



UNIVERSITY OF
ILLINOIS
URBANA-CHAMPAIGN

ECE 198 JS First-Year Design **(James Scholar)**

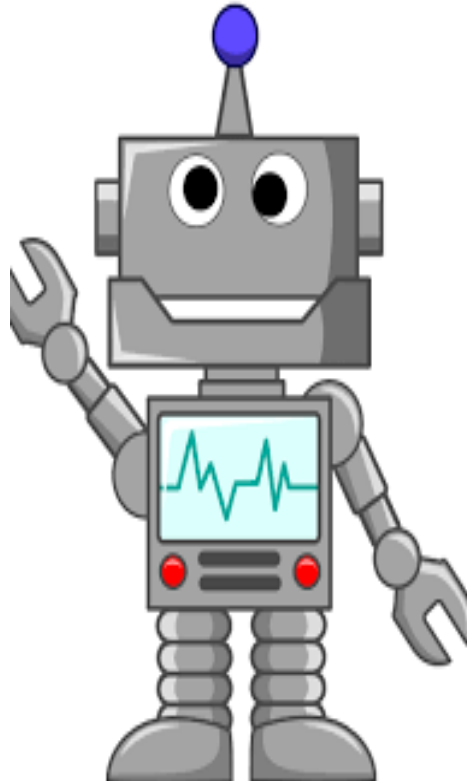
Electrical & Computer Engineering

Lecture 1

Course Description

Credit: 1 hour

This course will provide resources for first-year students to apply electrical and computer engineering concepts to an open-ended project design in their first year on campus. Students will generally work in pairs to plan and execute the project, resulting in a working prototype. *For James Scholars credit; must be co-enrolled in ECE 110 or ECE 120. Repeatable once.*



First-year hands-on experience with a fun semester-long project.

ECE 110 students and ECE 120 students can work together!

Provides James Scholar's Honors Credit.

Why First-Year Design?

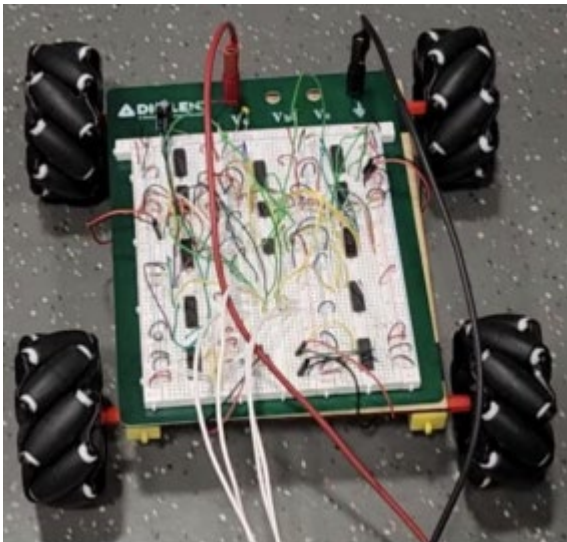


First-Year Design provides

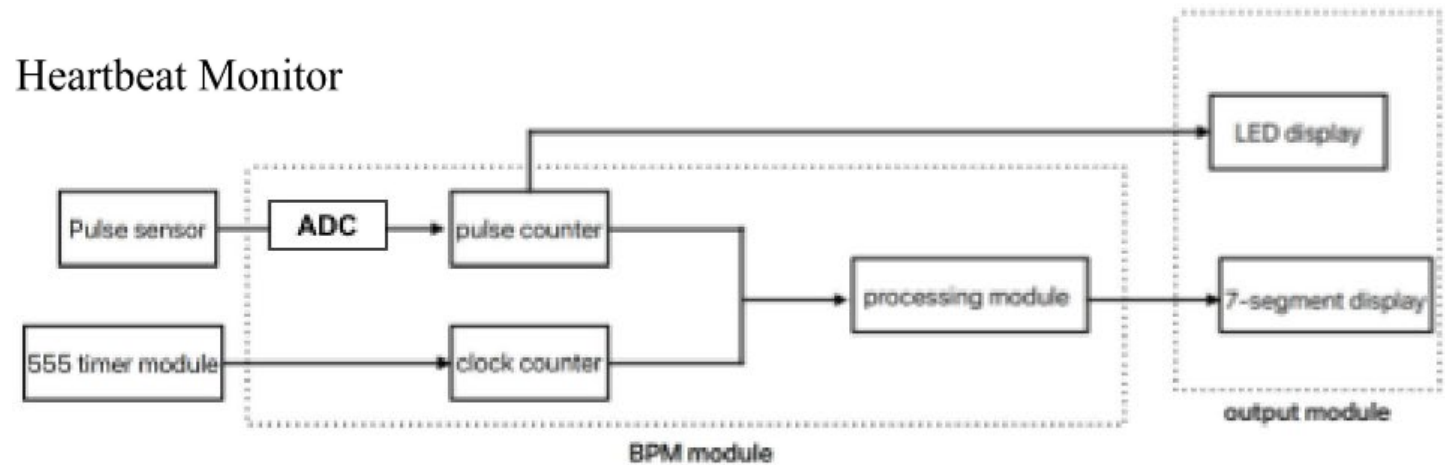
- structure for open-ended design
- a place and time to work
- a modest budget

Example ECE198 Projects from Fall 2023:

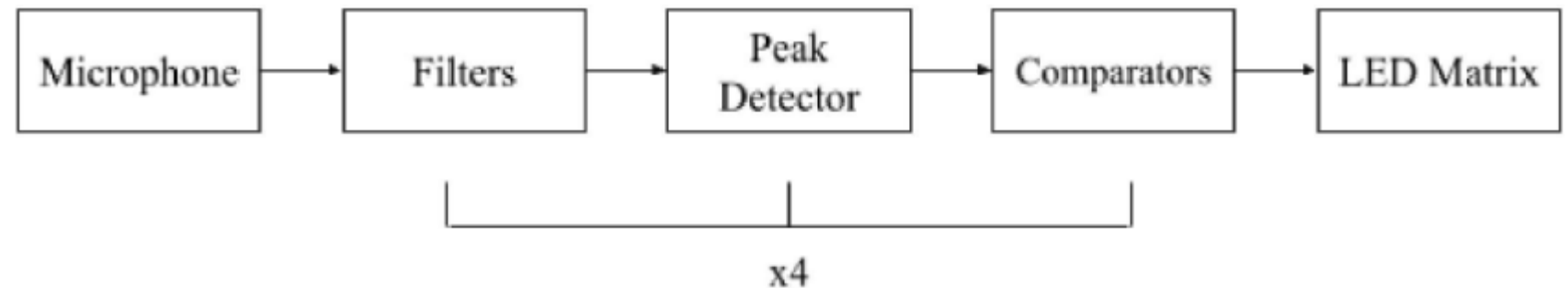
Mecanum wheels



Heartbeat Monitor



LED Spectrum Viewer



Why First-Year Design?

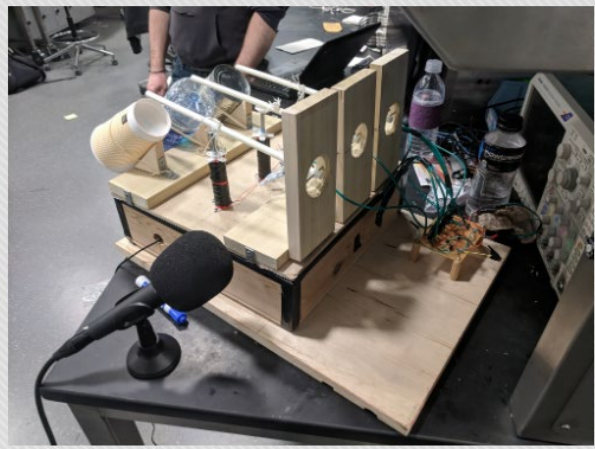


First-Year Design is structured similarly to ECE 445, Senior Design. Students learn engineering design while working as a team to complete a one- or two-semester-long project.

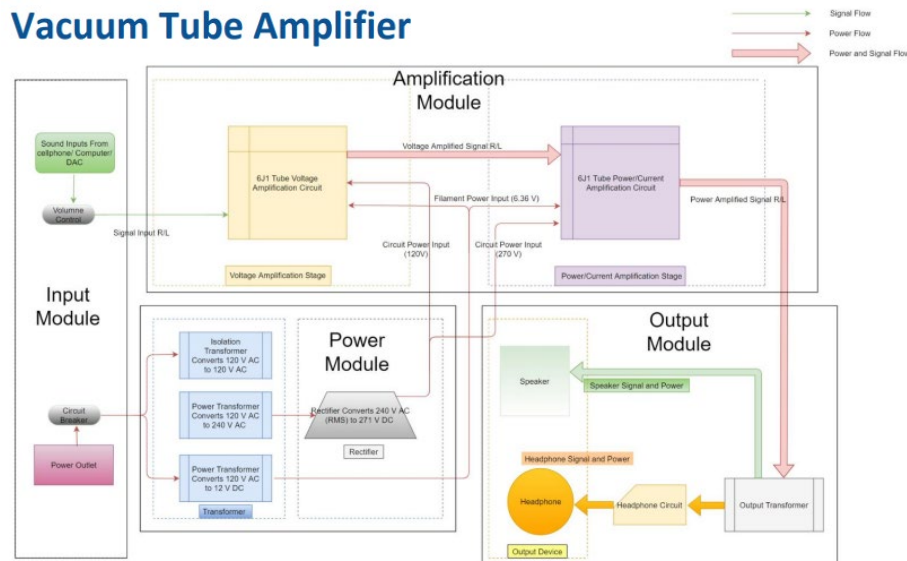
<https://courses.engr.illinois.edu/ece445/projects.asp>

VOXBOX ROBO-DRUMMER

Craig Bost, Nicholas Dulin, Drake Proffitt



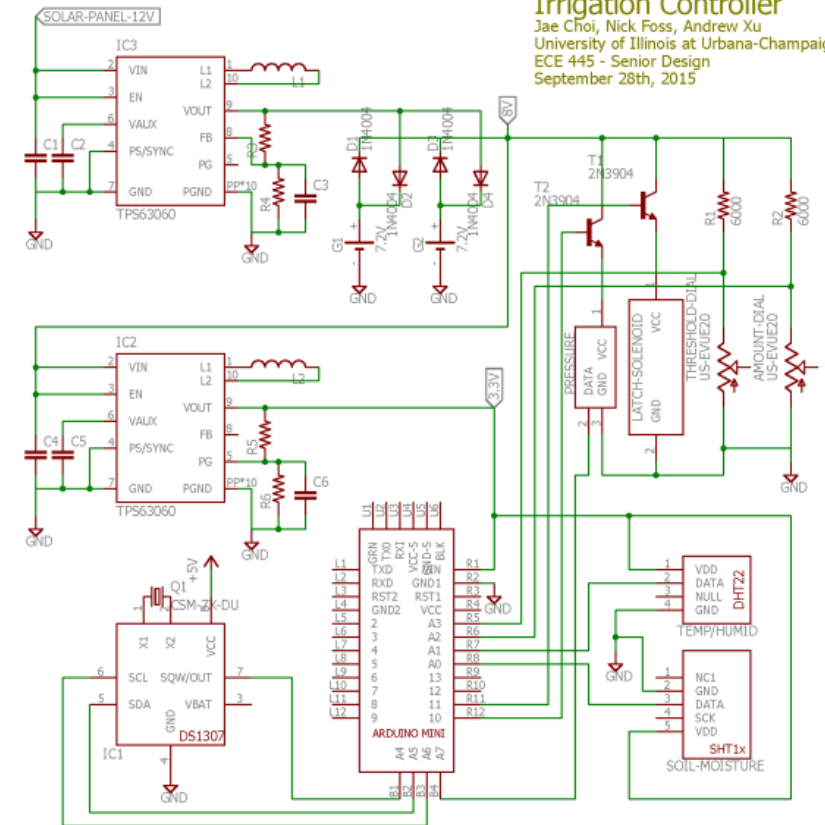
Vacuum Tube Amplifier



Example ECE 445 Projects:

Irrigation Controller

Jae Choi, Nick Foss, Andrew Xu
University of Illinois at Urbana-Champaign
ECE 445 - Senior Design
September 28th, 2015





Staff Introductions

(student intros coming later)

Prof. Schmitz (cdschmit@illinois.edu)

TA Daegan Fuss (wandke2@illinois.edu)

TA Kevin W. (dfuss2@illinois.edu)

- Yan, Jason zexuany2@illinois.edu
- Natarajan, Siddarth sn28@illinois.edu
- Subrahmanya, Anantajit as85@illinois.edu
- Murali, Trisha tmurali2@illinois.edu
- Ramos, Ivan iramo3@illinois.edu
- Myadam, Tanishq tmyadam2@illinois.edu





About the Course

6 PM – 7:50 PM on
Tuesdays (JS1) , Room: 1005/1001 ECEB

or

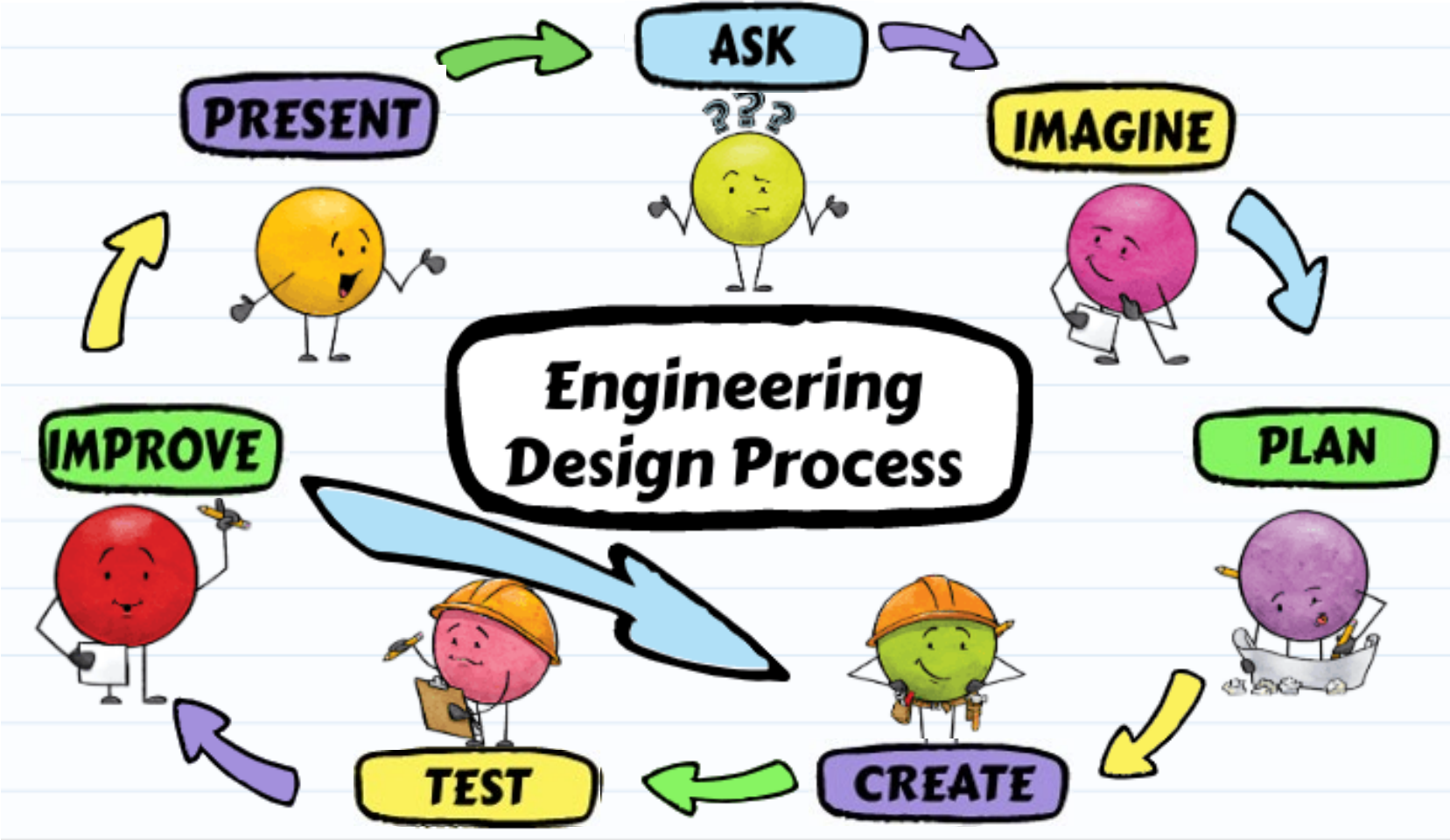
Thursdays (JS2), Room: 1005/1001 ECEB

Attendance required at *your* section

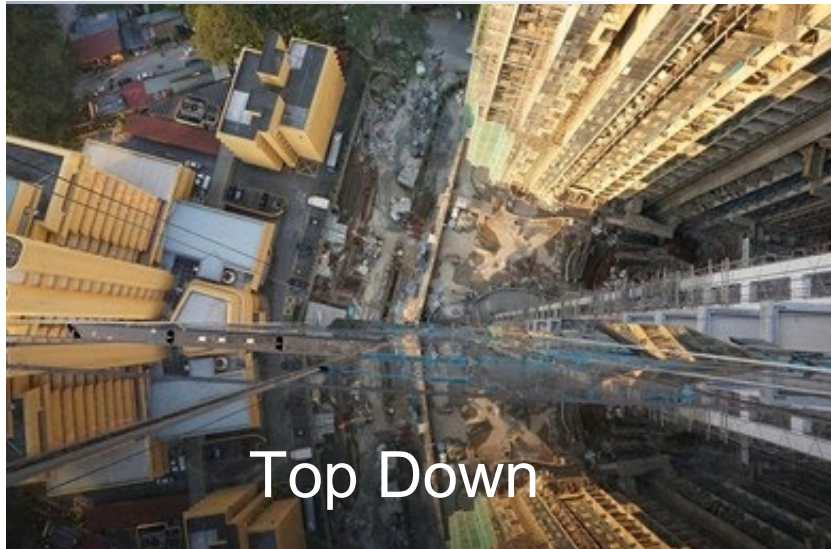
Website:

<https://canvas.illinois.edu/courses/42567>





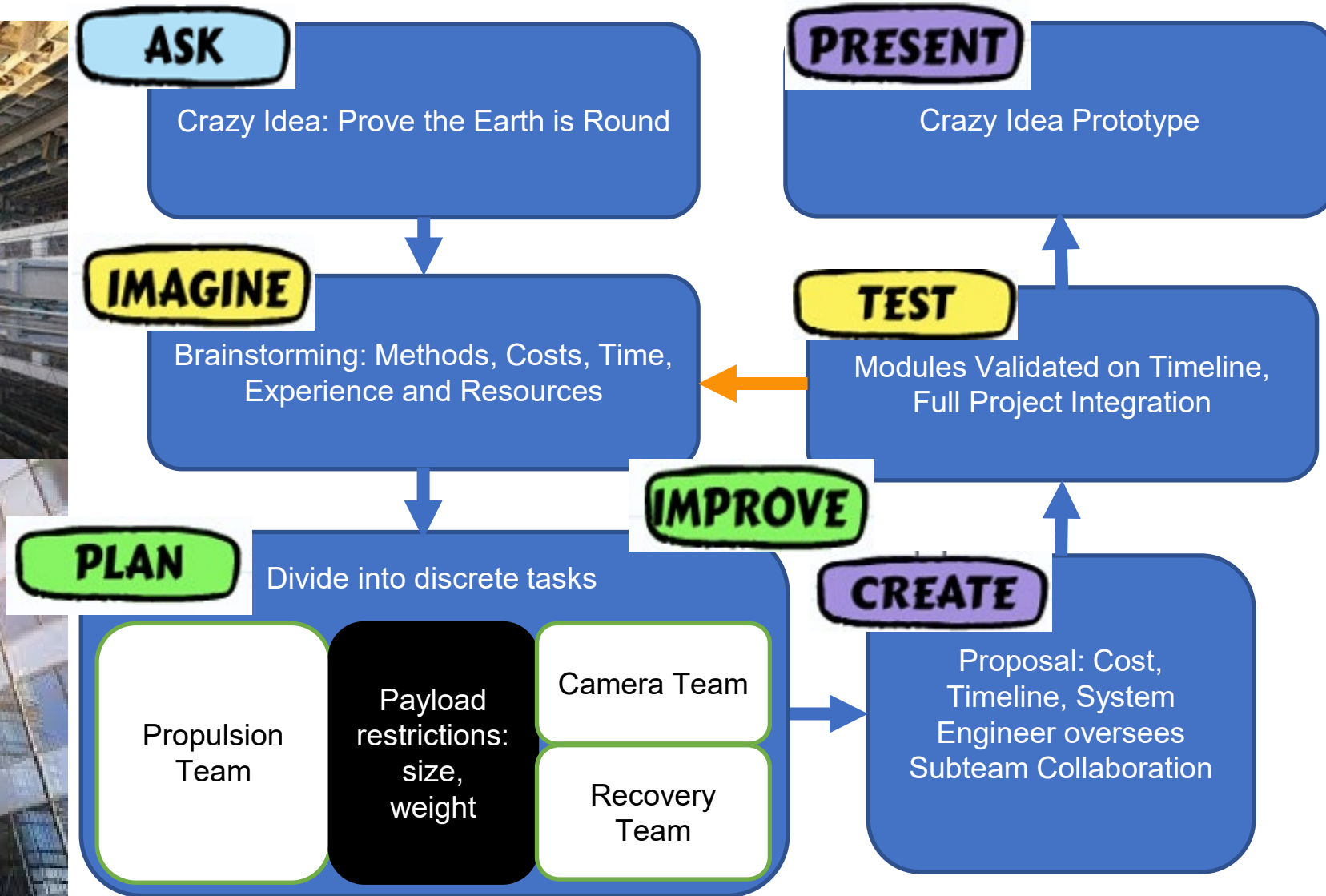
Top Down then Bottom Up



Top Down



Bottom Up





Complete the sentence with some problem to be solved...

make music for the deaf?

stop people from driving under the influence?

autoscore a dart board game?

automate cat care at home?

distribute candy from a machine?

explore Mars?

improve home comforts?

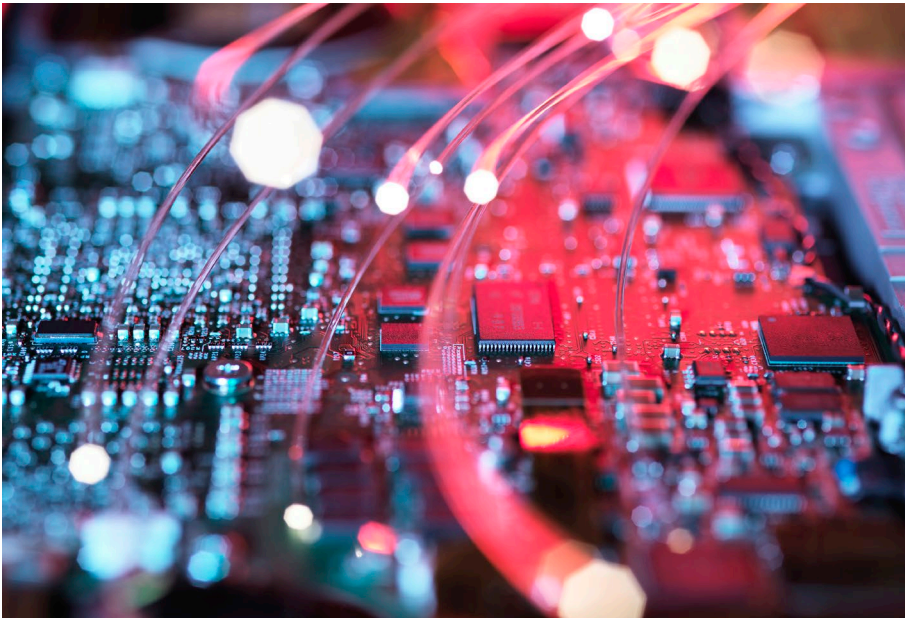
improve study habits?

Two (or three) persons per team.

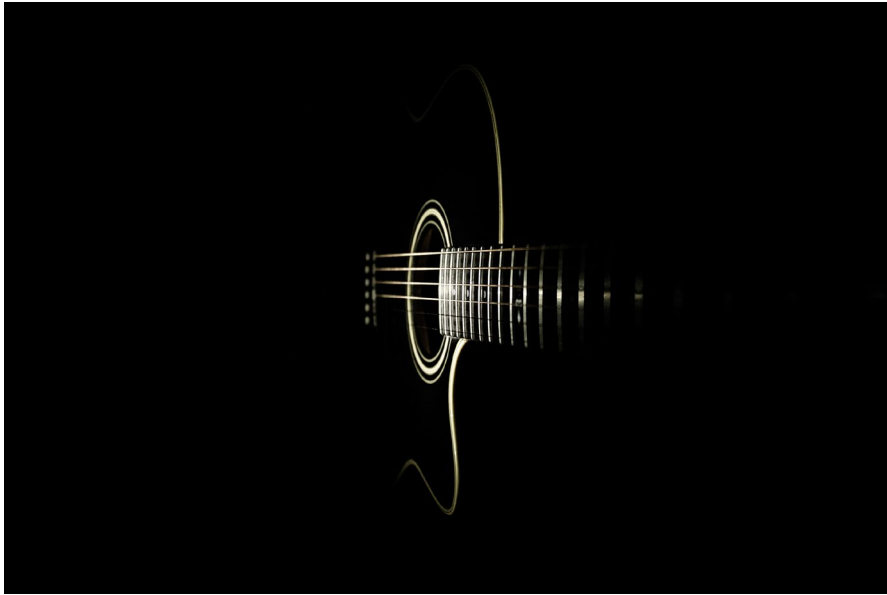
Solo projects (1-person team) rare, needs approval

More than three persons interested? Sub-divide into smaller projects with well-defined goals each.





- Your proposals must include parts and their prices
- \$100 budget per team
- ECE will order your parts from the following vendors:
 - ✓ DigiKey
 - ✓ Adafruit
 - ✓ SparkFun
 - ✓ Mouser
 - ✓ the E-Shop
 - ✓ ECE Supply Center
 - ✓ Some others...but **not** Amazon
- More detail to come once we have the proposals



Projects must have **significant** hardware (Op Amps, 555 timers, AND/OR/NAND, DFFs, etc.). We are **not** referring to mechanical features or ATmega chips.

Arduino, etc., can be used for “transforming” a digital sensor into an analog sensor. *Any other use would need special approval.*

ECE 110 Students must utilize a **sensor** as part of their project.

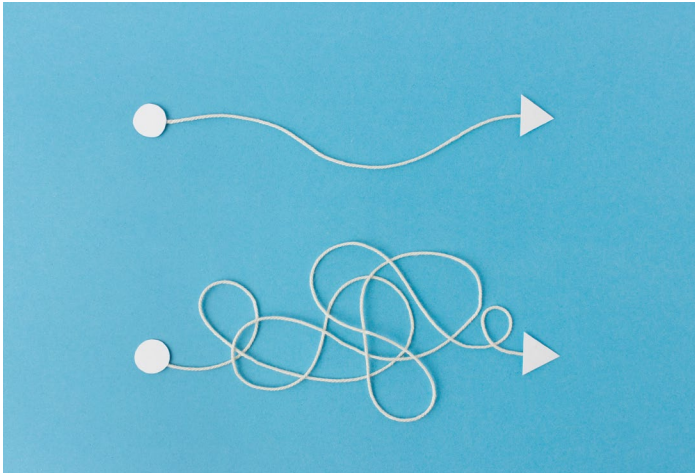
ECE 120 Students must utilize **digital logic** in their projects.

The key to completing a successful project always lies in the plan.

Ask what could go wrong? and How would you would fix those issues?

Painstakingly plan in the early stages so you have a clear idea of what you want to achieve and how you would achieve it.





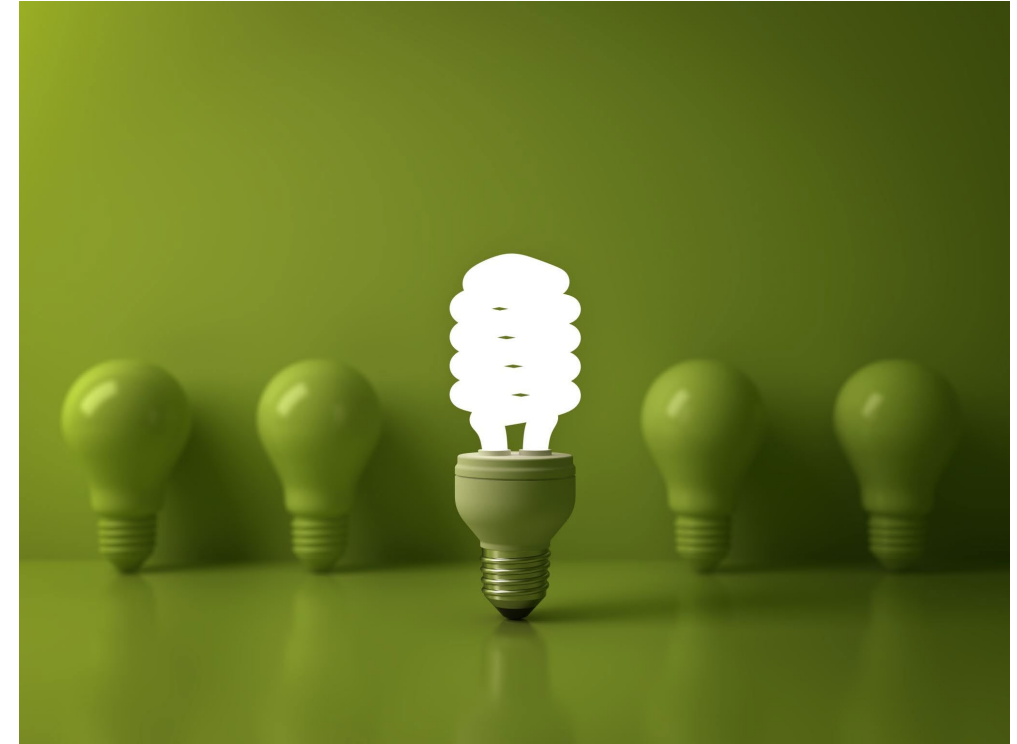
The more ambitious your project is, the more time you will have to spend on the project - and the more parts you will need to order.

Ask yourself - How many bells and whistles does my project need? Is there a baseline project onto which I can add more features, if I have the time?

Comment: Many successful projects in the past have two sets of goals - a 'basic' set and extra features (wish list) added after the team found they had extra time and resources.

Specialized parts could be a) difficult to obtain and b) more of a challenge to implement. You should always thoroughly investigate such parts.

Questions to ask: *“How do they operate? Are there tutorials of people using these online, or elsewhere? What does the data-sheet say? What alternatives could I use?”*



Do I have the Skills to be Successful?



If you do not have a history of hands-on, open-ended STEM projects...this course could be a tough challenge! BUT...

Over the next two weeks, we will be providing a lot of assistance.

For example, we will be going over some smaller sub-circuits and ways you can use them in your projects.





Grading

Project proposal (10%)

Mini project and demo (5%)

Biweekly journal and mentor assessment (50%)

Midterm progress reports and demonstrations (10%).

Final report (15%)

Final demonstration (10%)



Each unexcused absence or tardiness can result in up to a *5% reduction* of your grade. Let the TA know in advance if you must miss all or part of a class meeting.

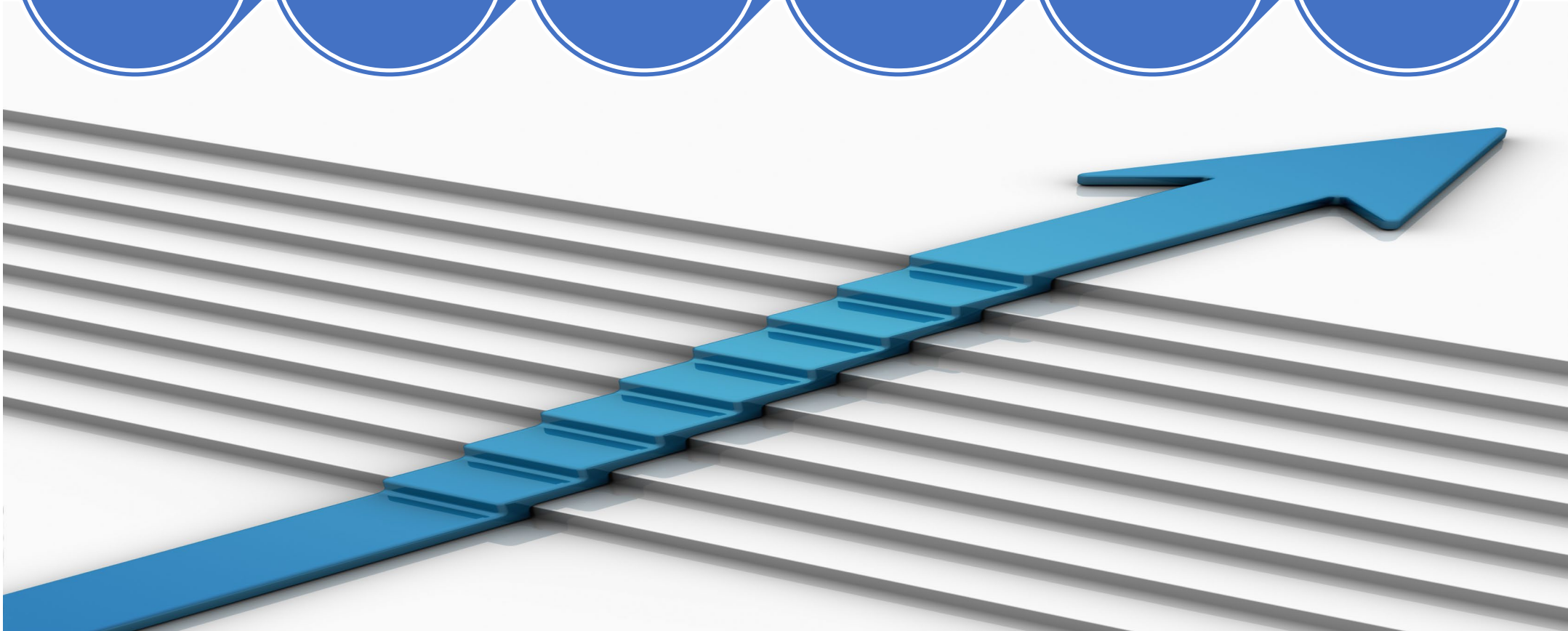
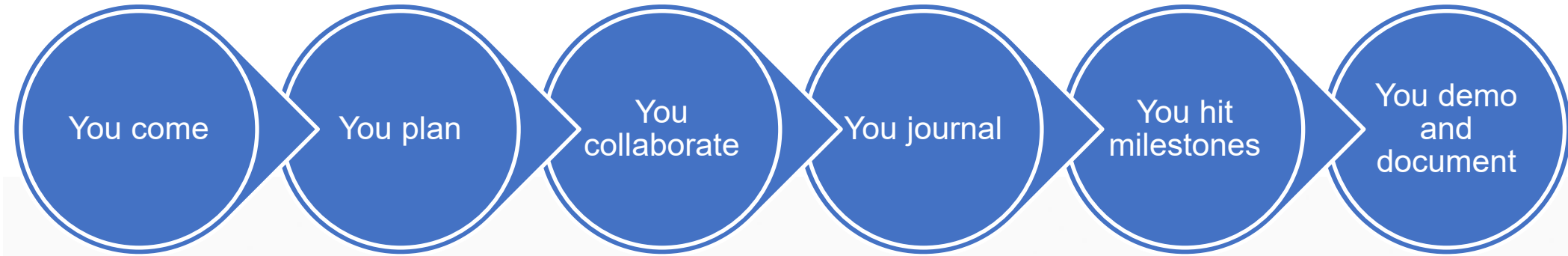
§ 3-202 Outside-of-Class-Period Examinations

An evening exam is not an excused absence from lab!

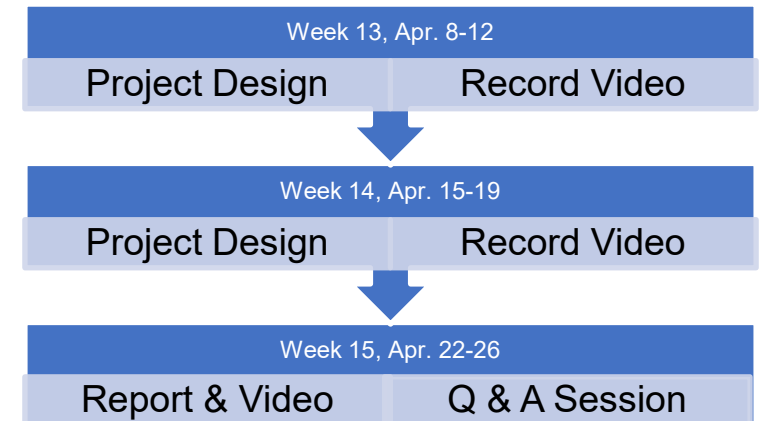
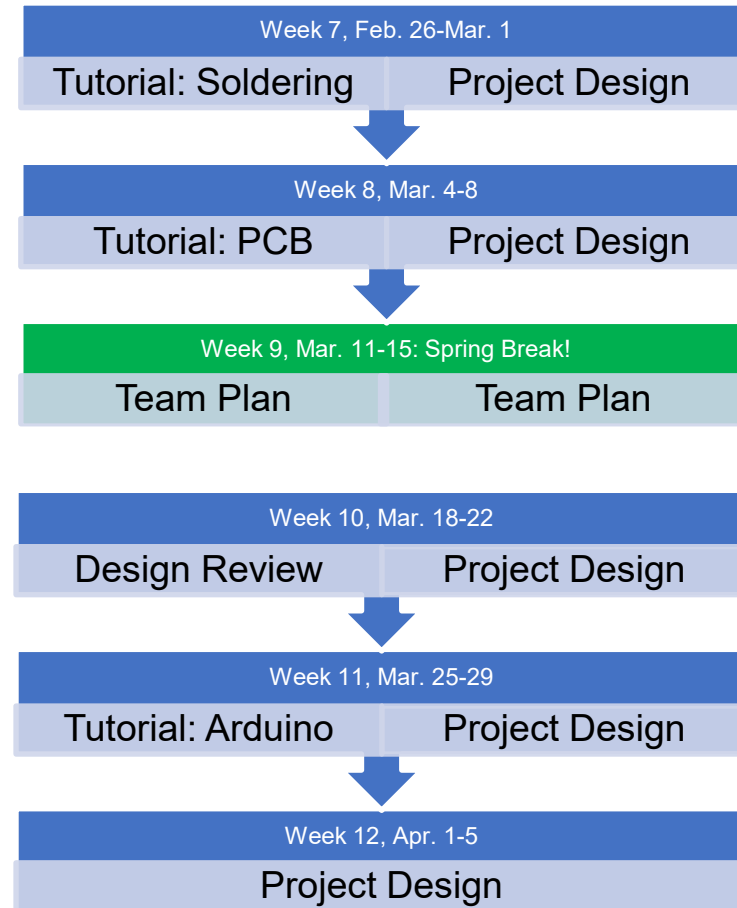
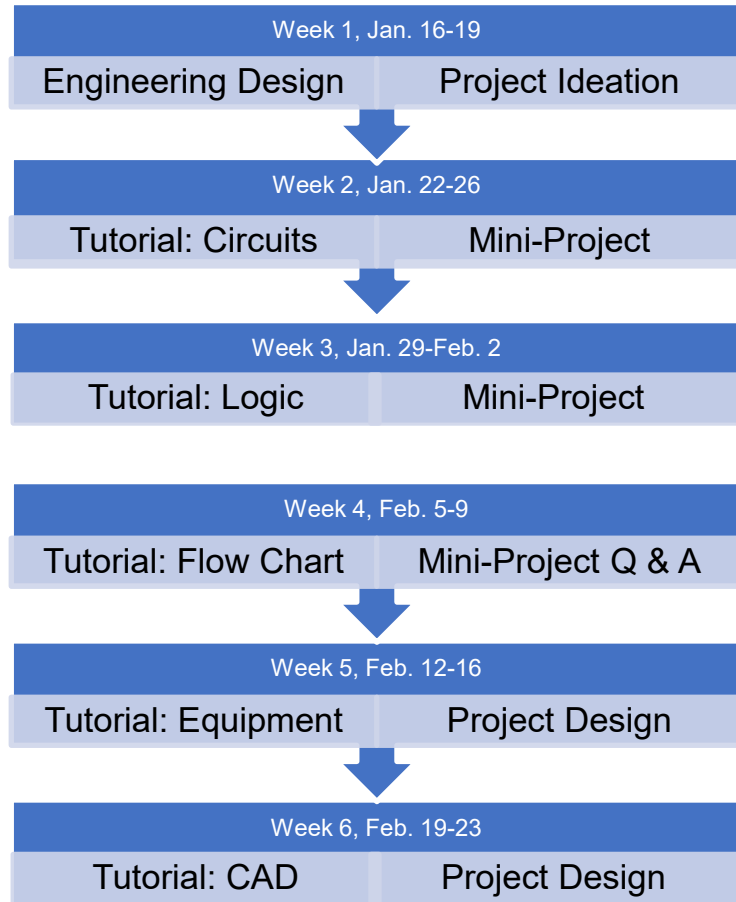
(h) Conflict or makeup examinations must be arranged for those students who cannot take the scheduled outside-of-class period examination because of the conflicts arising from participation in any of the following activities:

- (1) Other examinations, including special examinations, scheduled at a prior date. Priority will be given to the examination announced in class the earliest in the semester. If the two (or more) examinations being held at the same time were announced on the first day of class of each course, conflict and makeup examinations will be offered by the instructors of all of these courses and the students may choose which conflict or makeup examinations they wish to take.
- (2) Regularly scheduled university-affiliated performances or rehearsals. Students are expected to notify the instructor of the conflicting performance or rehearsal as soon as possible but no later than one week before the examination.
- (3) Regularly scheduled classes. Students are expected to notify the instructor of the conflicting regularly-scheduled class as soon as possible but no later than one week before the examination.

Expectations



Course Calendar (tentative)



Attendance Form

Sign in with this QR Code:





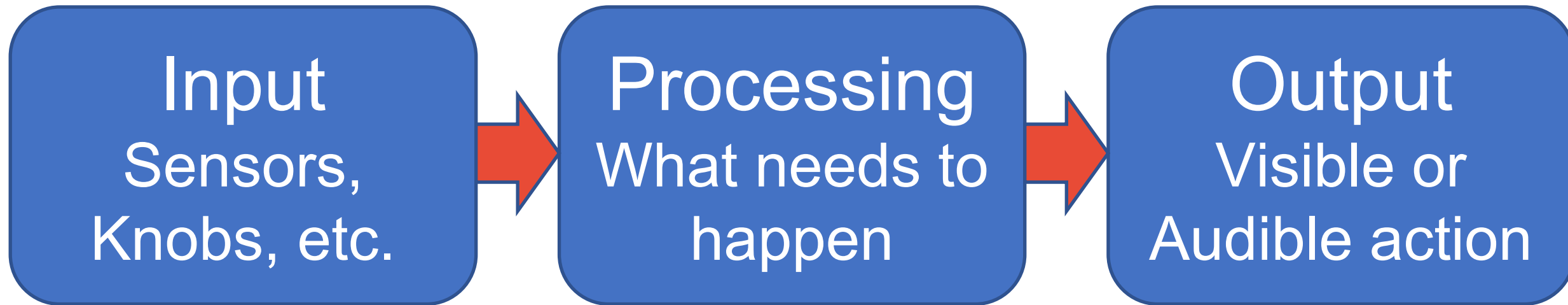
Student Introductions

- Name (what do we call you?)
- Your hobbies
- Project idea (one you'd like to do or one that is just cool)





Ideation Exercise



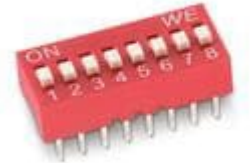
Light



Temperature



Buttons and Switches



Microphone



Gas/Chem



Magnetic Field

Movement

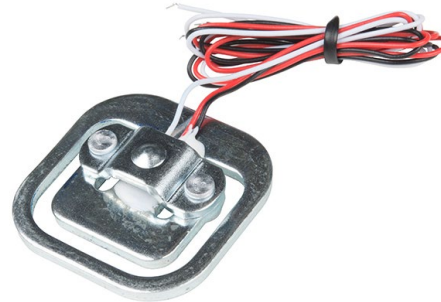
Flex



Gas/Chem



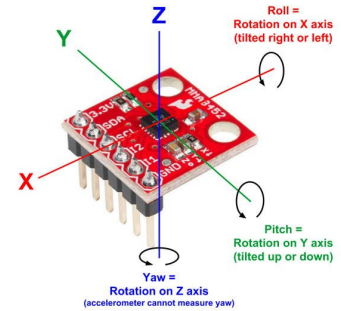
Infrared



Weight



Ultrasonic

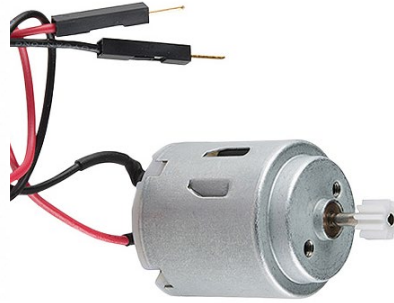


Touch

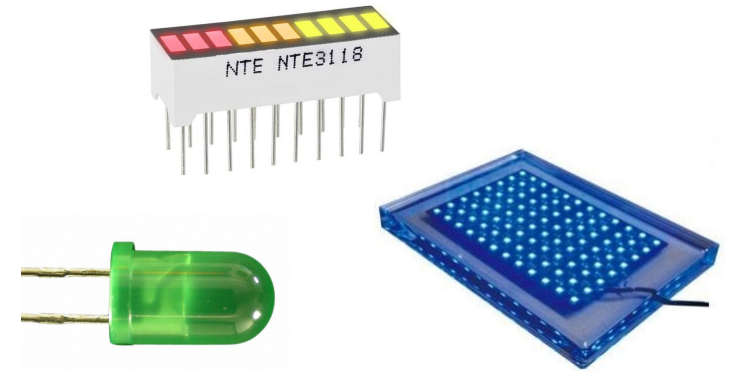




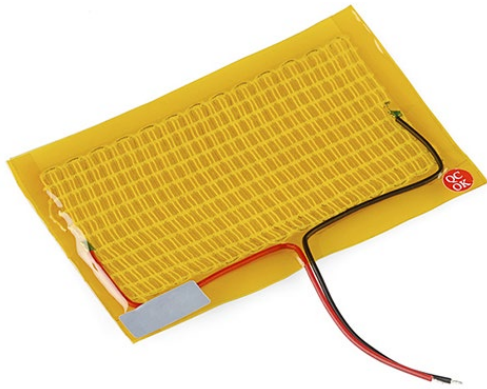
Loudspeaker



Motors



LEDs



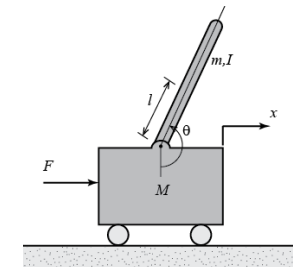
Heat/Cool



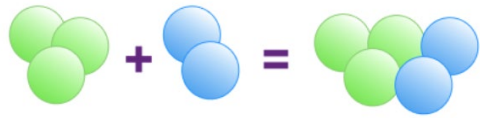
Buzz/Vibrate



Humidify



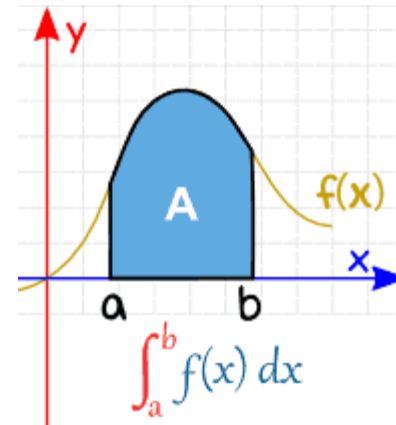
Control



Add



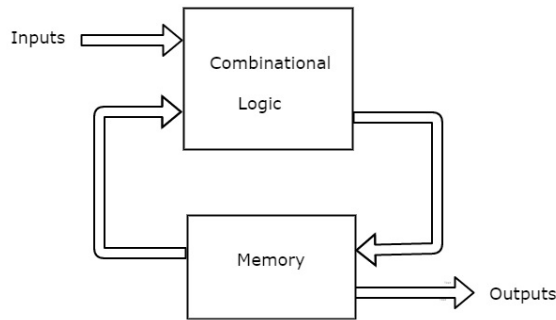
Compare



Integrate



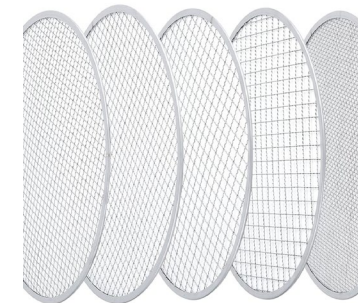
Count



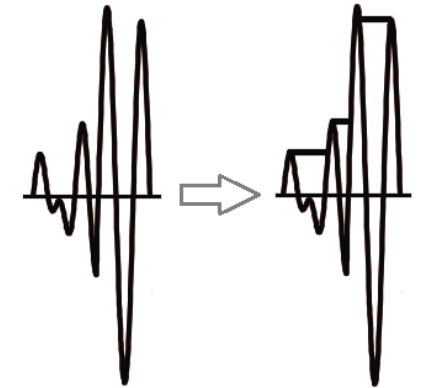
Logic



Transform

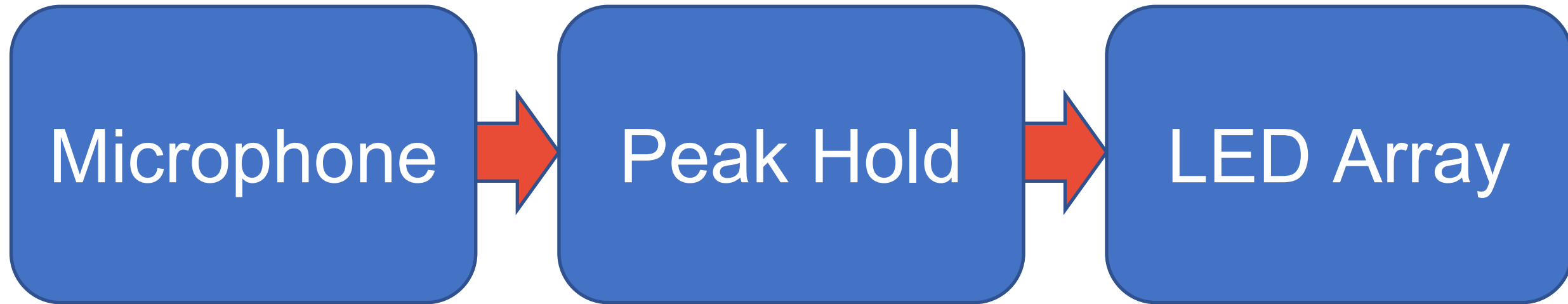


Filter



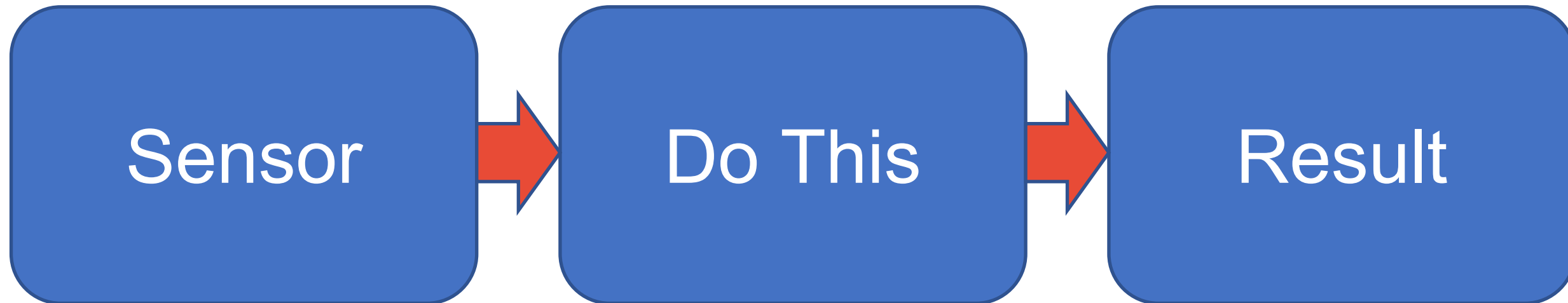
Peak Hold

Applause Meter



Fold a sheet of paper in half, three times then unfold. This creates 8 rectangles.

- You have one minute to brainstorm a “crazy” idea in each rectangle.
- Don’t worry about “knowing” how to solve your idea.
- You must move to the next when told.
- You must keep writing/sketching until 8 minutes are up.



Get in groups. Take a Crazy Eight sheet (not from a group mate) and apply SCAMPER writing the adjusted ideas on a different sheet of paper.

- You have one minute to SCAMPER each rectangle.
- Okay to apply more than one SCAMPER item to a rectangle if time allows.
- You must move to the next when told.

Substitute – What would happen if we would substitute something else for an input, output, or action?

Combine – What might happen if we combine two ideas from different boxes?

Adapt – How can we change and adapt this product to a different application?

Modify – How can we modify this offering to deliver more value with it?

Put to another use – How might we use this product differently with little or no adaptation?

Eliminate – What could we remove from this product to simplify it?

Reverse – How can we restructure this product to make it more efficient?



Discuss some of your favorite ideas.



Right Now...

Let's mix and find people with common interests. Form Teams!

Next Week...

Circuit Tutorial
Mini-Project
Ideation-to-Draft Proposal