Government Grants, Industry Committees & Professional Memberships

- NAS Advisory Workshop on Radio Frequency Identification (RFID), Seattle, Apr 2004: Invited expert Panelist.
- DARPA contract N66001-99-2-8924, 1999. "Expeditions into the Future", Portolano - Workscapes Project (sub. 993572). : Principal Investigator (PI),
- Infrared Data Association (IrDA) standards meetings 1995-1997: Representative for Xerox/PARC.
- DARPA contract DABT63-91-C-0027, 1991, "Ubiquitous Computing Program"; Affiliated Researcher.

Patents

Over 115 patents filed since 1990, the following 110 have issued:

	Patent	Issued	Title
110	US011736555	2023-08-22	IOT interaction system
109	US011265363	2022-03-01	IOT interaction system
108	US010635460	2020-04-28	Assisted interaction for mobile products
107	US010257256	2019-04-09	IOT interaction system
106	US010045169	2018-08-07	Systems and methods for personalizing public devices
105	US010024952	2018-07-17	Self-organizing hybrid indoor location system
104	US009911136	2018-03-06	Method and system for providing sign data and sign history
103	US009907008	2018-02-17	Cloud-coordinated location system using ultrasonic pulses and radio signals
102	US009870057	2018-01-16	Gesture detection using an array of short-range communication devices
101	US009817540	2017-11-14	Device, system, and method of composing logical computing platforms
100	US009791540	2017-10-17	Self-organizing hybrid indoor location system
99	US009666013	2017-05-30	Cloud-based vending
98	US009662569	2017-05-30	Sensor fusion to combine sensor input data from multiple devices into one input stream
97	US009621703	2017-04-11	Motion to connect to kiosk
96	US009609482	2017-03-28	Cloud-coordinated location system using ultrasonic pulses and radio signals
95	US009413872	2016-08-09	Motion to connect to kiosk
94	US009282232	2016-03-08	Collaborative Image Control
93	US009215286	2015-12-15	Creating a social network based on an activity
92	US009203476	2015-12-01	System and method for code communication
91	US009143944	2015-09-22	Secure peer-to-peer network setup
90	US009077912	2015-07-07	Motion initiated time synchronization
89	US009071282	2015-06-30	Variable read rates for short-range communication
88	US009002930	2015-04-07	Activity distribution between multiple devices
87	US008928555	2015-01-06	Privacy display
86	US008874594	2014-10-28	Search with my location history
85	US008755785	2014-06-17	Collaborative image control
84	US008705707	2014-04-22	Labeling communication device call logs

83	US008686921	2014-04-01	Dynamic geometry management of virtual frame buffer for appendable logical displays
82	US008638190	2014-01-28	Gesture detection using an array of short-range communication devices
81	US008626135	2014-01-07	Communication redirect via short-range communication for digital item retrieval
80	US008565791	2013-10-22	Computing device interaction with visual media
79	US008560484	2013-10-15	User model creation
78	US008515413	2013-08-20	Controlling a target device using short-range communication
77	U0S08504008	2013-08-06	Virtual control panels using short-range communication
76	US008456381	2013-06-04	Device, system, and method of providing an extended display with desired relative display orientation
75	US008405572	2013-03-26	Privacy display
74	US008363586	2013-01-29	Social networking and advertisements in a mobile device on a local personal area network
73	US008281123	2012-10-02	Apparatus and method for managing and protecting information during use of semi-trusted interfaces
72	US008254995	2012-08-28	Method and device for communicating data
71	US008170212	2012-05-01	Device, system, and method of establishing secure wireless communication
70	US008117284	2012-02-14	Unsolicited and unconfirmed computing platform service information
69	US008107879	2012-01-31	Device, system, and method of establishing multiple wireless connections
68	U0S08081612	2011-12-20	Device, system, and method of selectively activating a wireless network connection
67	RE42927	2011-11-15	System and method for obtaining and using location specific information
66	US008041951	2011-10-18	Code-based communication connection management
65	US007831278	2010-11-09	Method and device for communicating data with a personal wireless storage device
64	US007779193	2010-08-17	Method and apparatus for external data transfer in a personal storage device
63	US007707150	2010-04-27	Automatic exchange of information in an ad-hoc computing environment
62	US007664529	2010-02-16	Methods and apparatus for data communication for mobile electronic devices
61	US007483952	2009-01-27	System transmitting unsolicited and unconfirmed computing platform service info. to wireless devices
60	US007426403	2008-09-16	Methods and apparatus for data communication for mobile electronic devices
59	US007337466	2008-02-26	Information hiding through time synchronization
58	US007278024	2007-10-02	Session authentication using temporary passwords
57	US007253800	2007-08-07	Manipulative user interface systems and methods
56	US007229017	2007-06-12	Laser locating and tracking system for externally activated tags
55	US007202783	2007-04-10	Method and system for identifying when a first devices is within a physical range of a second device
54	US007200812	2007-04-03	Method, apparatus and system for enabling users to selectively greek documents
53	US007174462	2007-02-06	Method of authentication using familiar photographs
52	US007089288	2006-08-08	Interactive context preserved navigation of graphical data sets using multiple physical tags
51	US007082578	2006-07-25	Computer user interface using a physical manipulatory grammar
50	US006816859	2004-11-09	Rotationally desensitized unistroke handwriting recognition (extended)
49	US06630922	2003-10-07	Handedness detection for a physical manipulatory grammar
48	US006628447	2003-09-30	Array of rotatable solid elements for color display
47	US006611196	2003-08-26	System and method for providing audio augmentation of a physical environment
46	US006608549	2003-08-19	Virtual interface for configuring an audio augmentation system
45	US006573916	2003-06-03	Navigation of rendered virtual environments using physical tags
44	US006542083	2003-04-01	Electronic tag position detection using radio broadcast
43	US006498601	2002-12-24	Method and apparatus for selecting input modes on a palmtop computer
42	US006456273	2002-09-24	Flap array under fluidic and electrical control
41	US006446208	2002-09-03	User interface system based on sequentially read electronic tags
40	US006422474	2002-07-23	N-space indexing of digital data representations using physical tags
39	US006366697	2002-04-02	Rotationally desensitized unistroke handwriting recognition
38	US006342830	2002-01-29	Controlled shielding of electronic tags

37	US006340957	2002-01-22	Dynamically relocatable tileable displays
36	US006340931	2002-01-22	Network printer document interface using electronic tags (extended)
35	US006326946	2001-12-04	Operator icons for information collages
34	US006297838	2001-10-02	Spinning as a morpheme for a physical manipulatory grammar
33	US006297805	2001-10-02	Multiple interacting computers interface-able through a physical manipulatory grammar
32	US006292744	2001-09-18	Infrared beacon positioning system (extended)
31	US006268857	2001-07-31	Computer user interface using a physical manipulatory grammar
30	US006249226	2001-06-19	Network printer document interface using electronic tags
29	US006243075	2001-06-05	Graspable device manipulation for controlling a computer display
28	US006243074	2001-06-05	Handedness detection for a physical manipulatory grammar
27	US006241364	2001-06-05	Light fixture embedded infrared beacon
26	US006216087	2001-04-10	Infrared beacon positioning system
25	US006176425	2001-01-23	Information management system supporting multiple electronic tags
24	US006160540	2000-12-12	Zoomorphic computer user interface
23	US006122520	2000-09-19	System and method for obtaining and using location specific information
22	US006021399	2000-02-01	Space efficient method of verifying electronic payments
21	US006008727	1999-12-28	Selectively enabled electronic tags
20	US006005482	1999-12-21	Surface mounted information collage
19	US005982520	1999-11-09	Personal storage device for application and data transfer
18	US005952638	1999-09-14	Space efficient method of electronic payments
17	US005857023	1999-01-05	Space efficient method of redeeming electronic payments
16	US005825675	1998-10-20	Apparatus and configuration method for a small, hand-held computing device
15	US005818425	1998-10-06	Mapping drawings generated on small mobile pen based electronic devices onto large displays
14	US005812865	1998-09-22	Specifying and establishing communication data paths between particular media devices in multiple media device computing systems based on context of a user or users
13	US005793630	1998-08-11	High precision spatially defined data transfer system
12	US005721725	1998-02-24	Protocol for channel access in wireless or network data communication
11	US005627517	1997-05-06	Decentralized tracking and routing system wherein packages are associated with active tags
10	US005611050	1997-03-11	Method for selectively performing event on computer controlled device whose location and allowable operation is consistent with the contextual and locational attributes of the event
9	US005603054	1997-02-11	Method for triggering selected machine event when the triggering properties of the system are met and the triggering conditions of an identified user are perceived
8	US005564070	1996-10-08	Method and system for maintaining processing continuity to mobile computers in a wireless network
7	US005555376	1996-09-10	Method for granting a user request having locational and contextual attributes consistent with user policies for devices having locational attributes consistent with the user request
6	US005544321	1996-08-06	System for granting ownership of device by user based on requested level of ownership, present state of the device, and the context of the device
5	US005530235	1996-06-25	Interactive contents revealing storage device
4	US005493692	1996-02-20	Selective delivery of electronic messages in a multiple computer system based on context and environment of a user
3	US005493283 GB02230365A	1996-02-20 1989-02-18	Locating and authentication system
2	US005485634	1996-01-16	Method and system for the dynamic selection, allocation and arbitration of control between devices within a region
1	US005402469	1995-03-28	Carrier locating system