

From Autonomic Systems To Empathic Autonomic Systems



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(and others*)



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Experimental Computer Systems Researchers Should...

- Incorporate **user studies** into the evaluation of systems
- Incorporate **direct user feedback** into the design of systems

Experimental Computer Systems Researchers Should...

- Incorporate **user studies** into the evaluation of systems
 - No such thing as the typical user
 - Really measure user satisfaction
- Incorporate **direct user feedback** into the design of systems
 - No such thing as the typical user
 - Measure and leverage user variation

Our Experiences In Applying Prescription

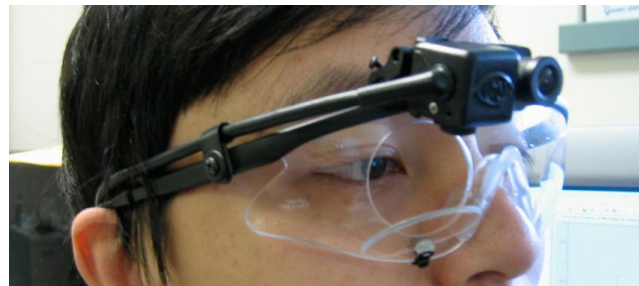
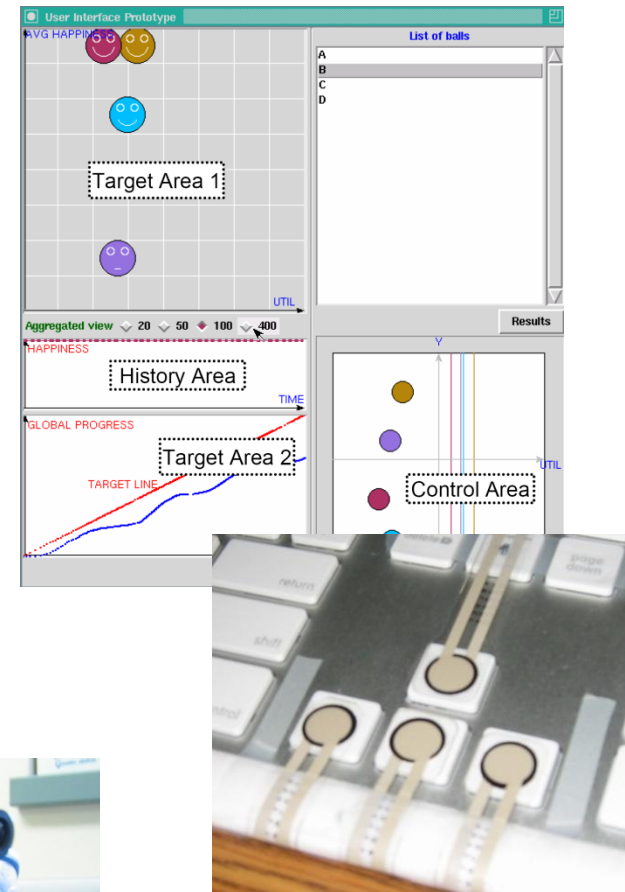
- Concepts : ExpCS 2007 @ FCRC
- Specific Projects
 - User comfort with resource borrowing
 - HPDC 2004
 - User-driven scheduling of interactive VMs
 - Grid 2004, SC 2005, VTDC 2006
 - User satisfaction with CPU frequency
 - CAL 2006, SIGMETRICS 2007
 - UDFS/PDVS: User-driven frequency scaling (/process-driven voltage scaling)
 - CAL 2006, SIGMETRICS 2007, NWU-EECS-06-11
 - PICSEL: Measuring user-perceived performance to control dynamic frequency scaling
 - ASPLOS 2008
 - iDVFS: Modeling the relationship between architecture-level information and user perceived performance
 - ISCA 2008
 - User-driven control of distributed virtualized environments
 - ICAC 2007, NWU-EECS-07-04
 - Speculative remote display
 - USENIX 2008

Empathic Autonomic Systems

- Autonomic systems that adapt to the *individual end-users*
- Optimization goal: maximize end-user's *perceived satisfaction* with system
 - End-user is part of control loop
- A *thin interface* from the end-users to the lowest levels of the system

Challenges

- Measuring perceived user satisfaction with minimal intervention
- Allowing user guidance in autonomic control
- Integrating satisfaction of multiple users



Right click on me to express discomfort feedback



More Challenges

- *Assigning Blame*
 - *Why* is the user dissatisfied?
 - Is it the interface or the system?
- How to incorporate user satisfaction into decision-making?
- How can we evaluate an empathic autonomic system?
 - Psychology and computer systems



For More Information

- Peter Dinda
 - <http://pdinda.org>
- Prescience Lab
 - <http://presciencelab.org>
- Empathic Systems Project
 - <http://empathicsystems.org>