

EECS 150 Spring 2004

Lab Lecture 1 *Instrumentation* 1/23/2004

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Today

- Labs & Lab Lecture
- Lab Policies
- Using the Computers
- Webcasts
- Cardkeys
- The first lab

Labs & Lab Lecture (1)

- Watching the slides
 - Projector
 - Plasma Screen
 - The LCD TVs (Channel 21), audio included
- ASK QUESTIONS!!!
 - If anything is unclear ASK!
 - Otherwise you will LITERALLY not be able to do the labs
- Try to read the labs ahead of time

Labs & Lab Lecture (2)

- Lab Lecture slides are posted early
- Lab ZIP file
 - Contains verilog, bitfiles, etc...
 - Also contains the lab assignment
- The Assignment
 - Read it
 - Do it
 - Get checked off

Labs & Lab Lecture (3)

- Checkoff
 - Answer any questions on the lab
 - Prepare any requested demos
 - A TA will sign off that you did the lab
 - Signed checkoff sheets are due 10min into the NEXT lab
 - You can get a lab checked off up through 10min the first 10min of the NEXT lab

Lab Policies (1)

- Lab Policy Enforcement
 - Suspend your account
 - Temporary for minor infractions
 - Permanently for major problems, this makes it REALLY hard to pass the class
 - Withhold your grades
 - Treat this lab with care

Lab Policies (2)

- Food & Drink
 - Nowhere near the computers
 - We're not kidding about this
 - You MAY eat at the small white tables
 - CLEAN UP AFTER YOURSELVES!

Lab Policies (3)

- Trash
 - Trash goes in the white/gray bins
 - Recycling in the blue bins
 - CLEAN UP AFTER YOURSELVES!
- Other classes
 - CS152 can use some computers
 - EE42 uses the white tables
 - We have priority on the computers

Computers (1)

- Logins are posted
 - Username: cs150-<your e-mail name>
 - Password: Your Student ID
 - If you don't have an account listed, see TA

Computers (2)

- Printing
 - There are 3 printers
 - By default computers will print to the nearest printer
 - We have a finite amount of paper
 - We will run out of paper by the final
 - Try not to print lecture slides or labs (other than the checkoff sheet), it is wasteful

Computers (3)

- Storage!
 - Your U:\ drive is your permanent storage, it is available from all computers
 - U:\ is VERY slow, don't work from it
 - C:\users\ - C:\users\WILL BE DELETED WHEN YOU LOG OFF!
 - Copy stuff back to your U:\ drive!

Webcast

- Lab lecture webcasts will be available soon
- We will continue webcasting as long as attendance is high
- ATTEND LAB LECTURE!
 - The people who don't attend often fail the course. Literally.

Cardkeys

- We know they're not active
- For now TAs will let people in
- Cardkeys will be activated Mon, Jan 26th
- Cardkey responsibility
 - Don't let strange people in the lab, our equipment is expensive
 - If you have trouble with your cardkey see your TA

Oscilloscopes

- Can show analog signals and digital signals from CUT (Circuit Under Test)
- Very good for signal quality, delays, etc
- Graph of Voltage (Y-axis) vs Time (X-axis)



Analog Inputs

- Two analog inputs
 - **Volts/Div** knobs sets Y axis
 - **Auto-scale** (white button) does a lot of work for you
- Measurements of voltage, time, etc
- Use buttons, then follow menus



Triggering

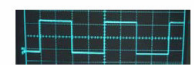
- Triggering determines when to catch and display signals
 - Edge rising or falling
 - Normal or auto
- Trigger menus for manual adjustment
 - Time/division
 - Threshold



Bad Trigger



Good Trigger



Logic Analyzer

- 16 Digital Inputs
- Main debugging tool for this semester
- View internal FPGA and Board signals
- Select time/division for viewing



Triggering

- Pattern matching (some basic logical operations)
- Check signal for High, Low, Positive Edge, Negative Edge, or don't care
- Storing sweeps of data
 - **Single** gets one sweep
 - **Run/Stop** freezes current output
 - **Auto-store** stores on trigger



A Bigger Logic Analyzer

- 16 Channels is kind of small
- 64 Channels is more like it
- The Big Analyzer
 - We have one up at the TA station
 - It's harder to use
 - If your project is in deep trouble we might hook you up to it
 - You probably wont need more than 16 channels

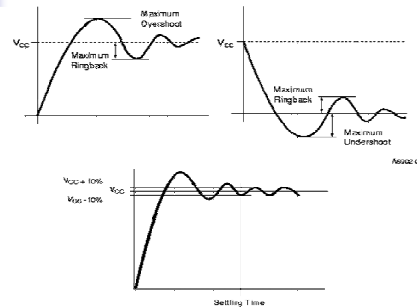
Lab Work (1)

- Simple Power Supply Measurements"
 - +12, -12, +5 Volts
 - Show Your TA
- Observe Signal Generator Output
 - 10 kHz, 45% duty cycle, 4 volt peak-to-peak, square wave
 - 10 MHz, 0-5V square wave with a 40ns pulse width

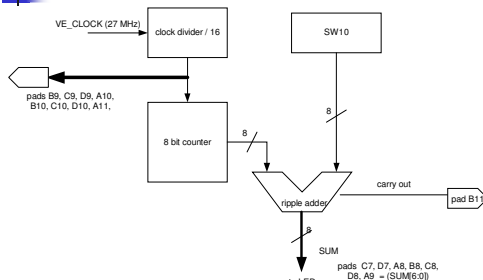
Lab Work (2)

- Simple Oscilloscope Viewing
 - Triggering (auto, norm, AC, DC, threshold)
- Measurements (periods, over/undershoots, rise/fall times, etc)
 - Analyze clock signals
 - Scales
 - Cursors
 - Measuring Buttons

Clock Quality



Small Circuit



Lab Work (3)

- Download Small Circuit
- Logic Analyzer Triggering and Viewing
 - Triggering (Pattern, edges)
 - Storing (Single, Run/Stop)
- Measurements:
 - Propagation Delays (Ripple Carry)
- State Analysis
 - Finite State machine sequencing



And Now...

- Stick around for questions
 - About lab
 - Administrativa
- Remember, labs and discussions next week!