Presenting with Power: Effectively and Dynamically Communicating Your Research

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UROP Workshop Series

March 24, 2009

Georgia Institute of Technology

80% of Your Presentation Will Be Forgotten

- People tend to remember
  - Tone
  - Pace
  - Nonverbal expressions

Planning Your Presentation

- What key points do you want your audience to remember?
- Structure your talk around the points and find ways to illustrate them.
- Have a clear beginning, middle, and end to your talk.

What? Why? How?

- The purpose of a research presentation is to summarize
  - **WHAT** you have been working on
  - **WHY** it is important
  - **HOW** you conducted your research

Customize Content for the Audience

- Who will be in the audience?
- What are their expectations?
- Are you presenting new material or building upon prior knowledge?
- How many attendees?
- Will the talk be interactive?
- How much time is allotted for the talk?

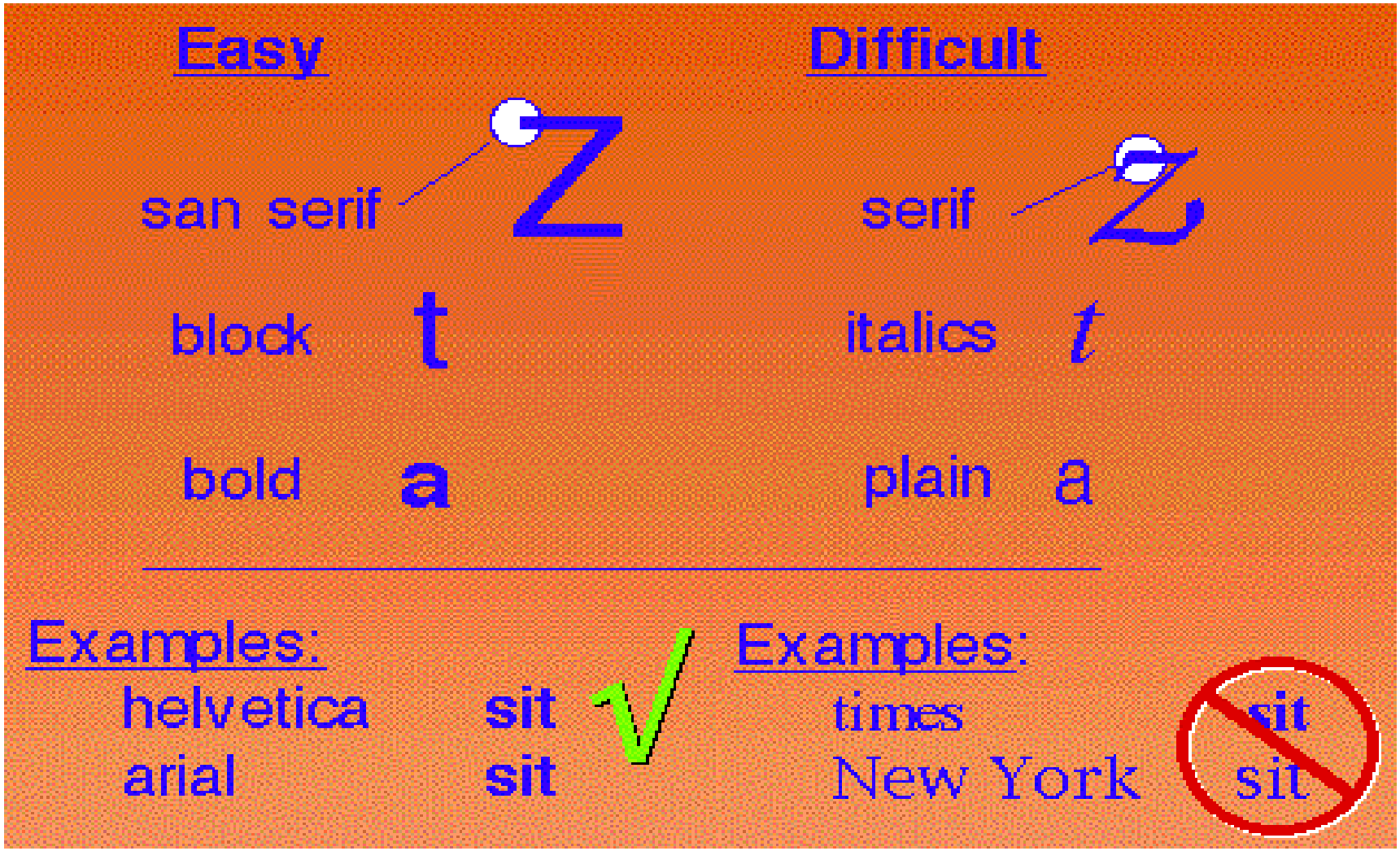
Content Guidelines for a Research Presentation

- Title slide (Highly descriptive title)
- Acknowledgements
- Research Question or Objectives/Goals
- Background
- Methodology (or Technical Approach)
- Results
- Discussion of Results
- Conclusions
- Future Work
- Questions slide

PowerPoint Do's

- Include a descriptive title/heading line on every slide.
- Keep slides simple and uncluttered by using short phrases, not long sentences.
- Use consistent capitalization and punctuation on all slides.
- Use consistent verb tense on all bullet items.
- Number your slides.

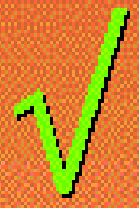
Choosing a Font



Effective Font Size

To Upper Case or to Lower Case, That is the Question

A MIXTURE OF UPPER AND LOWER CASE LETTERS IS EASIER TO READ QUICKLY AND ACCURATELY, AND TAKES UP LESS SPACE ON THE SLIDE.



A mixture of upper and lower case letters is easier to read quickly and accurately, and takes up less space on the slide.

Choosing the Right Contrast and Colors

- White background with dark text is the norm at professional conferences.
- Dark backgrounds with light text project well.
- Red, orange, or blue lettering become unreadable when projected on dark background.
- Avoid “busy” slide designs, those with distracting borders or graphics; keep it simple and “clean.”

When to Show & When to Tell

- Make use of visuals wherever you can!
- People like to **see** what you're doing:
  - Diagrams
  - Photos
  - Flow charts
  - Tables
- Use text when you present concepts that you can't show or when words help to describe the visual.

Let’s look at some examples of

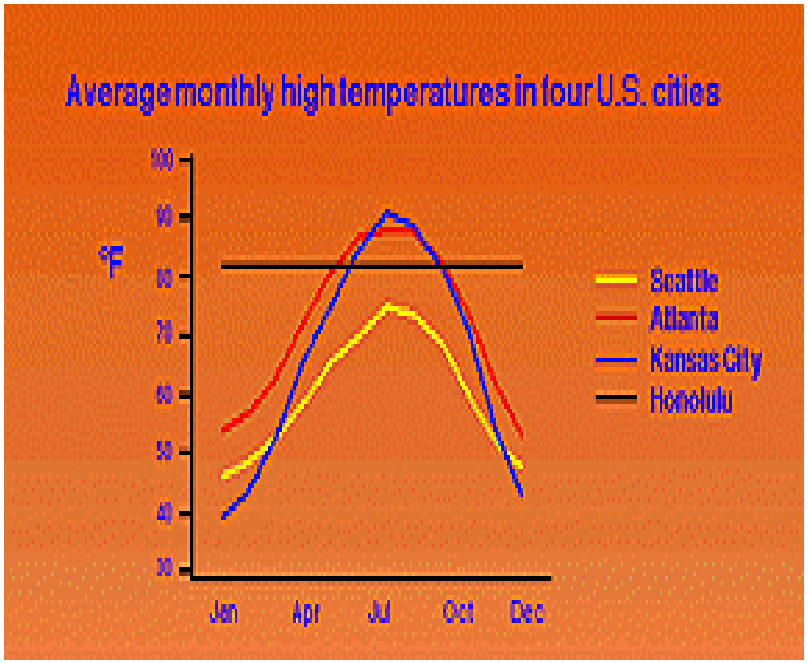
effective

use of graphics

How to Show Effectively

Average monthly high and low temperatures in four U.S. cities

	Seattle	Atlanta	KansasCity	Honolulu
January	46/37	54/36	39/22	82/73
February	49/38	57/37	44/26	82/73
March	53/40	63/41	53/33	82/73
April	59/44	72/50	66/45	82/73
May	66/49	81/59	75/55	82/73
June	70/53	87/66	85/66	82/73
July	75/56	88/69	91/71	82/73
August	74/56	88/68	89/69	82/73
September	69/53	83/63	82/60	82/73
October	60/48	74/52	71/49	82/73
November	52/42	62/40	54/35	82/73
December	48/39	53/35	43/27	82/73



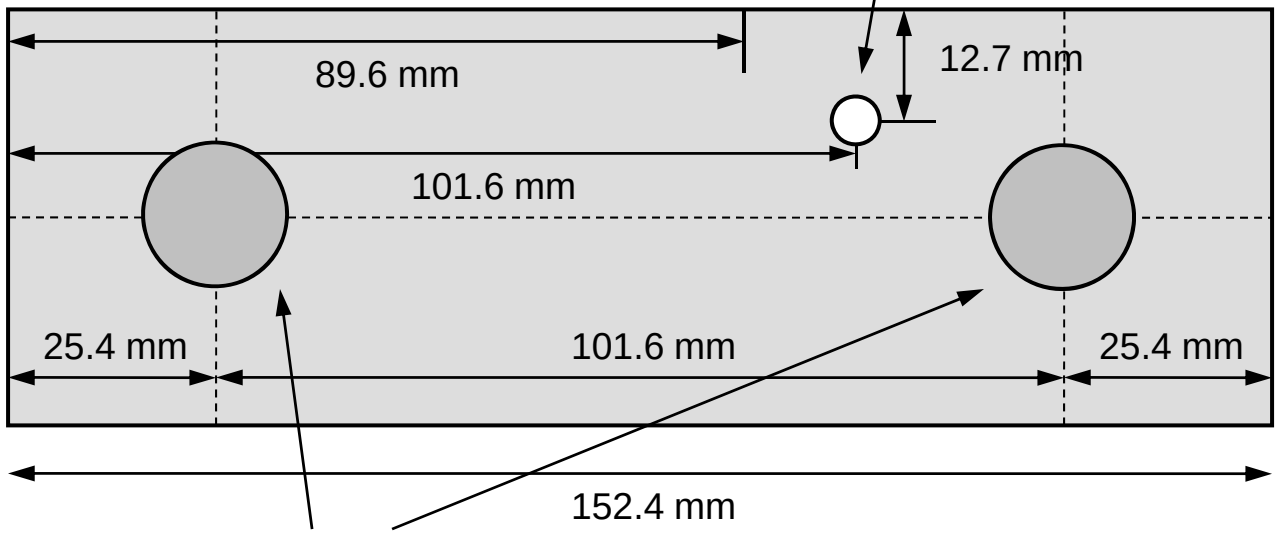
Average high temperatures for winter months in four U.S. cities

	Seattle	Atlanta	KansasCity	Honolulu
November	48	62	54	82
December	52	53	43	82
January	46	54	39	82
February	49	57	44	82

What Works

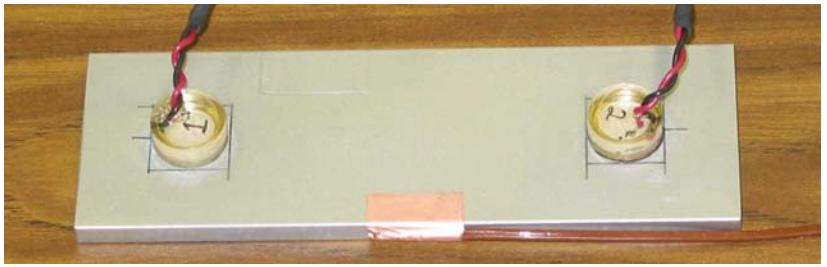
Specimen #1
6.35mm/0.25” long edge notch
introduced in 10 length increments
(notch width of 0.025mm/0.01”)

Specimen #2
6.35mm/0.25” diameter hole
drilled in 11 increments

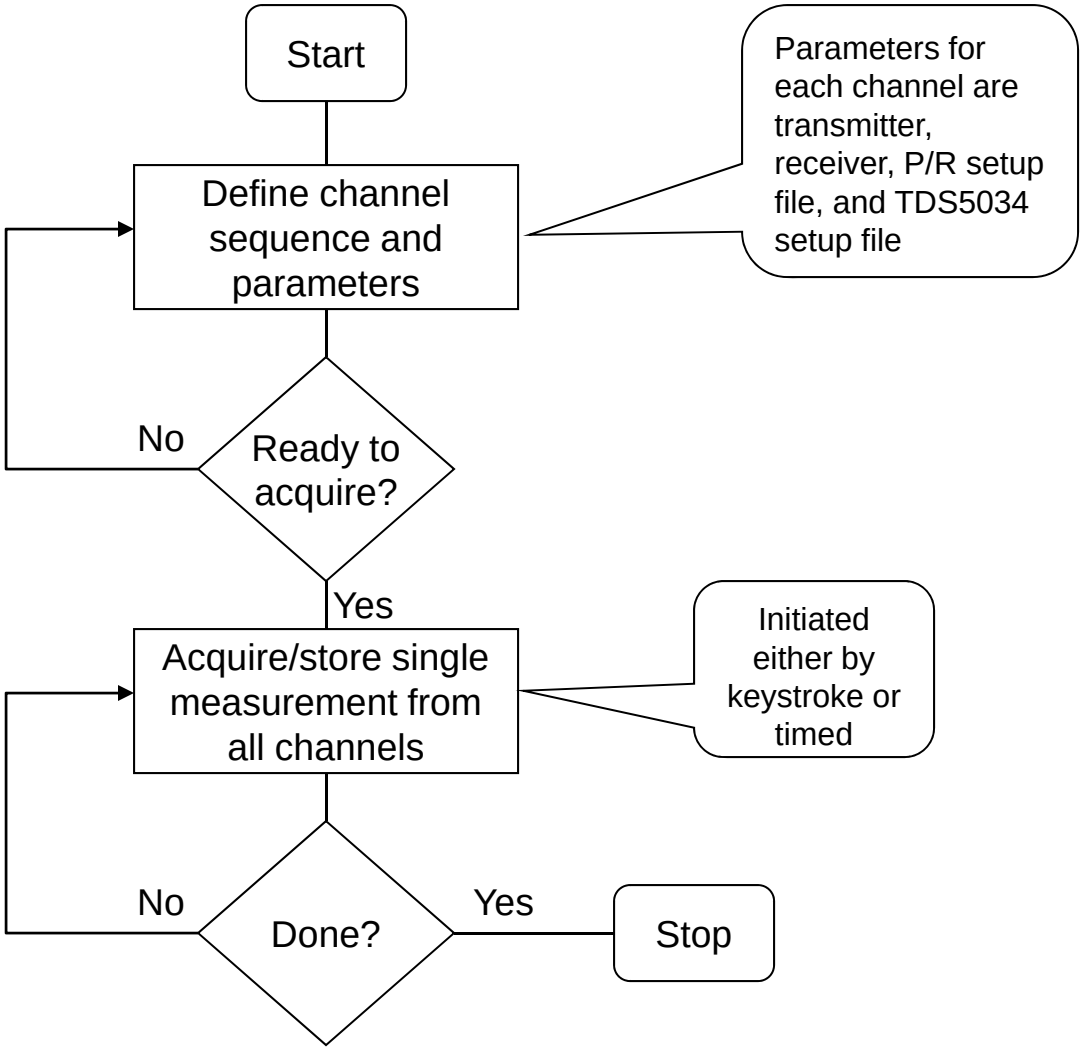


Aluminum
50.8mm x 152.4mm
x 4.76mm
(2” x 6” x 3/16”)

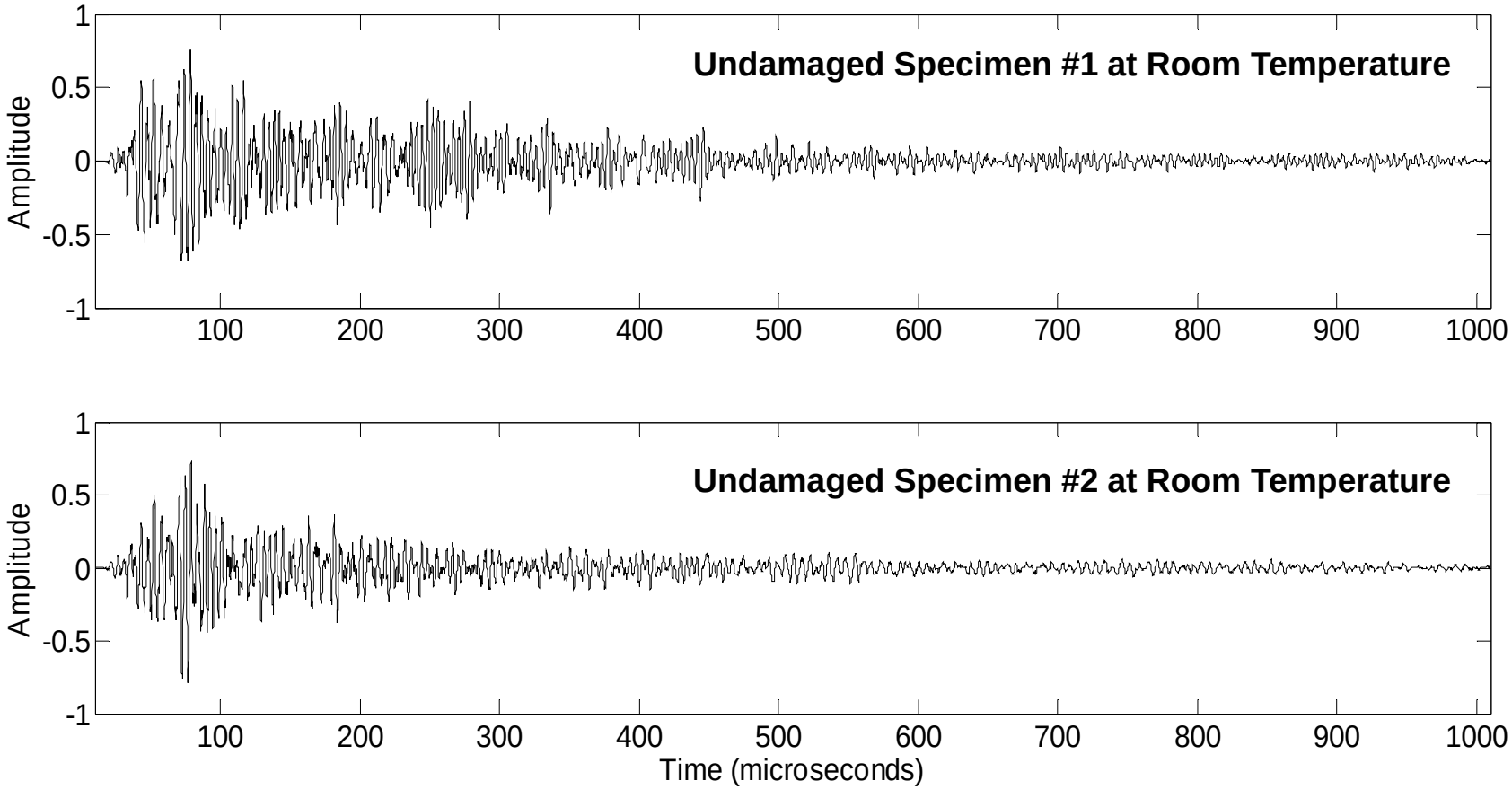
2.25 MHz, 12.7mm
diameter piezoelectric
discs bonded to top
surface



“High Level” Flow Chart



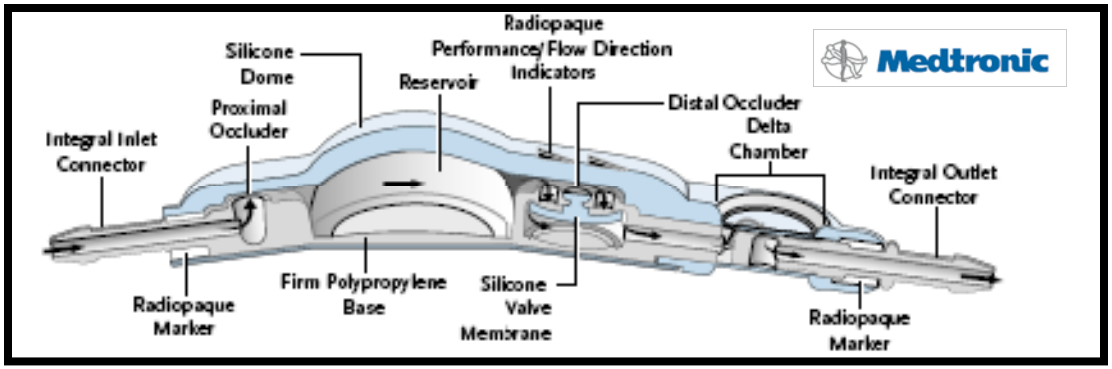
Ultrasonic Signals from Nominally Identical Samples



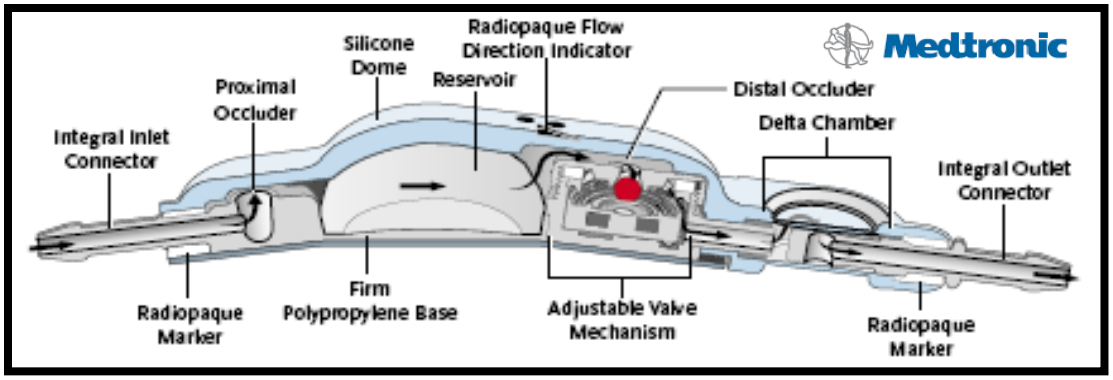
And here's what

doesn't work

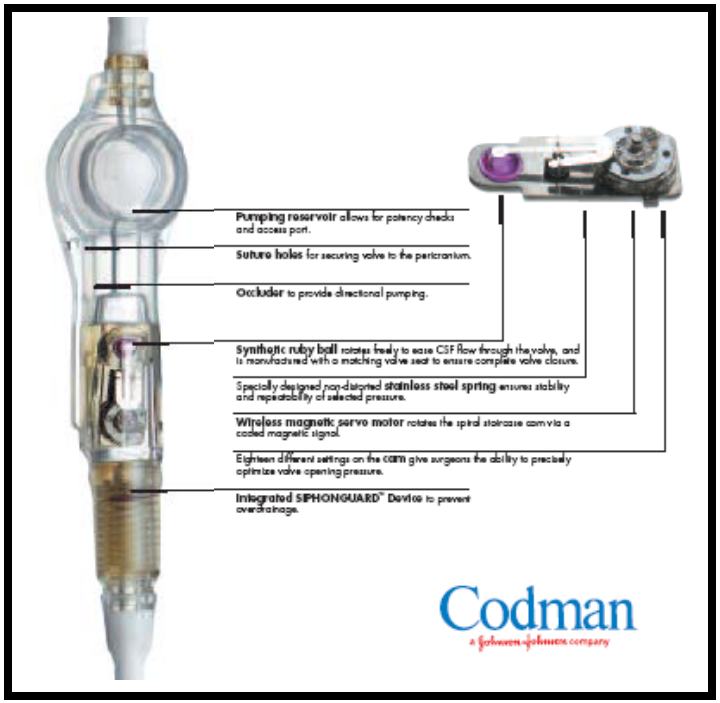
What Doesn't Work



Medtronic Delta Valve



Medtronic Strata Valve



Codman Hakim
Programmable Valve

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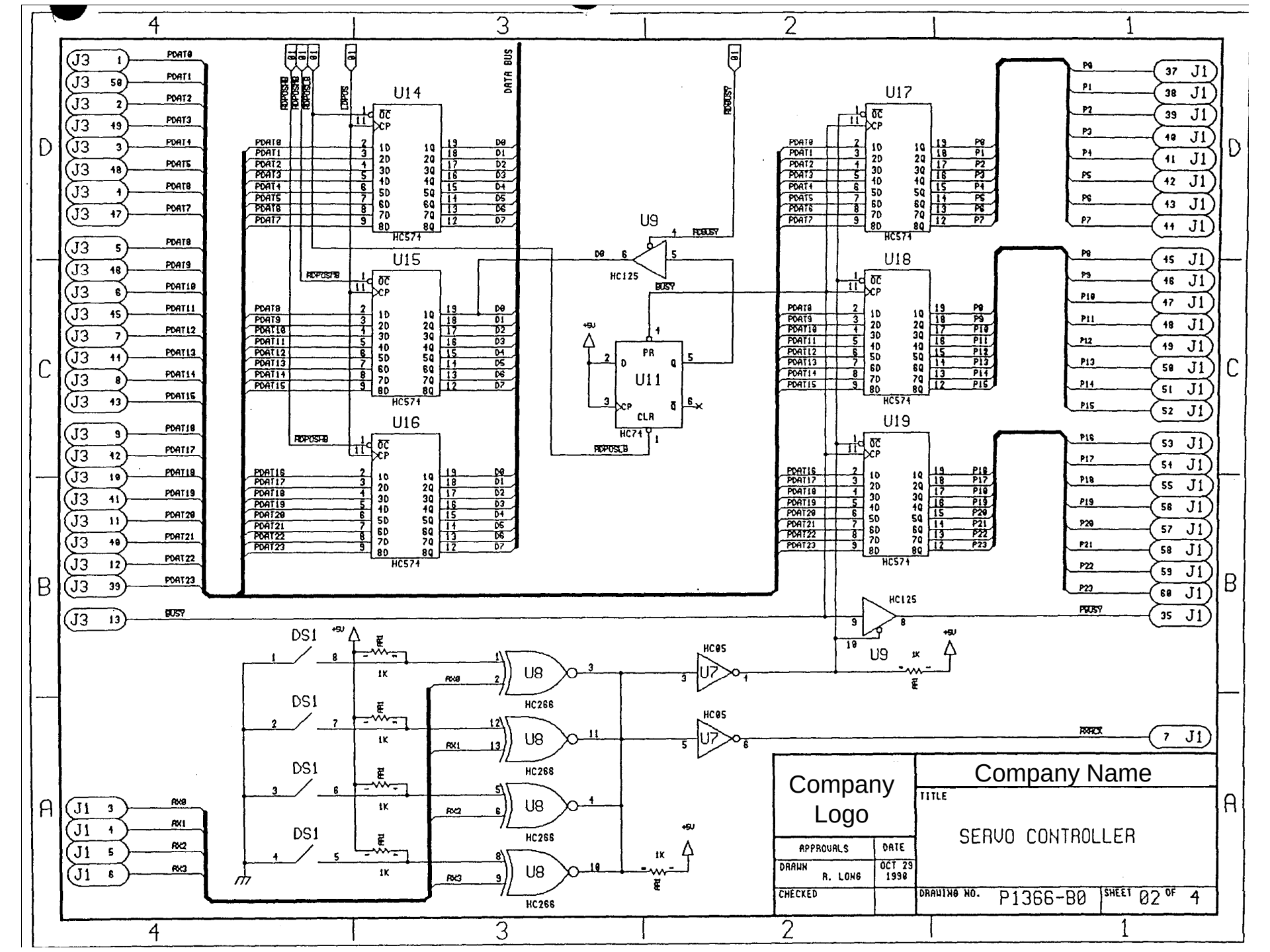
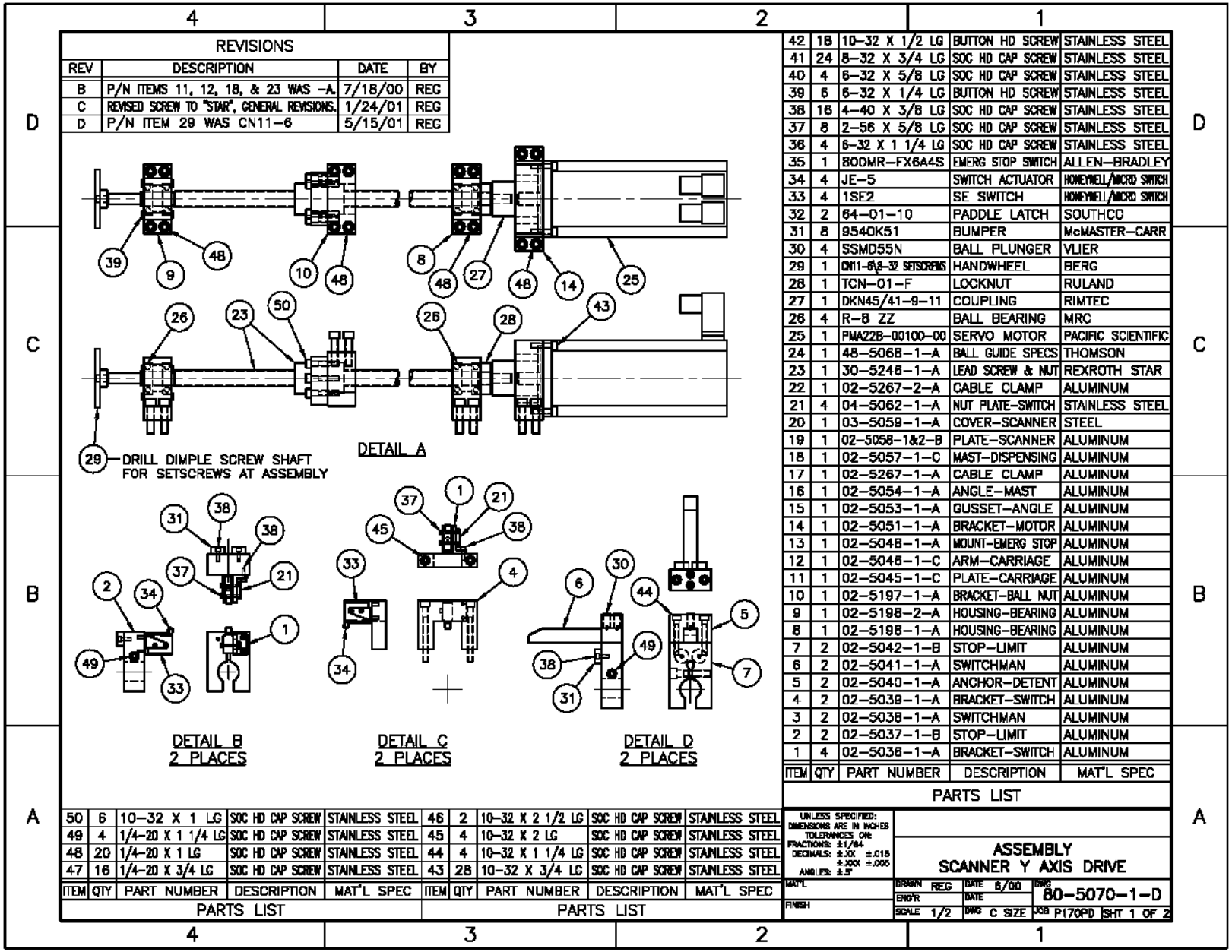

DATA BUS
U14
U15
U16
U17
U18
U19
U9
U11
HC574
HC125
HC74
U8
HC268
U7
HC05
DS1
1K
Company Logo
Company Name
TITLE
SERVO CONTROLLER
APPROVALS
DATE
DRAWN
R. LONG
OCT 29 1998
CHECKED
DRAWING NO.
P1366-B0
SHEET 02 OF 4



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Mechanical Assembly Drawing

Schedule of Due Dates

Recommended Presentation Content	Proposal Report September 15	Design Review Presentation By 24 October	Final Presentations Dead Week
1. Qualitative Project Goals (brief)	X	X	X
2. Quantitative Project Specifications	X	X	X
3. Background Research: State of the Art	X	audience relevant	X
4. Status	X	X	X
5. Schedule (GANTT or similar chart)	X	X	X
6. Budget	X	X	X
7. Results			X
Highlights:	Contrast candidate paths and commit	Status	Results with contrast to proposal
Duration		<10 minutes	< 15 minutes

Now let's look at some

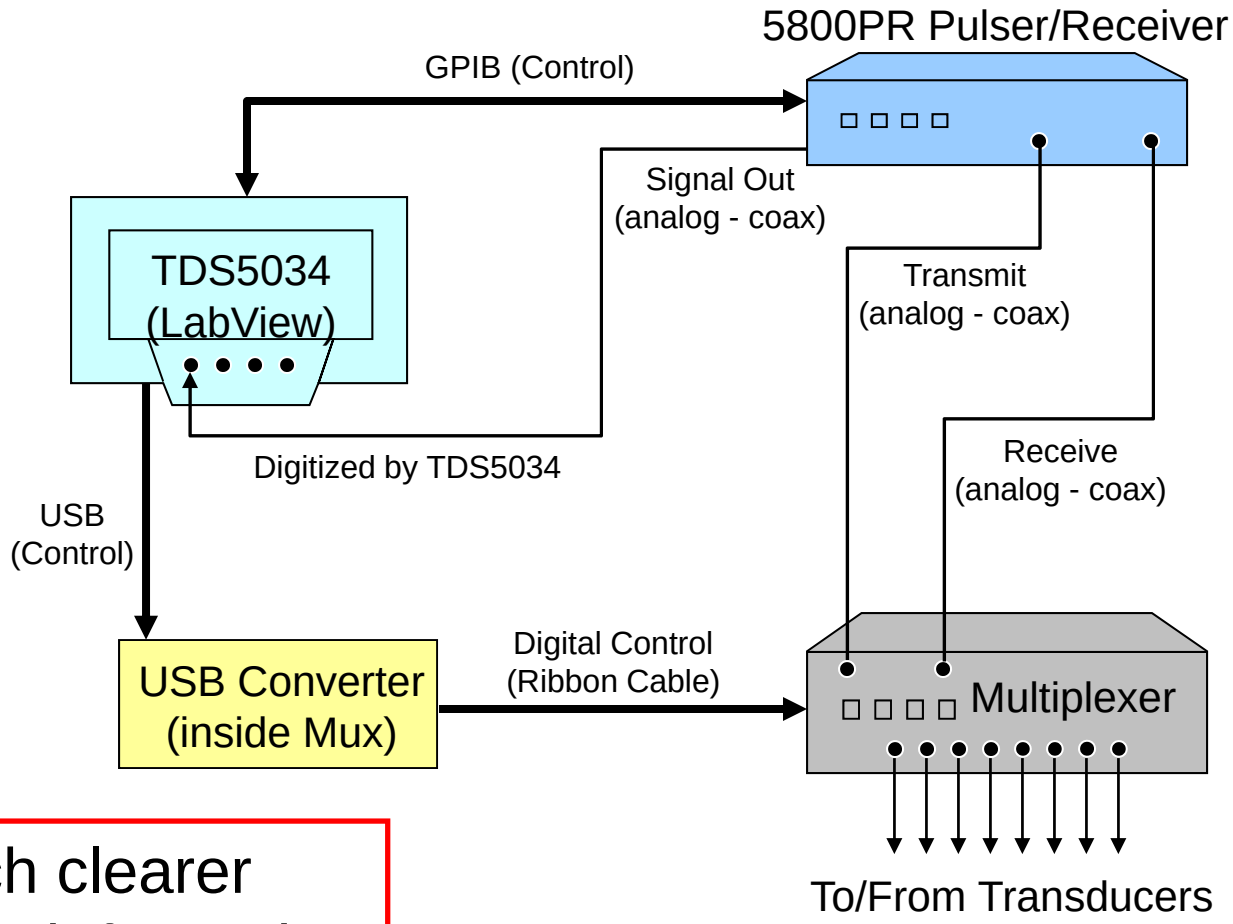
Before and After

examples

System Description

- PC-Based Oscilloscope (TDS5034)
  - Controls multiplexer via USB interface
  - Controls pulser-receiver via GPIB interface
  - Runs LabView
- Pulser Receiver
  - Signal output goes to scope input and is digitized
  - Transmit and Receiver are connected to the Mux
- Eight Channel Multiplexer
  - Supports up to 8 transducers
  - Routes Transmit and Receive to/from transducers
  - USB interface with scope PC

System Block Diagram

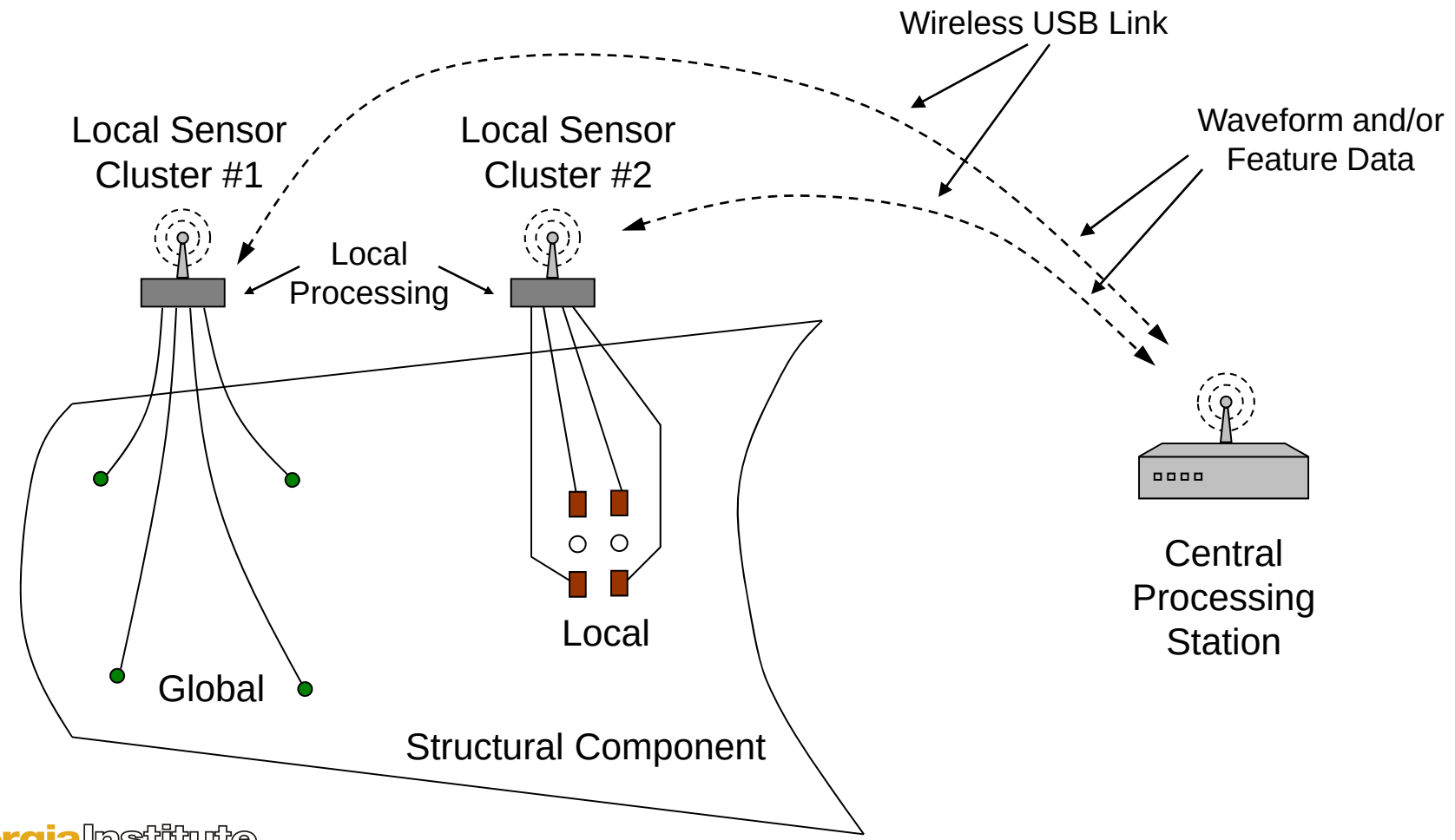


- Much clearer
- More information

Ultrasonic Structural Health Monitoring System

- Sensor Cluster
  - Multiple ultrasonic sensors (up to 16 per cluster)
  - Each sensor can operate as a transmitter or a receiver
  - Synchronization between all sensors in a cluster
  - Processing capabilities for local data analysis
- Structure with Multiple Sensor Clusters
  - Local sensors for monitoring small areas
  - Global sensors for monitoring large areas
- Wireless Link
  - Sends raw waveforms or processed data to base station
  - COTS USB link (2.4 GHz)
- Base Station
  - Further processing of data
  - Can link/combine data from multiple sensor clusters

Ultrasonic Structural Health Monitoring System



Remember These?

- Title slide (Highly descriptive title)
- Acknowledgements
- Research Question or Objectives/Goals
- Background
- Methodology (or Technical Approach)
- Results
- Discussion of Results
- Conclusions
- Future Work
- Questions slide

Let’s look at a few more examples of

what works

and

what doesn’t

Methods for Quantifying Changes in Diffuse Ultrasonic Signals with Applications to Structural Health Monitoring

Jennifer E. Michaels, Yinghui Lu, and Thomas E. Michaels

Georgia Institute of Technology
School of Electrical and Computer Engineering

10th SPIE International Symposium
Nondestructive Evaluation for Health Monitoring and Diagnostics

March 6-10, 2005

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Project Overview

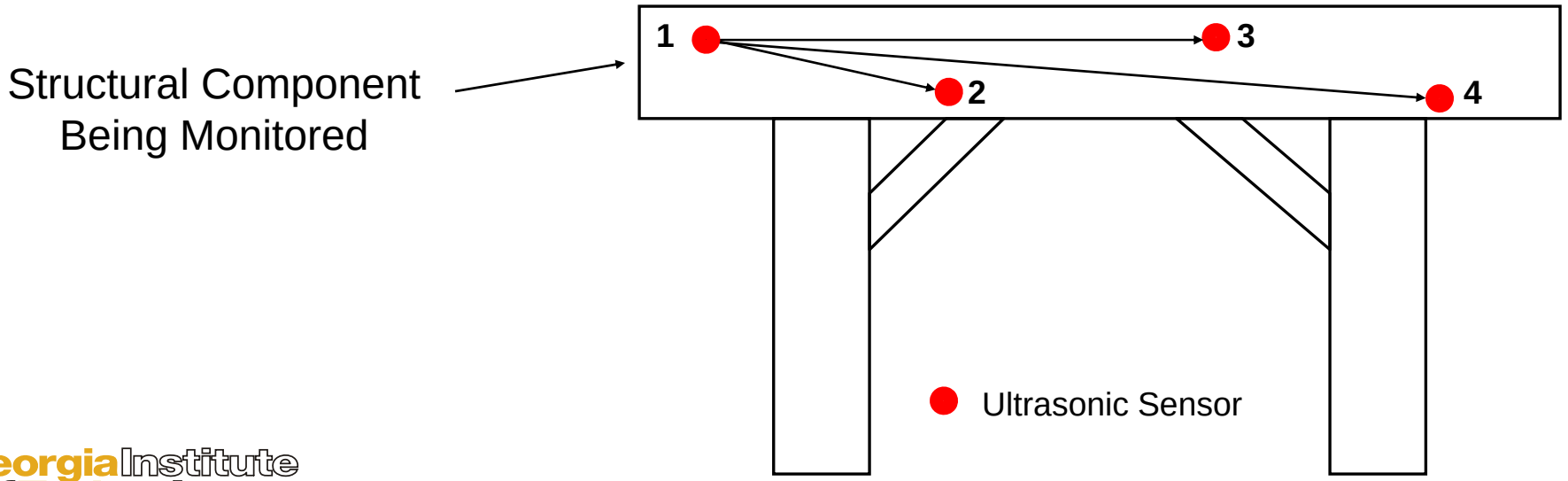
- Monitor continuously integrity of critical structures, using permanently attached ultrasonic sensors.
- Apply technology for monitoring commercial airliners, bridges, and buildings. Primary client is Air Force.
- Estimate development costs at $3 million; initial cost of a deployed system, including instrumentation and wiring, should be less than $150,000.

Design Objectives: Weak

- Monitor structures
- Have attached ultrasonic sensors
- Read sensors
- Record waveforms
- Determine condition of structure

Design Objectives: Better

- Monitor continuously health of critical structures (airplanes, buildings) in real-time
- Attach permanent ultrasonic sensors near, on, or in structure
- Interrogate sensors, record waveforms
- Analyze waveforms to determine if structure has developed internal flaws or pre-flaw conditions



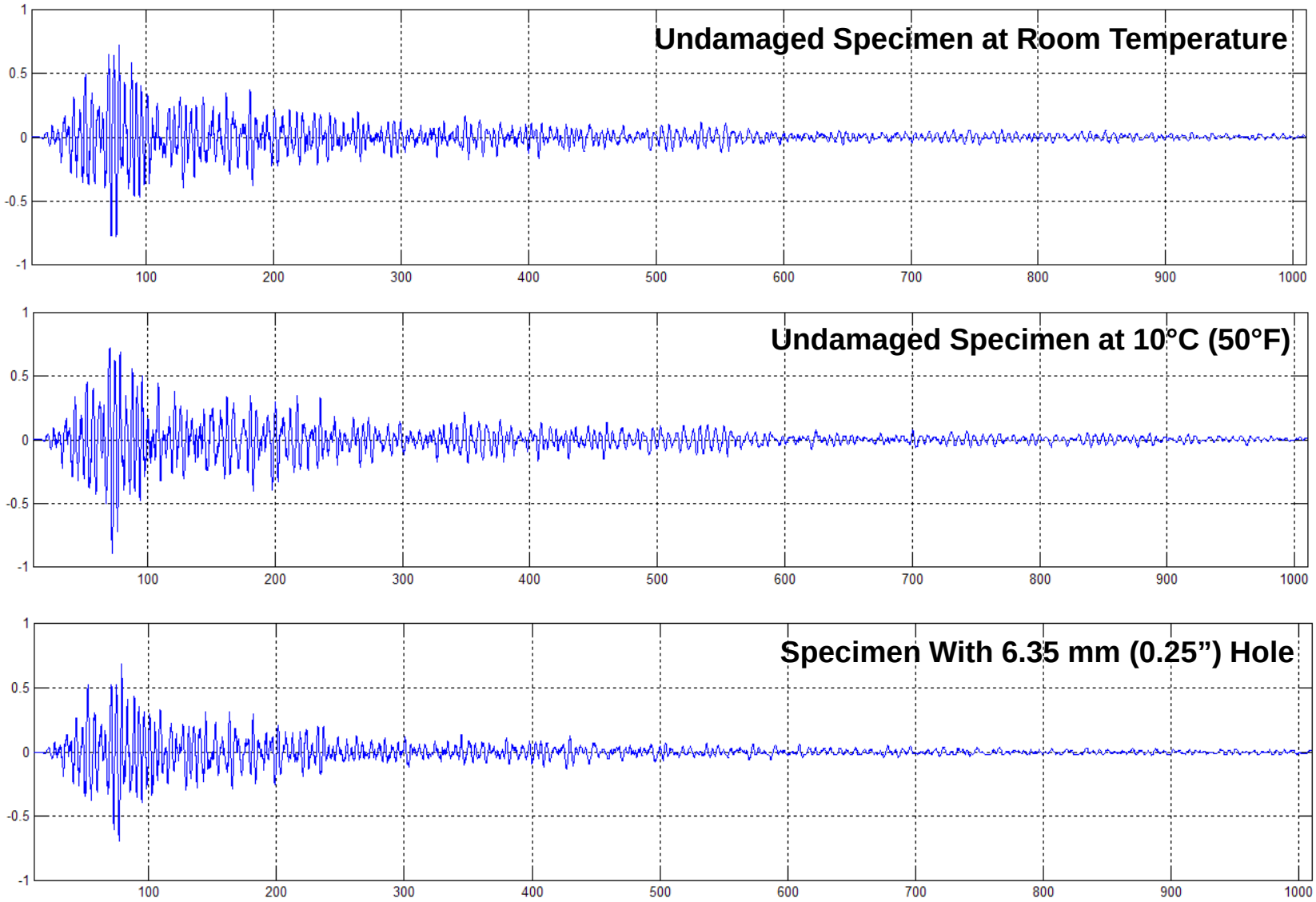
Technical Approach: Weak

- Pulse with transducer
- Flood with energy and look for diffuse waves
- Introduce temp. changes and defects
- Goal is to detect minimum flaw in the presence of temp. changes.

Technical Approach: Better

- Pulse with one transducer and receive with other
- Flood structure with energy, record response until energy has substantially died out (diffuse waves)
- Introduce temperature changes and artificial defects (separately and simultaneously)
- Goal is to discriminate between temperature changes and defects and to quantify minimum detectable flaw size in the presence of temperature changes

Measured Ultrasonic Signals



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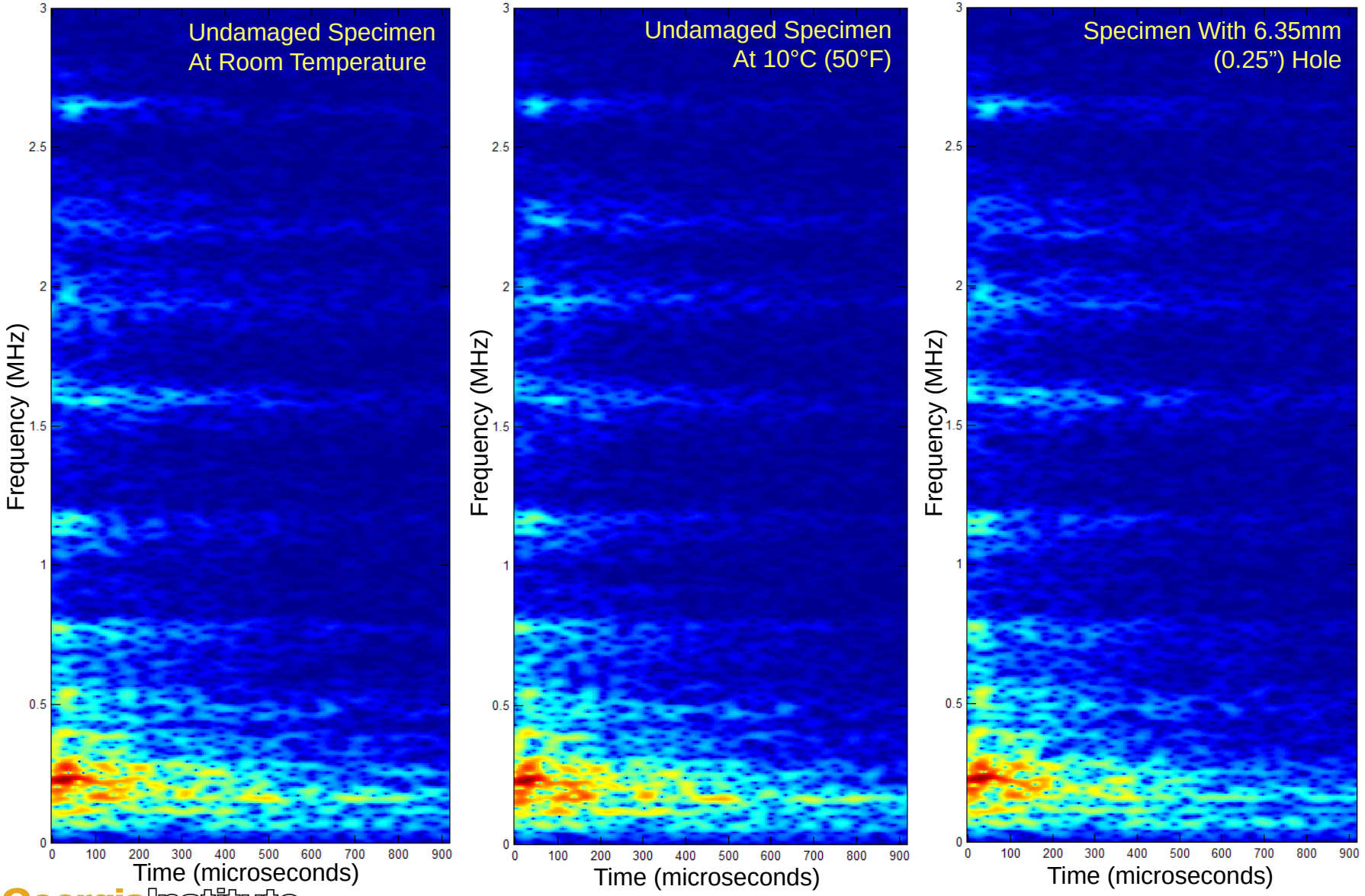
Short-Time Fourier Transform



Data: Weak

- Waveforms were recorded at various temperatures.
- Waveforms were recorded at various temperatures as notch was enlarged.

Experimental Data: Better

- Specimen #1
  - 65 waveforms recorded from undamaged specimen at various temperatures
  - 397 waveforms were recorded from damaged specimen at various temperatures as notch was enlarged from 0.025” to 0.25” in length
- Specimen #2
  - 98 waveforms recorded from undamaged specimen at various temperatures
  - 64 waveforms recorded from damaged specimen at various temperatures as t hole was enlarged from 5/64” to 0.25” in diameter
- Goal: detect damage while minimizing false alarms

Future Work

- Implement data fusion at feature level to improve detection performance
- Develop, implement methods for estimating flaw sizes
- Investigate effect of flaw type and location on detection sensitivity
- Consider more complicated specimens with real defects

Project Summary

- Four candidate methods for comparing diffuse ultrasonic signal to baseline have been identified and evaluated for detecting damage in presence of temperature changes

- All four methods perform reasonably well if large number of baseline waveforms span expected temperature range

Presenting With Style: Looking as Good as Your Slides

- Think conservative.
- Clean, pressed shirts and slacks/skirt.
- Men—white t-shirt under button down or polo shirts.
- Shoes and belt should be same color.
- Women—knee length skirts, moderate heel, minimize accessories.
- Nothing tight or trendy.

Performance Techniques: Bringing Your "A" Game

- Take several deep breaths.
- Stand up straight—pay attention to your posture.
- Make eye contact with your audience.
- Project your voice.
- Pace the rate of your speech so that it is natural and moderate.
- Monitor your gestures and avoid habitual behaviors (hands in pocket, playing with your hair, pacing).

Presentation Never's

- **Never** run over your time limit. Ever!
- **Never** apologize for any aspect of your presentation. If you have to apologize, you aren't prepared.
- **Never** respond aggressively to a question or comment. Even if you are right, the whole audience will resent you for picking on that poor questioner.

Top 5 Secrets of the Pros

5. Tour the space you'll be presenting in prior to your talk.

4. Make sure the room's technology is compatible with yours.

3. Stand to one side of the projection screen instead of behind the podium.

2. Use the "meteorologist chop" instead of a laser pointer or a cursor.

And the #1 Secret…

Practice!

A lot!

Questions?

Use the story board method
to draft your presentation

Here are some sample slides
to help you organize your work

Title Slide

Acknowledgements

- Sponsors
- Advisors
- Funding source

Description of Research

- What
- Why
- How
- Results

Show Your Work or Things Like Your Work

- Illustrations
- Diagrams
- Photos

Show the audience what you've been doing

- Show the actual thing
- Show a diagram/figure/illustration of the thing
- Show something that is like your thing

Background

- Prior art
- Summarize work being done in the field
- Explain concepts/terms
- Provide context

Your Research Methods

Problems/Issues Encountered

- Sometimes the best “story” about your research is what didn’t work

- What problems/issues arose? How did you overcome them or solve them?

Results

- Quantify your results

- Show your results—tables, data, schematics, figures, photos,

Significance of Results

- What is important about the results?
- How can the results be applied to the real world or to your field?
- What do these results mean?
- What are the wider implications of the results?

Future Work

- What areas of your research need to be continued?
- What additional work needs to be done to complete this research?
- Be specific

Last Slide

- The last slide could be your Future Work slide.

- You could also have a “Discussion” slide where you pose some questions or bullet points that guide the Q&A that will follow your presentation

Extra Slides

- If you anticipate that your audience might have questions about a particular aspect of your work, you could prepare extra slides that can easily be pulled up during the Q&A.

- You could also create a handout for your audience.