

& Math
✓
Science Education using
Networked IT

I-Light 2004

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pervasivet^{technology}labs

AT INDIANA UNIVERSITY

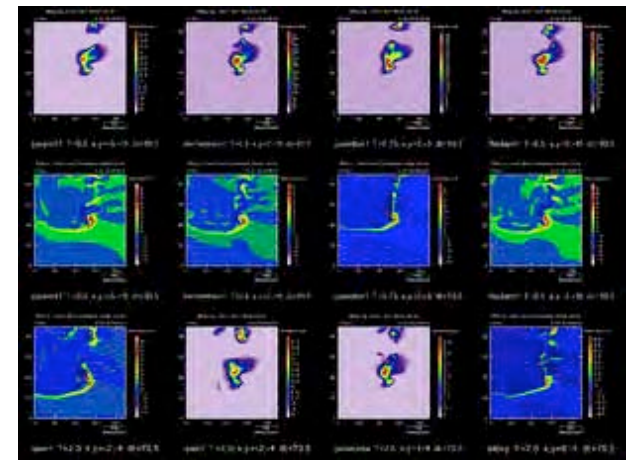
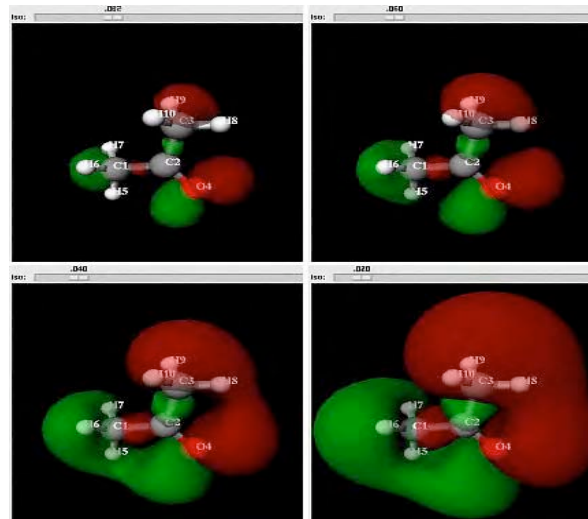
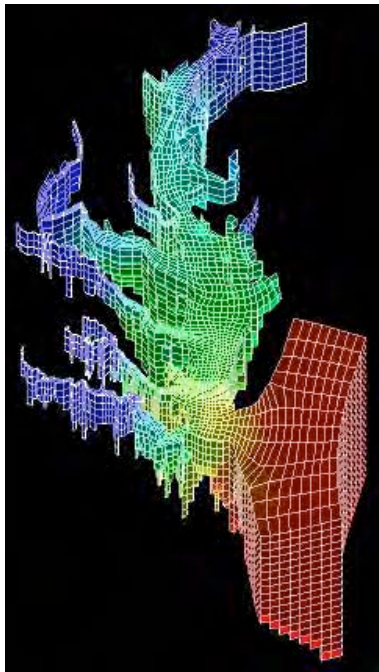
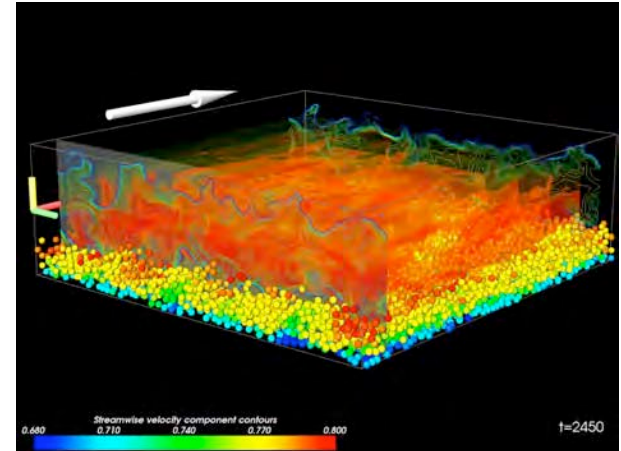
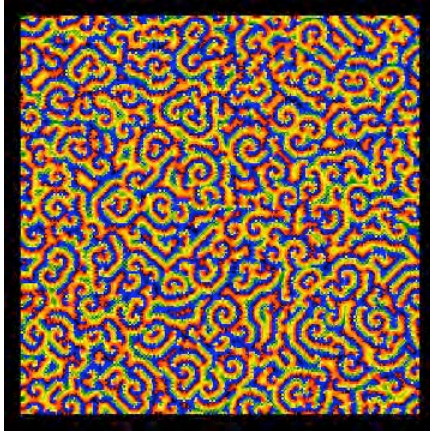
Speaker's background

- ◆ **B.S. Comp Math, Eastern Illinois U.**
- ◆ **M.S. Comp Science, U. of Utah**
- ◆ **M.A. Mathematics, Arizona State U.**

- ◆ **14 yrs scientific computing; data visualization/analysis for HPC (NCSA/UIUC, Gov't Labs)**



Snapshots of Past Projects



NSF TeraGrid \Leftarrow IP-grid



- ◆ Large simulations
- ◆ Distributed clusters
- ◆ High bandwidth
- ◆ Data repositories
- ◆ Visualization \Leftarrow



Scientific Data Analysis Lab

- ◆ Self-explanatory? 😊
- ◆ Scientific visualization/analysis for HPC; data mining
- ◆ Collaborations with Indiana⁺ researchers/businesses
- ◆ Education/Outreach



Motivation for this talk

- ◆ HPC scientists \Leftrightarrow K-12
- ◆ Opportunity
 - ◆ Came to IUPUI summer `03
 - ◆ Internet/Web/Grids
- ◆ Middle age
 - ◆ learning \Rightarrow teaching/sharing
- ◆ Self-interest (kids)



Broad Categorization

Networked computer-based tools
for science & math education

Bandwidth



- ◆ Passive
- ◆ Active ~ Exploratory
- ◆ Interactive ~ Participatory



Passive (dist'd computing)

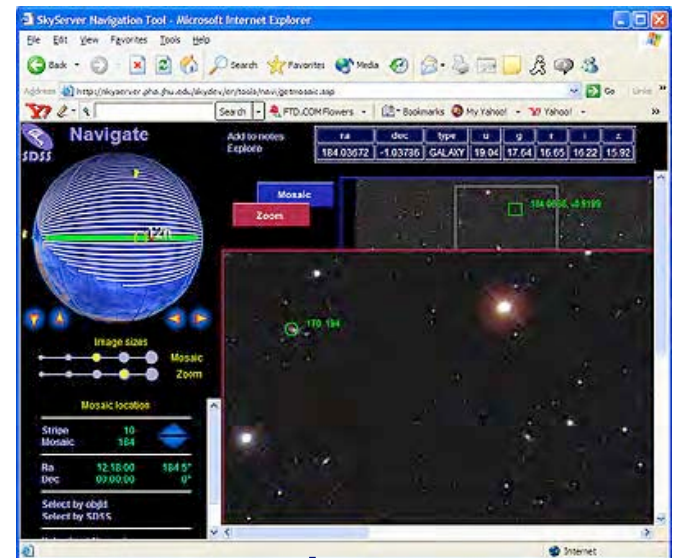


Active ~ Exploratory

Online encyclopedias,
applets, games

mathworld.wolfram.com

science.howstuffworks.com



sdss.org



Interactive ~ Participatory

Online gaming?

- Multiplayer/broadband
- chessclub.com
- DARPA FutureMAP

Local/regional science projects?

- eco monitoring
- americanbirding.org



“clickworkers” – NASA,
public participation for
classifying Mars craters



Targeting K-6: squeakland.org

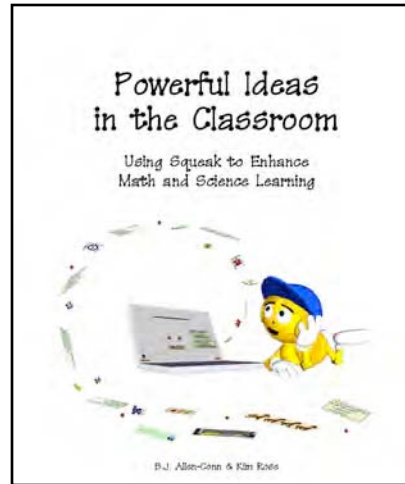
- ◆ Free/open graphics tool
- ◆ Fun, interactive
- ◆ Math & science concepts through simulations
- ◆ Alan Kay – “father of the personal computer”

Advisory Board

JP Barlow, G. Bell,
R. Dawkins, M. Minsky,
S. Papert, M. Resnick,
D. Hillis, L. Smarr,
Quincy Jones ...



Squeak Media



Book/Tutorial

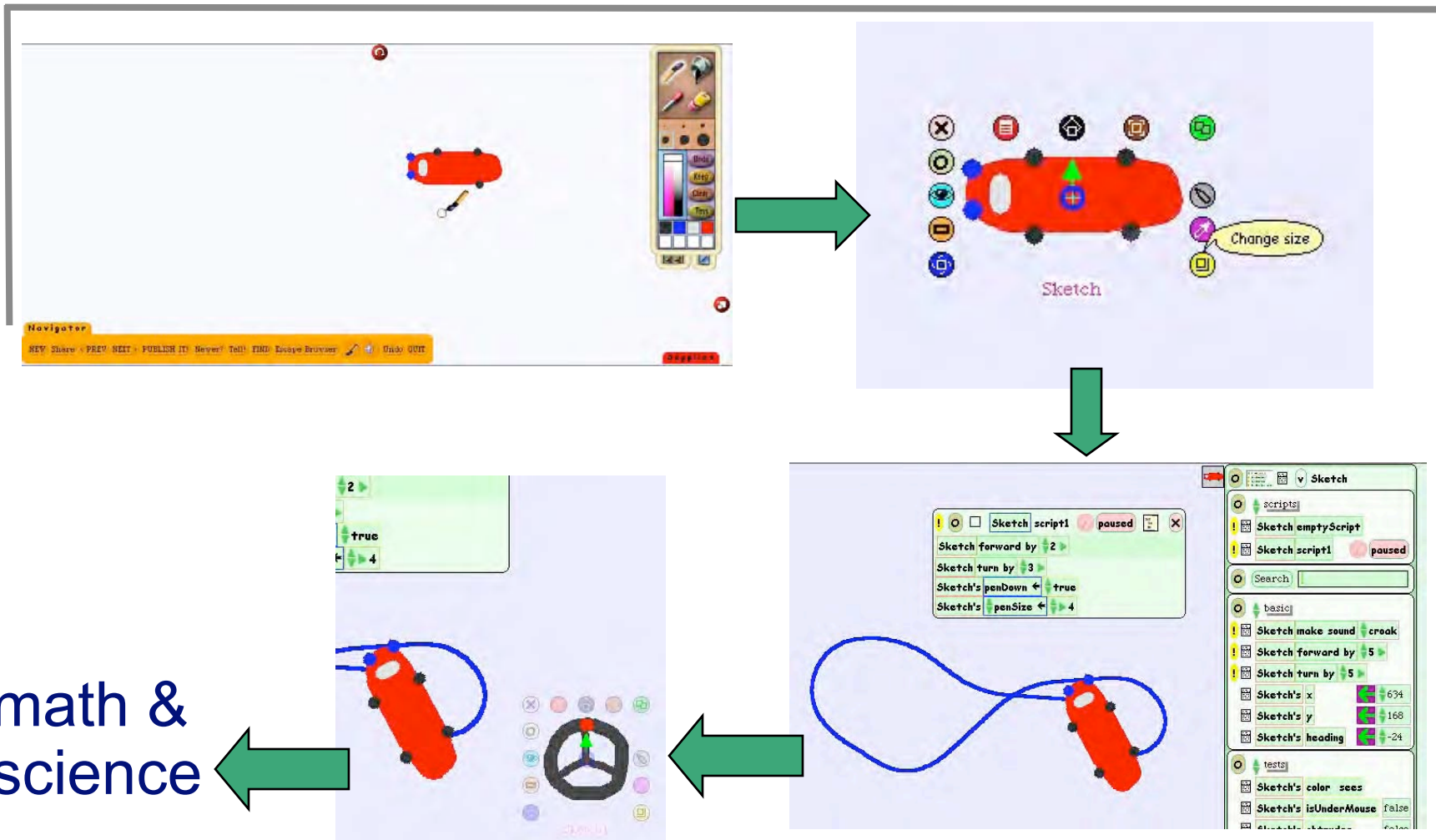


DVD (Ball State/Lilly)

- Articles & references
- Online community



Squeak Project #1: drive-a-car



math &
science



“Computers, Networks and Education”

- ◆ Alan Kay, SciAm Sept '91
- ◆ Computers as supporting media
- ◆ Value of computer simulation for education
 - ◆ Visual explanations
 - ◆ “what if” scenarios
- ◆ Value of networked computers
 - ◆ Benefits of peer interaction



Summary

- ◆ How can we use I-Light/Grids for K-16 science/math education?
- ◆ Need student-friendly tools, data, projects
- ◆ Squeak: an interesting, open tool; collaborative/networked squeak
- ◆ Like to hear your ideas

