Today:

- Announcements
- Next Times
- 1M?
- Soldering 101
- HW 04 Assigned
Announcements:

- HW #3 Due by 8 AM Wednesday, 9/9

- Spatial Visualization Workshops start tonight for those who scored below 20

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*makeup sessions on Sundays 4-6pm in ITLL 150*
Announcements:

- Everyone submits HW 4 via email but it is a team HW

- Bring everything built and done in HW 4 to class SEP 10

- Success of class on SEP 10 depends on teams doing HW 4
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- Before you leave *today*, each team will take:
Thursday...

**Arduinos – Part 1  DLC 1B70**
Please be early to help setup

**Bring HW #4 hardware and Laptops (2 per team)**
**HW #04 DUE**
Next Tuesday...

**Arduinos – Part 2  DLC 1B70**
Please be early to help setup

Bring HW #4 and #5 hardware and Laptops (2 per team)
**HW #05 DUE**
Next Tuesday Night…

Conceptual Design Reviews DLC 1B70
“Elevator Pitch”

Presentations due 4:00 PM 09-15-15

Template on the website

Colorado Space Grant Consortium
Next Thursday...

**Arduinos – Part 3**  **ITLL 1B50**
Please be early to help setup

**Bring HW #4 and #5 hardware and Laptops (2 per team)**
Next Thursday Night...

**Arduinos – Part 4** DLC 1B70
Please be early to help setup

Bring HW #4 and #5 hardware and Laptops (2 per team)
One Minute Report
Soldering 101

Colorado Space Grant Consortium
Hands-on: Soldering

This is a difficult class to conduct with the number of students

Be quiet and patient with me and your team and yourself

Not everyone will enjoy this experience (95% will)

Not all these kits will work so don’t be discouraged

This is the Dean’s prized conference room so…
Hands-on: Soldering

When completed…

- Push chairs in and clean up
- Help other team members
- Start cleaning up
- Complete 1 minute reports
Soldering:
PCB – Printed Circuit Boards

Soldering

Top View

Side View

Circuit Board

Solder Pads

Resistor
Soldering Iron

Iron is only there for heat – to heat the board and part
Move soldering iron until tip is touching wire & solder pad.

Iron is only there for heat – to heat the board and part.
Move solder to touch edge of tip

Solder will go where the heat is
Hold until solder melts on tip by resistor lead

Iron is on the board/pad
Move solder back to touch resistor lead only
Move solder to form a small pocket/blob

Solder
Move soldering iron tip up dragging the solder with it
Remove solder and then iron leaving nice shiny fillets (Hershey kisses)
Soldering:

- How much solder?
- Cold Solder Joints (CSJs)
TIPS:

- Use caution when clipping leads to avoid flinging metal across the room
- Please put clipped leads in the trash not the floor
Solder bridge shorting two traces or pads
But, can be fixed by reheating or using solder sucker
Soldering:

- Easy to add solder or re-melt vs. remove it
- Tin the tip of the soldering iron by melting an inch or so of solder on the tip
- The iron will now look shiny on the tip
- Then wipe any excess solder on the golden sponge.
Safety:

- Soldering is dangerous if not respected

- Be mindful of where you are and where the soldering iron is

- Eyes and liquid solder – everyone shall wear safety glasses

- Everyone is expected to solder

- If you get burned…

- LEAD – Wash Hands
Hands-on: Soldering

- Get into your teams

- Each person on the team will solder their own circuit but will have to share resources

- I will guide you and the rest of the class through the 24 steps

- Turn your soldering irons on

- Don’t work ahead…
Caution:

- Soldering is dangerous if not respected
- Be mindful of where you are and where the soldering iron is
- Eyes and liquid solder
- Everyone is expected to solder
- If you get burned…
- Stay together, don’t work ahead
Hands-on: Soldering

Step 1: Distribute solder kits among team

You will have to share the soldering stations

Help each other learn the techniques
Step 2: Layout kit
Hands-on: Soldering

Step 3: Look at board, find reference point

Install Side
Step 4: Look at board, find reference point
Step 5: Flip board over and solder 8 pin socket
Hands-on: Soldering

Step 6: Flip board over and bend chip leads out
DO NOT SOLDER AT THIS TIME
Resistors…

What is a resistor?

In the event that your resistors get mixed, please refer to the chart at the left to classify your resistors, or use your multimeter.

If you are unsure, don’t hesitate to raise your hand and ask for assistance.
Hands-on: Soldering

Step 7: Install 120 kΩ resistor (Brown, Red, Yellow)
Hands-on: Soldering

**Step 8:** Install 33 kΩ resistor (Orange, Orange, Orange)
Hands-on: Soldering

Step 9: Verify resistors

120 kΩ
Brown, Red, Yellow

33 kΩ
Orange, Orange, Orange
**Hands-on: Soldering**

**Step 10:** Flip board over

**Step 11:** Solder Resistors

- **33 kΩ**: Orange, Orange, Orange
- **120 kΩ**: Brown, Red, Yellow
Hands-on: Soldering

Step 12: Inspect solder joints and trim leads
Step 13: Flip board over and install capacitor.

Gray strip indicates "negative" lead.

"-" Lead
Step 14: Verify capacitor is installed correctly

“-” Lead
Step 15: Flip over board and solder capacitor

“-” Lead
Hands-on: Soldering

Step 16: Verify solder joint and clip leads
Hands-on: Soldering

Step 17: Install YELLOW LED

Negative Lead
Hands-on: Soldering

Step 18: Install GREEN or RED LED
Step 19: Flip board over and solder LED leads
Step 20: Solder socket to board. Go slow

Verify solder joints and check for solder bridges
Hands-on: Soldering

Step 21: Install the chip

Small circle placed over pin hole “1”
Hands-on: Soldering

Step 22: Install 9V battery clip to board
Hands-on: Soldering

**Step 23:** Flip board over and solder battery leads
Hands-on: Soldering

Step 24: Attach test battery and watch what you made

NOTE: If it doesn’t work, detach battery immediately and have it inspected
Hands-on: Soldering

When completed…

- Push chairs in and clean up
- Help other team members
- Start cleaning up
- Complete 1 minute reports