CRA Grand Challenges Conference Application

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Short Biography

Valerie E. Taylor is an Associate Professor in the Electrical and Computer Engineering Department at Northwestern University and holds a guest appointment with the Mathematics and Computer Science Division at Argonne National Laboratory. She has been at Northwestern since 1991. Her research interests are in the areas of computer architecture and high performance computing, with particular emphasis on mesh partitioning for distributed systems and the performance of parallel and distributed applications. She has authored or co-authored over 70 publications in these areas.

Valerie E. Taylor received her B.S. in Computer and Electrical Engineering and M.S. in Electrical Engineering from Purdue University in 1985 and 1986, respectively. She received her PhD in Electrical Engineering from University of California at Berkeley in 1991.

In 1993, Valerie Taylor received a National Science Foundation ``National Young Investigator'' award. In 1994 she received the National Technical Association Computer Engineer of the Year Award. In 1994 she was elected to the Associated Student Government Faculty Honor Roll and in 2001 she received the Hewlett-Packard Harriet B. Rigas Award from IEEE Educational Society. She is a member of the Association for Computing Machinery and the Institute for Electrical and Electronics Engineers-Computer Society. She is a member of the SC Steering Committee, the Executive Committee for the National Computational Science Alliance, and Co-Chair of the Coalition to Diversify Computing.

Grand Challenges

With advances in technology, it is plausible that in the future we will be able to incorporate sensors into different devices, such as appliances, thereby allowing automatic detection of when service is needed or when to invoke energy efficient modes. As such devices become incorporated into many items, two grand challenge problems will result:

- **Data Integration**: With the integration of sensors into many devices, it will become imperative to have systems that can integrate the data from the many sensors such that intelligent "decisions" can be made. The focus will be on how to gain insights from the large amount of data, such that the insights can be presented in a way that is easily understood.
- **Security**: Another issue that will result from the many devices will be security. In particular, how to control who gets information and who gets the feedback or decisions

about the integration of the data. Further, how to develop security such that groups can be specified as having access instead of being at the level of individual devices.

In addition to the grand challenges related to the system, there are challenges related to society. Such applications related to issues pertinent to the society as a whole. These application include

- **Training to address the digital divide:** One major issue related to the digital divide is the training of users to feel comfortable with the use of technology and efficient ways for accessing the needed data. It would be interesting to determine how micro-devices can be used with technology to help in the training and with data searchers.
- **Literacy:** Another societal challenge is the large number of people who are illiterate. It would be good to determine how micro sensors can be used to aid with reading as well as understanding the given language.