Citation

For pioneering contributions to the design and development for wireless sensor networks

Dr. David E. Culler

Positions and Organizations :
Chair, Electrical Engineering and Computer Sciences
Howard Friesen Chair Professor, EECS
Faculty Director, i4Energy
University of California, Berkeley

Doctorate : PhD, (MIT 1989)

Date of Birth : November 12, 1959

Brief Biography :
1980 A.B. in Mathematics, Univ. of California, Berkeley (UCB)
1980-82 Magnetic Fusion Energy Computer Center
1985 M.S. in EECS, Massachusetts Institute of Technology (MIT)
1986-88 Co-founder, Chief Systems Architect, A.I. Architects, Inc.
1989 Ph.D. in Computer Science, MIT
1989- Assistant, Associate, Prof. of EECS,
Vice Chair, Associate Chair, Chair EECS,
Associate CIO, Engineering, Associate Dean of IT, UCB
1996- Faculty Computer Scientist
National Energy Research Scientific Computing Center
Lawrence Berkeley National Laboratory
2001-03 Founding Director, Intel Research Laboratory, Berkeley
2005-10 Co-founder, initial CEO, CTO, Chairman,
Arch Rock Corporation
Present Howard Friesen Chair Prof. and Dept. Chair of EECS, UCB
Other:
Fellow Association of Computing Machinery(ACM), Fellow IEEE, National Science Foundation, CISE Scientific Advisory Council (co-chair), International Computer Science Institute, Board of Trustees.

Main Awards and Honors :
1990 National Science Foundation Presidential Young Investigator Award
1992 National Science Foundation Presidential Faculty Fellowship in Engineering
2003 Technology Review 10 Emerging Technologies that Will Change the World
2003 Scientific American Top 50 Researchers
2004 ACM Fellow
2005 National Academy of Engineering
2006 IEEE Fellow
2007 ACM SIGMOBILE Outstanding Achievement Award
2007 Howard Friesen Chair of Engineering
2013 HPDC Top papers in 20 years Award (WebOS)
2013 ACM SIGPLAN 10-year Most influential Paper Award (NesC)
2013 ACM SIGCOMM Test of Time Paper Award (PlanetLab)

Main Achievements :

Dr. Culler was born on November 12, 1959 in Santa Barbara, California. He earned his Bachelors degree (AB) in Mathematics from the University of California, Berkeley (UCB) in 1980 and his Masters (M.S.) and doctor of Philosophy (Ph. D.) degree from Massachusetts Institute of Technology in 1985 and 1989, respectively. Since then he has been on the faculty in teaching, research, and administrative positions at UCB, where he is currently the Howard Friesen Chair Professor of Computer Science and Chair of the Department of Electrical Engineering and Computers Sciences. He co-founded two companies and founded the Intel Research Laboratory, Berkeley and continues to work with the Lawrence Berkeley National Laboratory and several large and small companies.

Throughout his professional life Dr. Culler has been conducting research and designing experimental systems at the extremes of the computing spectrum, with a goal of advancing science broadly and discovering new roles for computing. He is a second-generation computer scientist, exposed to the inception of interactive graphical computing, computer networking, array processing, and digital speech through his father, Dr. Glen J. Culler, and to computing as a creative tool to enhance human understanding. Upon graduating from Berkeley he joined the National Magnetic Fusion Energy Computer Center, which had just acquired a Cray-1 for the energy research community, and co-wrote the Cray Time Sharing System (CTSS), which became the basis for the NSF Supercomputer Centers in the USA.

Inspired by the potential to express parallelism elegantly in a computer architecture, he took up graduate studies on Dataflow architectures and programming languages at MIT and collaborated widely with scientists in the area, including the Fifth Generation Computing Initiative in Japan.

Upon joining the faculty at Berkeley, he developed efficient means of expressing fine-grain parallelism and tolerating latency on conventional architectures, creating the Threaded Abstract Machine (TAM) as a target for implicitly parallel languages and Active Messages to integrate communication and computation. Building on these, he created the explicitly parallel language Split-C, which brought efficient synchronization and latency tolerance into a simple framework for managing a shared address space to enhance locality on massively parallel processors. Recognizing that the design and engineering tradeoffs in extremely high performance systems had fundamentally shifted with the emergence of high performance workstation/PC plus the low-latency single-chip switch, both advancing with Moore's Law, he developed the Network of Workstation (NOW) system architecture, demonstrating how to build incrementally scalable clusters of arbitrary size. It became the foundation of the first fast, massive web search engine and for modern Internet service architectures. He was inducted into the National Academy of Engineering for this work and authored a seminal text on Parallel Computer Architecture.

As the millennium approached he began to explore the opposite extreme of tiny, connected devices embedded in the physical world-wireless sensor networks (WSN). He developed TinyOS, drawing together the efficient communication and synchronization of Active Messages in a small memory footprint with a component model for reliable software composition and techniques for extremely low-power operation. He also developed several generations of the Berkeley Motes to allow researchers worldwide to gain hands-on experience with embedded networking protocols and to allow scientists to use WSNs as a kind of macroscope to observe subtle complex natural phenomena. In 2001, as Principle Investigator for the DARPA Networked Embedded Systems Technology program and Founding Director of Intel Research, Berkeley, he inspired a global open source community around the TinyOS/Mote platform, worked with many companies to move the technology forward, and with the global research community to tackle core challenges in low-power embedded network protocols. In 2005, Dr. Culler co-founded Arch Rock Corporation, which brought this technology into the Internet architecture; it was later acquired by CISCO as a foundation for their Smart Meter program. Co-chairing the IETF working group on Routing in Low-power and Lossy Networks (ROLL), he guided the formulation of the IP routing protocol that forms the foundation of the modern Internet of Things.

Throughout these developments, Dr. Culler has held various leadership positions within the University, with large and small companies, and in the research community. He helped to found the ACM Sensys conference, serving as its first program chair, as general chair, and on the steering committee, as well as other venues for publication of premier research in the novel areas. He is widely recognized for his vision and leadership in the research community. In 2013, he and his Intel Research team received five test-of-time awards for work done 10 years earlier, including WSN work, PlanetLab, which was a brief return to the design of planetary scale systems, and WebOS from 20 years ago presaging what today is 'The Cloud'.

In recent years, he has focused on the application of these technologies to challenges of energy and sustainability. He founded the LoCAL project to explore the creation of an information plane for electric grids to enable deep penetration of renewable sources and energy efficient operation and the Software Defined Buildings project to allow buildings to be agile, cooperative resources on such a grid. In both cases, he brings innovative experimental system design to bear on important problems facing society, including what we see in post 3/11 Japan.

For pioneering contributions to the design and development for wireless sensor networks, Dr. David E. Culler is hereby awarded the Okawa Prize.