Systems Level Design Review

Xylophone Kit
- Questions regarding the assembly of kit (base layout)
  - Will the 2 base designs feasibly work?
- Need to find out if getting an oscilloscope would be possible
  - Would give students an engineering relation
- End conditions (clamped vs. not clamped)
  - May be easier for the students to test than a change in geometry
- Will geometry change make a difference?
  - Natural frequency = $f = \sqrt{\frac{k}{m}}$
  - K= material property
  - M=mass
  - How will we change the natural frequency enough to make a noticeable difference to the students?
- Change importance of producing different sounds (should be higher!!)
- Look into resonating box
- Change kit name?

Electronic Keyboard Kit
- Something to do to impose interference?
- 555 timer circuit to get a square wave
  - Or could clip sine wave to get a square wave
- What happens if 2 keys are played at one time?
- How much pre-requisite information will the students have in this area?
  - That will limit the depth of the kit
- Talk to teachers/project lead the way instructors
- Why not use an actual keyboard?

Communications Kit
- Inverting amplifiers have different power options
- Inverting amplifier can be passed through a transistor on the output
  - As long as max. current isn’t exceeded for transistor
- Distance and direction
- 29-35 dB range for crib toy
- Noise can be added
- Use boards from controls class

Electric Guitar Kit
- Will you have an electrical engineer present
  - Oscilloscope and dB meter are difficult to use
  - Full size oscilloscope is very heavy
- If old oscilloscope, may die
- Handheld oscilloscopes are pricey
- Use iPhone app, pictures, or a DVD instead of using an oscilloscope
- How big will they be? Will size be an issue?
  - How big will the guitar body need to be to support string tension
- Too many variables
  - Maybe have pre-determined strings and pitches
- Need to pick design variables
- Have each student pick a note to tune to
  - Strings may break
- If picking guitar strings, tension, length it would take up a majority of activity time
- If strings are pre-tuned, the TEAK co-op would have to know how to tune them

**Overall**
- All kits do the same thing (4 different ways of demonstrating physics)
- Analogies of one kit to the next are very appealing
- Make sure kits are childproof
  - Durable
  - Kits can be used more than once in a classroom
- PCB
  - How much $ depends on how big
  - Surface mount (will need help)
  - Thru and thru
- Half a dozen apps on iTunes for oscilloscopes