



# The Infinity Project

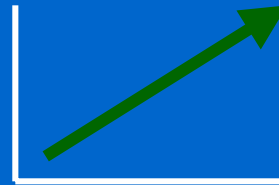
Engineering and Technology Education  
for the New Century



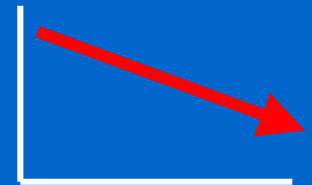
A partnership between Southern Methodist University &  
Texas Instruments

# Situational Analysis

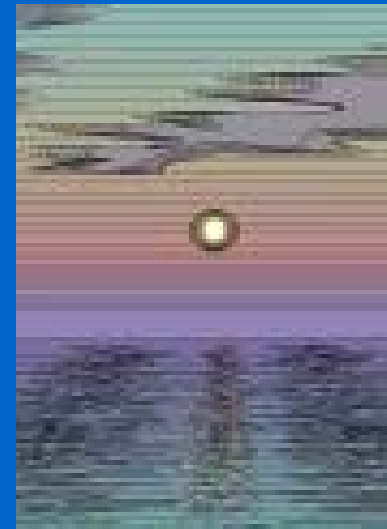
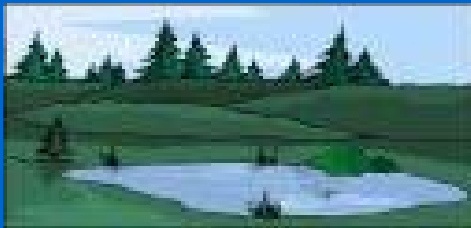
◆ DSP is the fastest growing segment of the SC market



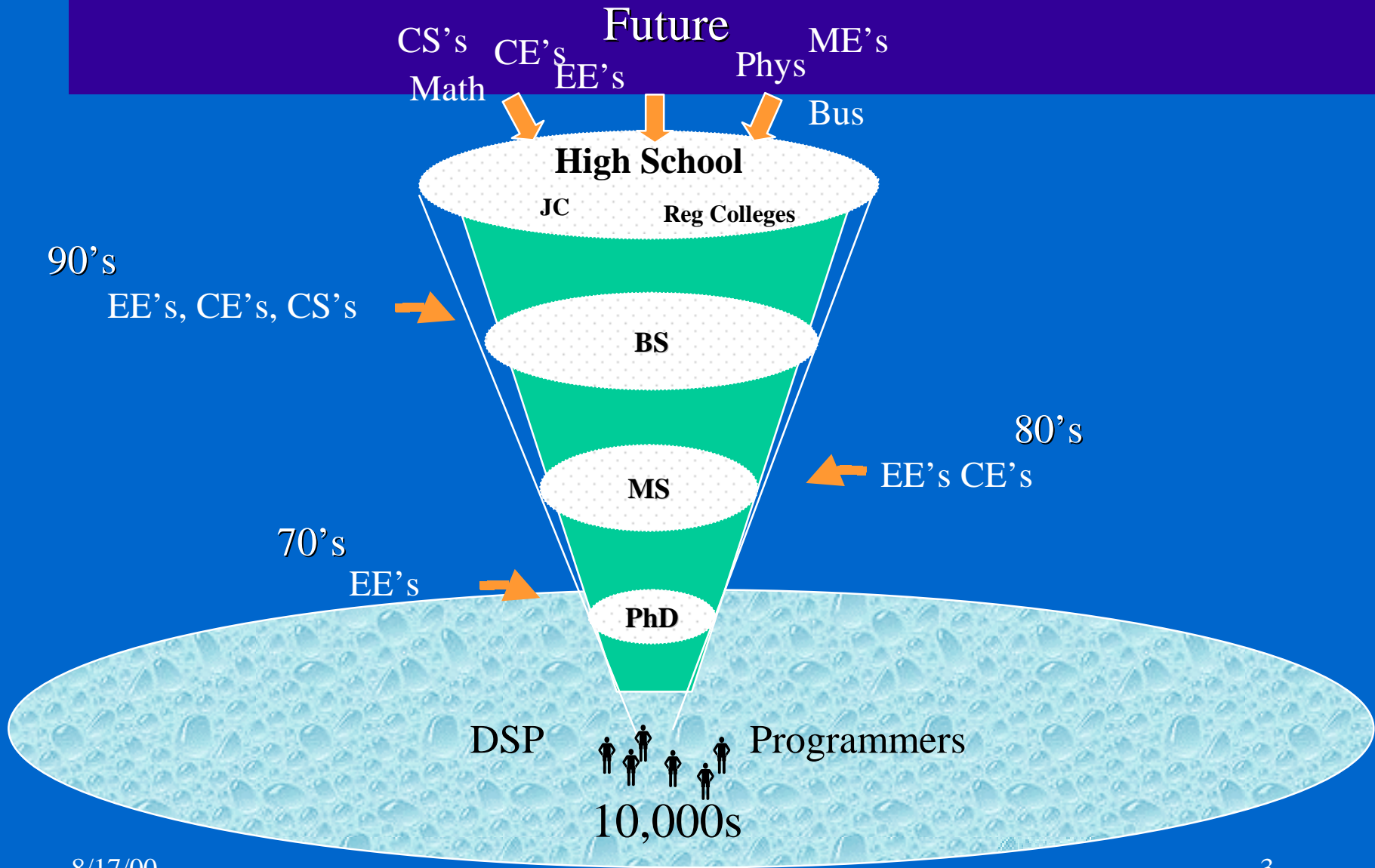
◆ BS EE Degrees



◆ Industry and academia must attract a larger pool of students to engineering & technology



# The Landscape

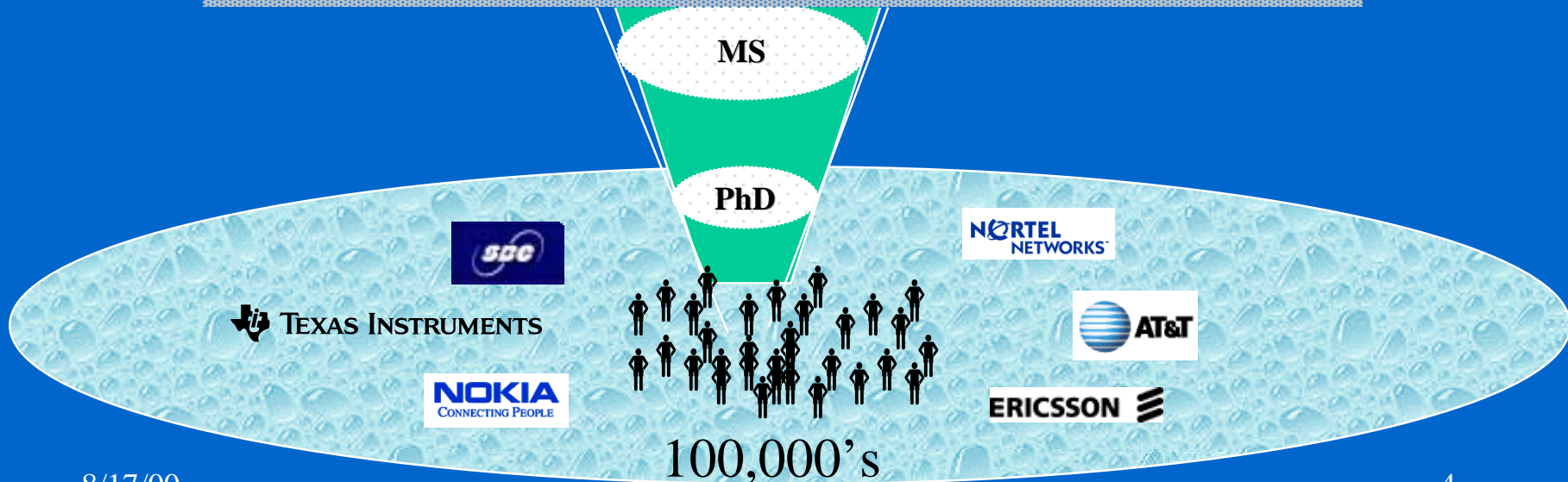


# The Landscape



90's  
EE's

## Infinity Project



# Where are all the Engineers?

- Technology is everywhere
- Kids love to play with it, yet....
  - They aren't very interested in studying engineering in college.
- Too hard? Lots of road blocks
- Too geeky? Not any more
- Don't think they are invited to the party?
- Never been exposed?

# The INFINITY Project

**Objective:** *Bring engineering/technology education to all High Schools*

The timing is right:

- parents want it
- corporate America wants it
- teachers and administrators are excited about it
- educational technology is maturing

# Particulars of INFINITY

- Initiated in early 1999
- Supported by a partnership between



# Objectives

- Ensure that every student have an opportunity to be exposed to technology and engineering (EARLY)
- Increase the number of students pursuing technical degrees at the University level
- Make math/science/technology/engineering relevant and exciting



# The INFINITY Team

- Management
- University/Industry Curriculum Authors
- Advisory Board
- INFINITY Leadership Instructors
- INFINITY Technology Development Team

# Profile of INFINITY Team

- 5 Past Presidents of IEEE Societies
- 8 Fellows of the IEEE
- 3 Founders of Technology Companies
- 2 Chairs of EE Departments
- 2 Current or Past University Presidents
- 10 Leading High School Math and Science Teachers

# THE INFINITY Authors



**Ravi Athale**  
GMU



**Geoffrey Orsak**  
SMU



**Sally Wood**  
Santa Clara



**Scott Douglas**  
SMU



**John Treichler**  
AST



**Mark Yoder**  
Rose-Hulman



**Dave Munson**  
U of Illinois

# Key Element to Success

- **Make it very easy for schools to implement**
  - Great Curriculum
  - Lots of hands-on designs and exercises
  - One-stop shopping for all technology needs
  - World-class training for teachers
  - On-line classroom and teacher support
  - Low cost

# Our New Curriculum

*Basic Math + Basic Technology = Cool Stuff*

- Fun to learn - fun to teach!
- Rooted in math and science
- Hands-on, loaded with experiments
- “Calculus-free” - doesn’t mean it is light weight
  - *opens the curriculum to most students*

# The Content

- Basic math, science, and engineering which underpins the Information Age
  - “digitizing” the real world
  - processing all those numbers
  - Internet, cell phones, networks
  - transistors, fiber optic systems, computer devices, DSPs, Moore’s law, MP3,...
  - what is coming in the future?
  - *let’s design and implement.*

# The Book

- Multimedia and Information Engineering
  - 600 pages
  - 500 figures
  - 20 chapters
  - integrated labs and designs
  - lots of assessment

- 
- 
- 

# Make Curriculum Relevant

Polynomials



Sines and Cosines



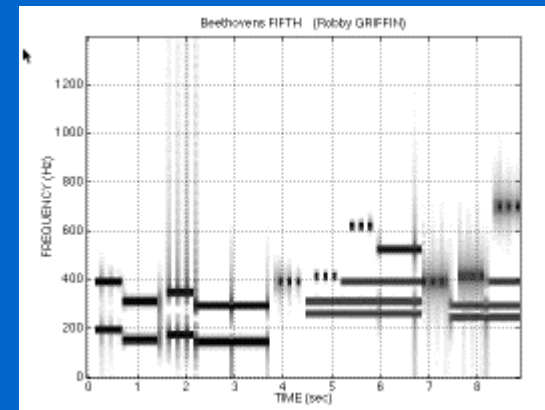
Matrices





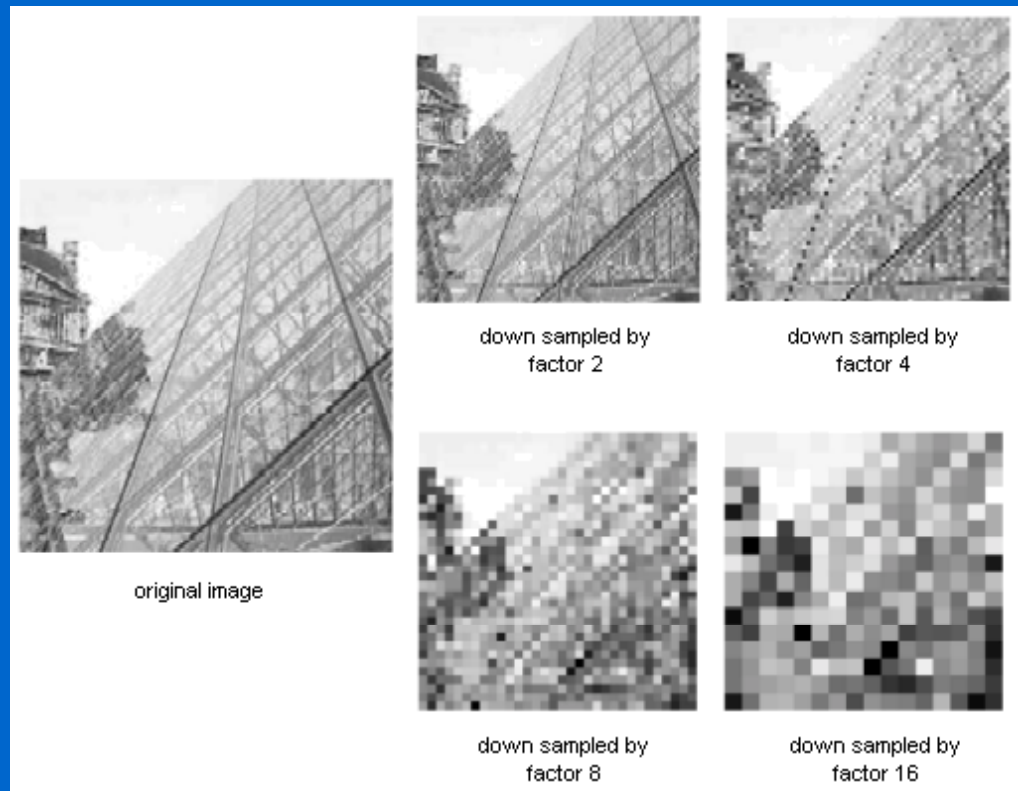
# Signals are Important

- Signals
- Analog vs. Digital
- Sound
- Sampling (A/D - D/A)
- Quantization
- Frequency Analysis
  - Fourier Series
  - Fourier Transform
  - Spectrograms
- Processing of Signals



# Images and Movies Excite

- Pixel resolution
- Quantization
- RGB
- Digital Processing of Images
- Noise reduction
- Imaging Technologies
  - digital camera
  - DLP
  - scanning
- Trade-offs



# Storing Information: Ones and Zeros

- Storage Technologies

- bit density

- Mathematics of storing 1's and 0's

- compression for data

- compression for media

- limits of compression

- error correction

- encryption

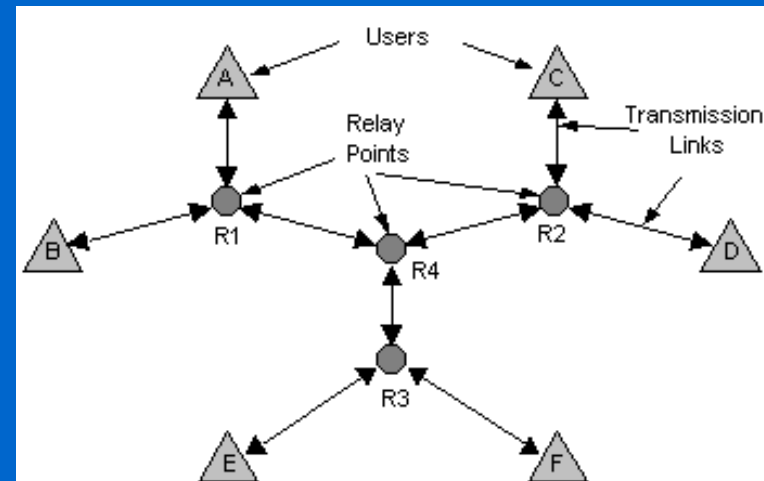
- Public Key Encryption

1	0	0	1
1	1	0	0
0	1	1	0
1	0	1	0
1	1	1	1
0	1	1	0



# Moving Information

- Wireless Communications
  - FSK
- Data rates
- Modems (Airmodem!)
- Bandwidth, SNR
- Limits to communication speed
- Antenna
- Networking
- The INTERNET



# INFINITY Technology Kit

*“Turns a standard PC into a multimedia beast!”*

- TI C31 DSK
- VAB for INFINITY
- Speakers
- Microphone with pre-amp
- Manufactured by

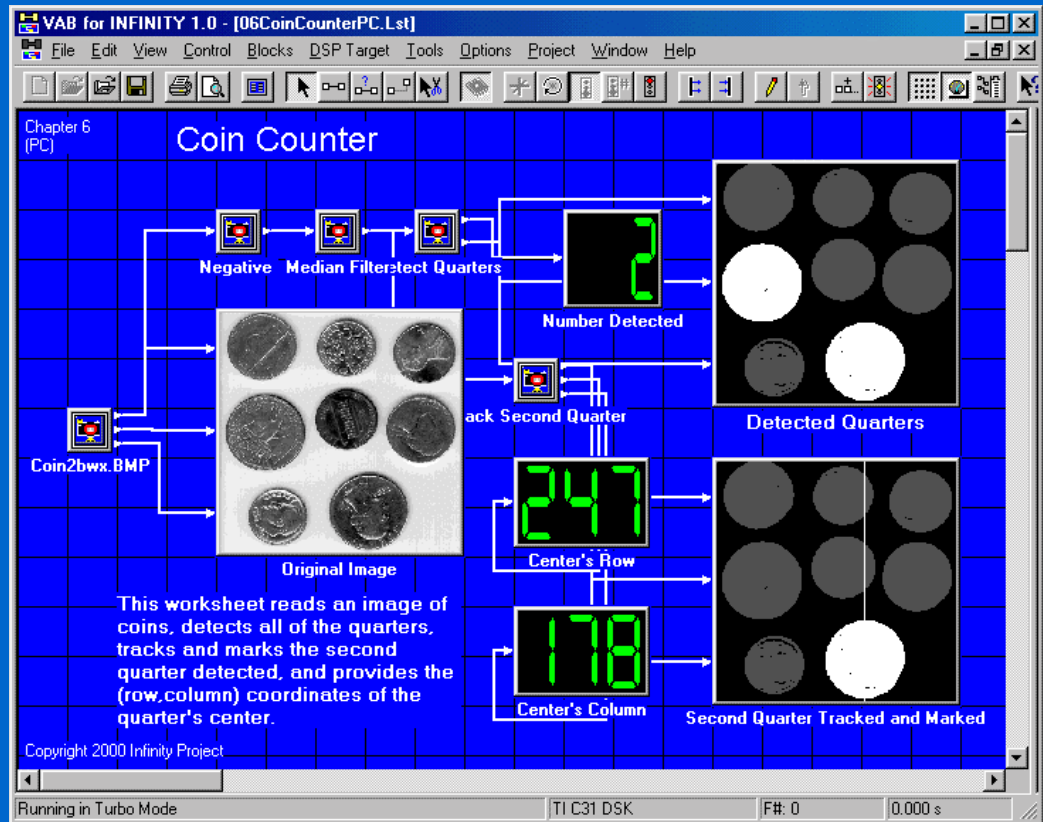


# VAB for INFINITY

- Remove “programming” as a barrier
- Gives students a block diagram view
  - easy to understand
- Focus on high-level systems design
  - allows students to do some “real” things
- Software is easy to install, easy to use, and easy to create new designs
- Ideal for real-time

# Example

- Visual
- Intuitive
- Real-time
- Media-rich
- Easy to use



# Teacher Training and Support

- We use a time-tested model for training HS teachers



- T3 successfully trained over 100,000 teachers world wide in the use of graphing calculators
- Cost-effective and **teachers like it**



# INFINITY Institutes - 2000

## 2000-2001 AY

- 2 INFINITY Institutes
- 5 days each
- 25 teachers
- 14 schools



# INFINITY Institute

Hard at work....



Graduation!



8/17/00

And off to teach engineering to my students...26

# Year One Assessment

- Teachers love this stuff!

*“Interesting, interactive, knowledge packed: I learned a lot and I think the students will like it”*

*“All the details involved in each chapter will fascinate the students”*

# Other Achievements

- Gates Foundation Grant to Texas
  - help train all Superintendents and Principals on technology
- Required course for graduation at Hightower HS, FBISD
- Will be in every HS in DISD next year

# Call to Action

- Think differently
- Identify area secondary schools & teachers
  - <http://www.infinity-project.org>
- Consider I N F I N I T Y as introductory course