

Social Learning in edX

ABSTRACT

edX was born following two revolutions in technology: cheap, robust video streaming and the growth of on-line social, in a belief that this progress would allow us to create effective, at-scale digital learning experiences. Indeed, the first MOOCs, predating edX, were born purely based on the rise of on-line social. Three years in, we are still in the early ages of social in MOOCs. We'll discuss some of our initial experiences and approaches, such as community question-and-answer, several experiments in sourcing content from learners, on-line chat, discussion forums, peer review, and small project groups, successes and failures, upcoming features to enable more social interaction, and as an open source platform, ways that interested parties can get involved, and ways that folks have integrated with us in the past.

Google Youtube

DANCE Talk Series * May 14, 2015

Piotr Mitros * Leslie Gerhat * Ned Batchelder

Social Learning in edX

DANCE Talk Series Inaugural Talk
May 14, 2015

Piotr Mitros, Chief Scientist, edX
Leslie Gerhat, Product Manager, Teaching and Learning, edX
Ned Batchelder, Open Source Community Manager, edX

- Intro/overview
- What we’ve done
- What’s coming up
- Getting involved

Sustainability

Improving Quality

Education at Scale

Research

Sustainability

Improving Quality

Education at Scale ← this talk

Research

MITx Log In

Circuits & Electronics
6.002x

View 6.002x Circuits & Electronics as a guest

6.002x (Circuits and Electronics) is an experimental on-line adaptation of MIT's first undergraduate analog design course: 6.002. This course is running, free of charge, for students worldwide from March 5, 2012 through June 8, 2012.

About 6.002x

6.002x (Circuits and Electronics) is designed to serve as a first course in an undergraduate electrical engineering (EE), or electrical engineering and computer science (EECS) curriculum. At MIT, 6.002 is in the core of department subjects required for all undergraduates in EECS.

The course introduces engineering in the context of the lumped circuit abstraction. Topics covered include: resistive elements and networks; independent and dependent sources; switches and MOS transistors; digital abstraction; amplifiers; energy storage elements; dynamics of first- and second-order networks; design in the time and frequency domains; and analog and digital circuits and applications. Design and lab exercises are also significant components of the course. You should expect to spend approximately 10 hours per week on the course.

6.002x on *MITx*

If you successfully complete the course, you will receive an electronic certificate of accomplishment from *MITx*. This certificate will indicate that you earned it from *MITx's* pilot course. In this prototype version, *MITx* will not require that you be tested in a testing center or otherwise have your identity certified in order to receive this certificate.

The course uses the textbook Foundations of Analog and Digital Electronic Circuits, by Anant Agarwal and Jeffrey H. Lang. Morgan Kaufmann Publishers, Elsevier, July 2005. While recommended, the book is not required: relevant sections will be provided electronically as part of the online course for personal use in connection with this course only. The copyright for the book is owned by Elsevier. The book can be purchased on *Amazon*.

Requirements

In order to succeed in this course, you must have taken an AP level physics course in electricity and magnetism. You must know basic calculus and linear algebra and have some background in differential equations. Since more advanced mathematics will not show up until the second half of the course, the first half of the course will include an optional remedial differential equations component for those who need it.

The course web site was developed and tested primarily with Google Chrome. We support current versions of Mozilla Firefox as well. The video player is designed to work with Flash. While we provide a partial non-Flash fallback for the video, as well as partial support for Internet Explorer, other browsers, and tablets, portions of the functionality will be unavailable.

View 6.002x Circuits & Electronics as a guest

ABOUT THE COURSE STAFF

Anant Agarwal
Director of MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL) and a professor of the Electrical Engineering and Computer Science department at MIT. His research focus is in parallel computer architectures and cloud software systems, and he is a founder of several successful startups, including Tilera, a company that produces scalable multicore processors. Prof. Agarwal won MIT's Smullin and Jamieson prizes for teaching and co-authored the course textbook "Foundations of Analog and Digital Electronic Circuits."

Gerald Sussman
Professor of Electrical Engineering at MIT. He is a well known educator in the computer science community, perhaps best known as the author of Structure and Interpretation of Computer Programs, which is universally acknowledged as one of the top ten textbooks in computer science, and as the creator of Scheme, a popular teaching language. His research spans a range of topics, from artificial intelligence, to physics and chaotic systems, to supercomputer design.

Piotr Mitros
Chief Scientist of edX and Research Scientist at MIT. His research focus is in finding ways to apply techniques from control systems to optimizing the learning process. Dr. Mitros has worked as an analog designer at Texas Instruments, Talking Lights, and most recently, designed the analog front end for a novel medical imaging modality for Rhythmia Medical.

Mitros, et. al, 2013

...

<User1> right, so... loops yes ;) Im having trouble working out how he determines the direction of his loops and which ones are important. Take the 5 resistor example in S2V4 where he uses 4 of the 7 loops (arbitrarily?) and goes counterclockwise in one "just for fun"

<User1> so my question is, how do you work out which loops you need to use for KCL or KVL and then how do you decide upon the direction?

<User4> you can decide on the direction in any way you want. doesn't really matter. going the other way round just swaps all + and - signs in your equation, but since the result is =0, nothing really changes

<User1> ok, let me refer back tot he 5 resistor example

<User1> if you go the same way around for all of them then you dont get 0 when it looks to add up the equations you get from KVL

<User4> (I'm still vieweing S2V1 though so I don't know the exact example you're referring to yet... I will get there in a few minutes though ;-)

<User1> and you should... now I am probably "picking" the wrong loops, and I see where you are coming from and am abashed I did not see that sooner :P

<User1> ok :P

<User1> my question then becomes, how do you know what loops to pick?

<User4> eventually you'll have to pick them all (or all but one) anyway. Normally you

...

12,287 questions

Sort by | date | activity | answers | votes ▼

Hints on HW4

Since my hints on HW 5 and 6 seem to be well liked, I've decided to go back and do HW4 for those who haven't yet. Hope it helps some people. H4P0 This question is just a check t...

Apr 08 by anupadkh — H4P0 H4P1 H4p2 H4P3

13260 views | 32 answers | 351 votes

Please sign AA's thank-you note (before Monday night)

I got Dr. Agarwal a thank-you note and memento for his bookshelf. I'm going to sign it "Thank you from the 6002x students, class of 2012", and the URL for this question. Anyone w...

Jun 24 by VCO — Dr.Agarwal 6002x students

10229 views | 740 answers | 326 votes

Summaries for Lectures 1 to 12 (more added, links fixed)

http://dl.dropbox.com/u/42783014/midterm_summaries.pdf allow some minutes for the archive to be uploaded to dropbox edited: april 25 dropbox seem to be blocked due to high traffi...

Jun 11 by hwangyinghua — midterm summary LECTURES notes

11592 views | 59 answers | 239 votes

Collaboration guidelines

Course Discussion

Ask a question

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SEARCH QUESTIONS

INTERESTING TAGS

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IGNORED TAGS

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TAGS

HINTS notes

92

S7E1 Easy solution

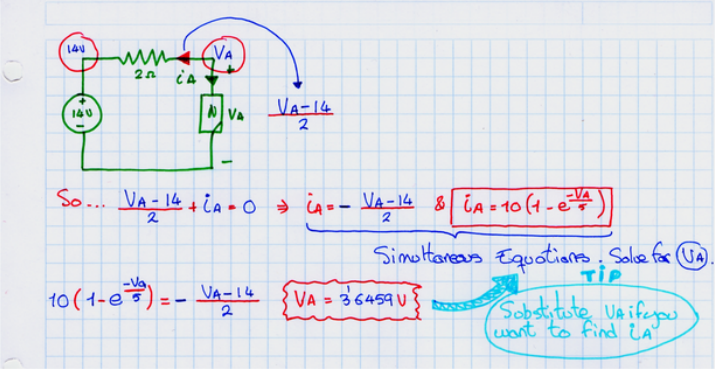
S7E1 | easy | nonlinear | ExpoDweeb | solution

edit | close | flag offensive | ✖

Asked **Apr 02** by
theoq 1390 ● 4 ● 7 ● 19

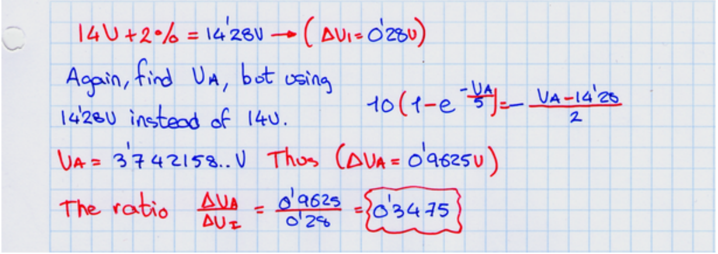
Hi everyone! At first, this exercise seemed impossible to me, but after going over it several times, and reading of course the textbook, everything made sense to me.

However, if you don't know how to solve it, I'll try and help you.
Question 1-They ask you for **VA** when VI=14V and R=2Ω.



-FULL RESOLUTION IMAGE: http://theoq.net/scan001.jpg

Question 2-They ask you for the incremental change in **VA** adding a 2% to VI.



- FULL RESOLUTION IMAGE: http://theoq.net/scan002.jpg

Question 3-They ask you for the **Incremental Resistance** for **VA**=14V. The incremental resistance is the **reciprocal** of the derivative of **iA=1(1-e^(-VA/5))**.

Course Question

Asked Apr 02
Seen 4,017 times
Last updated Apr 10

Lab2b 3 resistor intuition

13

lab2b lab2

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Hi All,

I have solved the mixer problem after working through the numerous forum posts about using 3 resistors.

Unfortunately I still do not have any idea / intuition as too WHY 3 resistors should be used? An explanation from the community would be greatly appreciated.

Thanks

Asked **Mar 25 '12** by JanS 131 • 2 • 2 • 4

Updated **Mar 25 '12**

> Thanks for the solution. I've been "busting my behind" trying to figure out how to solve this problem. I tried to solve it using the 2 resistor solution, but was unable. I don't completed understand why it needed 3 resistors, but I'll study the circuit and try to figure it out. Thanks again.
>
> **bsa1** (Mar 25 '12)

> Look my solution. http://mediartics.sytes.net/LAB-1.PDF and http://mediartics.sytes.net/LAB-2.PDF We can solve the ecuations systems.
>
> **felipealejandro** (Mar 26 '12)

> Solution here too: https://6002x.mitx.mit.edu/discussion/question/30191/lab-2b-solution
>
> **RayH** (Mar 26 '12)

post a comment

19 Answers

Sort by | oldest | newest | **most voted**

25

A mixer with two resistors will take two signals and mix them in a proportion related to the two resistances. If they are equal you get 50:50.

The example circuit shows: 1/2 * (V_1 + V_2), but we want 1/2 * (V_1 + 1/3 * V_2)

So you need to create a voltage divider to cut V_2 to 1/3 V_2 feeding into a 50:50 mixer.

NOTE: you need to account for the resistors on all branches.

Answered **Mar 25 '12** by RayH 3754 • 13 • 47 • 81

Updated **Mar 26 '12**

flag

> This gets to the right answer quickly, but one thing bothers me: Since R1 and R2 are shorted together, isn't a voltage divider for V2 also a voltage divider for V1?
>
> **Archimedes** (Mar 25 '12)

> @ Ray H your explanation is really good. but i have the same doubt of Archimedes.yah that part has been troubling me a lot...a voltage divider for V2 wont be effecting V1 ? can anyone clarify???
>
> **najah** (Mar 26 '12)

> Thanks a lot RayH. Although I had solved it using 3 resistors..I could not get a feel for selecting 3 resistors. Your explanation gave me good insight.
>
> **plaincurious** (Mar 26 '12)

> Yes, the resistor on V1 will affect the resistors on V2 and vice versa, but you can use superposition. This will consider all three resistors when computing the ratio for the voltage divider. You will have 2 resistors in parallel to convert to a single resistance and then use it in the voltage divider equation. You will get two equations (one for each voltage source) and three unknowns. You will get the values for two resistors as a proportion of the third one. Set the smallest resistor to some value (1k ohms) and compute the others. The actual values do not matter, just their ratios.
>
> **RayH** (Mar 26 '12)

post a comment

11

If you used 2 resistors, the best you could do would be creating a voltage divider, putting your inputs at the two ends and getting your output in the middle... in a voltage divider with 2 resistors, the voltage is split up in 2 fractions which add up to 1, and 1/2+1/6 is different from 1

Answered **Mar 25 '12** by gabrio 318 • 1 • 4 • 14

flag

> Maybe the simplest, best explanation of why it can't be done with the requested output values and only 2 resistors!
>
> **Wayne_I** (Mar 25 '12)

post a comment

6

It can be explained mathematically along similar lines to gabrio's answer. However, try this water analogy if you're still stuck:

First look at the two resistor solution and mentally convert your voltage sources to pumps and the wires to pipes. You should see that all of the 'water' (current) ends up at the output no matter what happens (assuming our resistance cannot go to infinity). This is fine when our flow fractions (i.e. 50% v1 mixed with 50% v2, 30% v1 mixed with 70% v2 etc...) add up to 100% - we can then use a voltage divider model to get a solution.

However! in the lab we need 50% of v1 and just over 16 % of v2 - clearly this doesn't add up to 100%! In fact, we have an excess signal (water) at the ouput. Thinking in terms of water, we need to "bleed" some away from the output, otherwise there would be too much (100%). Adding a 'by-pass' or 'drain' to allow the excess to escape we get a solution.

Therefore:

Adding a third resistor to bleed away excess voltage allows you to perform incomplete mixing.

Answered **Mar 25 '12** by FentonEng 241 • 1 • 6 • 8

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2

While I didn't do it this way, I think the easiest way to conceptualize the problem is to think of it as a superposition of three states:

Vout = aV1 + bV2 + cV3

where a + b + c = 1 since they are the percentage mix.

You can then think of it as a three source mixer where you would get:

a = R2||R3 / (R1 + R2||R3)

b = R1||R3 / (R2 + R1||R3)

c = R1||R2 / (R3 + R1||R2)

you then get:

(1/a)*R2*R3 = R1*R2* + *R1*R3 + R2*R3 [eq1]

(1/b)*R1*R3 = R1*R2* + *R1*R3 + R2*R3 [eq2]

(1/c)*R1*R2 = R1*R2* + *R1*R3 + R2*R3 [eq3]

You can then use substitution to get equations for two of the resistors as a function of the third.

(NB: this does not work out to three independent equations in R1, R2, and R3 which is why we get an infinite amount of solutions. I believe what you would get is:

a*R1* - *b*R2 + 0*R3 = 0 [eq1.1]

a*R1* + *0*R2 - c*R3 = 0 [eq2.1]

0*R1* + *b*R2 - c*R3 = 0 [eq3.1]

and it is easy to see that eq3.1 = eq2.1 - eq1.1)

Answered **Mar 25 '12** by KPEdwards 138 • 1 • 9

Updated **Mar 25 '12**

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1

When you build a simple resistor-adder each branch of the adder contributes a certain fraction less than or equal to one to the total, and the total fraction contributed by all branches must equal 1. That is, 10% can come from one source, 30% from another, and 60% from a third for a total of 100%, but you cannot have 60% from one signal and 50% from another because then you would end up with 110% and would have built an amplifier which is not possible without an active component. You can also not have 50% of one signal and 10% of another because this is less than 100%.

The maximum fraction any one branch can have is 1, and the total must add to 1.

Thus, you cannot get 1/2 and 1/6 with only two branches and only two resistors. In order to get this, you must add a third branch, ground, or 0v, or "no signal", that is assigned the remaining 2/6 of the signal.

Think of the solution as a simple mixer with 3/6 from one source, 1/6 from another, and 2/6 from "nothing" (0v (gound)). 3/6+1/6+2/6=6/6=1. Now the need for the third resistor should be obvious.

Answered **Mar 26 '12** by cwm9 3688 • 30 • 53 • 74

Updated **Mar 29 '12**

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0

The maximum voltage always comes out at +1 volt no matter what I do.

Answered **Mar 25 '12** by triley 1 • 2

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0

I knew the Resistors couldn't be 'fractions', it would've been sooooooo much easier and faster to 'solve'!!!!!!!!!!!!!!!!!!!!! Please MIT people: Fix it!!! :)

Answered **Mar 25 '12** by marcosigonzalez 66 • 4

flag

> Admittedly, this is confusing, given that the homework and lab input areas other than the circuit sandbox accept fractions...
>
> **WhirlWind** (Mar 26 '12)

post a comment

0

If knew the Resistors couldn't be 'fractions', it would've been sooooooo much easier and faster to 'solve'!!!!!!!!!!!!!!!!!!!!! Please MIT people: Fix it!!! :)

Answered **Mar 25 '12** by marcosigonzalez 66 • 4

flag

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0

If I had known the Resistors couldn't be 'fractions', it would've been sooooooo much easier and faster to 'solve'!!!!!!!!!!!!!!!!!!!!! Please MIT people: Fix it!!! :)

Answered **Mar 25 '12** by marcosigonzalez 66 • 4

flag

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0

Man, this one stumped me for a while. What I was forgetting to add was the ground on R3 and therefore couldn't get the waveform to behave.

Answered **Mar 25 '12** by Gutworks 21 • 3

flag

post a comment

1 2 next page ›

YOUR ANSWER

Please try to give a substantial answer. If you wanted to comment on the question or answer, just **use the commenting tool**. Please remember that you can always **revise your answers** - no need to answer the same question twice. Also, please **don't forget to vote** - it really helps to select the best questions and answers!

hide preview

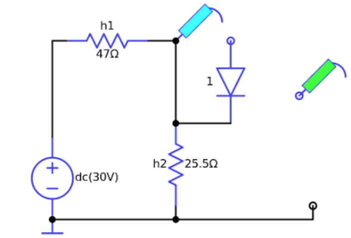
Post Your Answer

Last modified: Apr 09, 2012, 03:46 PM

Kirchhoff's Voltage Law

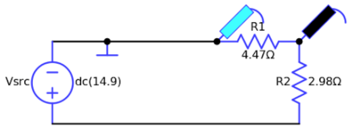
Kirchhoff's Voltage Law (KVL)

In the lumped matter discipline we assume that the total voltages in each loop sum up to zero. In a much more limited sense, it also means that each of the voltages can be found by adding or subtracting the other voltages in any loop...



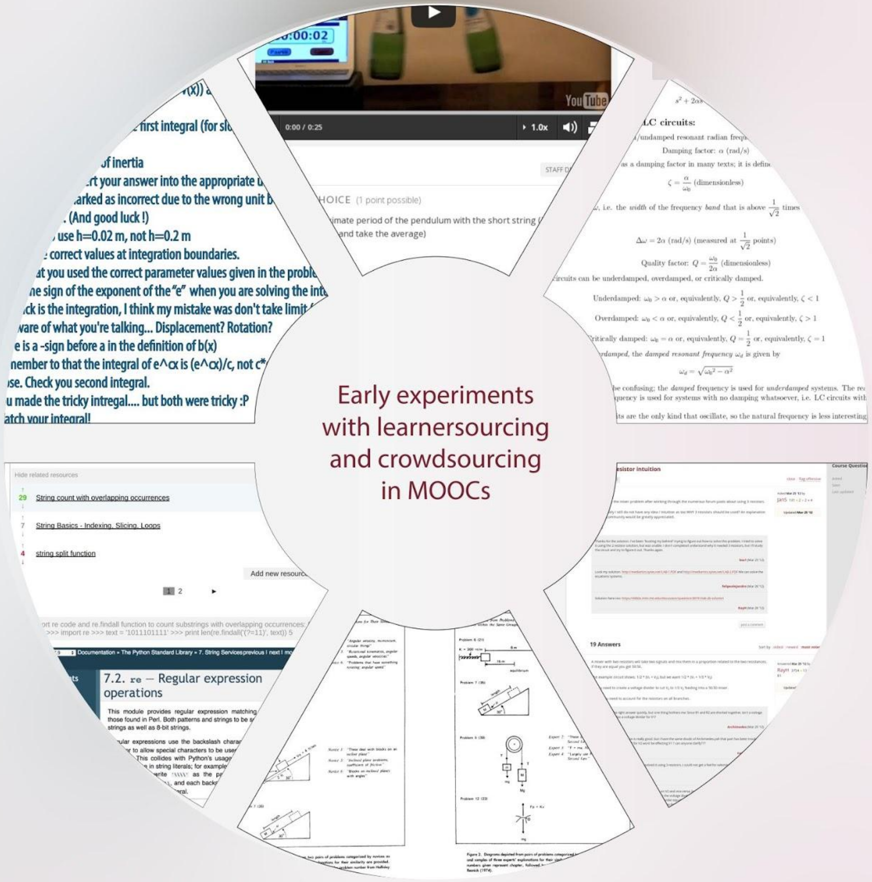
Any voltage, V_1 is going to be the very opposite of V_{src}. That means that if we have 1 volt coming in, we have a corresponding drop of 1V in the total sum of the other circuit elements that aren't the 1 Volt source as long as they're in a loop.

By tradition, and as can be seen in S1E6a, the positive sides that reduce voltage have the positive end connected to positive ends of elements that supply voltages. However, that is just a matter of convention. For example:



Just like an AC voltage source does $\frac{Hertz}{2}$ per second, this supplies the same voltage to the diode with reference to ground the 'wrong' way round. Previously, where we had $V_1 = -V_{src}$, all this has done in the algebraic abstraction is to change it to $V_{src} = -V_1$, we've just flipped the signs. So, when there's a negative terminal of a voltage drain being connected to a positive terminal of a voltage source, we can just add them all up. If you have a positive terminal in the same node as another positive terminal, they just subtract from each other.

Early experiments with learnersourcing and crowdsourcing in MOOCs



[Mitros, 2014](#)

Hide related resources

47 PyCharm - The intelligent Python IDE with unique code assistance and analysis, for productive Python development on all levels.

15 Anaconda open source scientific python environment

15 Sublime Text

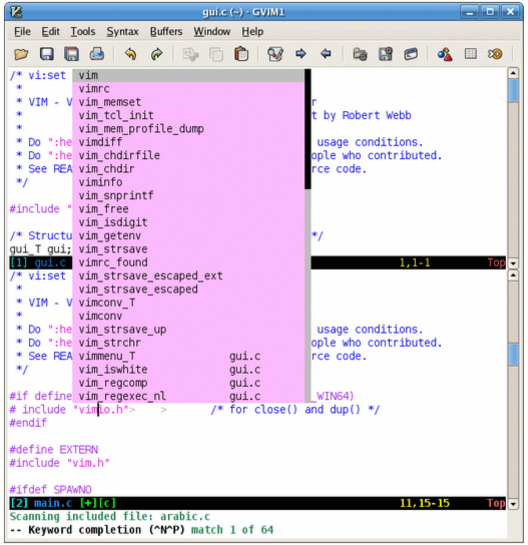
14 Eclipse for Python

13 vim/gvim

Add new resource >>

1 2 3 ... ▶

Text based editor available on most Unix systems. Successor of vi.



[Li, Mitros, 2015](#)

Class discussion | Alpha | Delta | Sigma | Gamma | Theta | Zeta

POST REPLY | Actions | 1 of 4 (1) | Help

cphys-delta ›

physics experiment data repository

8 posts by 4 authors

[redacted] 3/25/14

Noting the many e-resources available, 'e-ase' of access does not solve the silo problem. Part of the problem is that web sites will aspire to a consistent look, continuity of presenter etc. So how to encourage reuse?
Physics experimental data could easily be reused, and included in mashups that meet the look-and-feel demands of web producers. Small sets of experimental data could be stored in tables in wikidata.org (or github), and used to reproduce the experimental results - that would be real science..

cheers
[redacted]

Click here to Reply

[redacted] 3/28/14

This link offers Newtons Laws OER
http://www.oercommons.org/search?f.search=newtons+laws+of+motion

[redacted]

[redacted] 3/28/14

Other recipients: [redacted]

Am wondering if we might do a job of finding the "best" OERs on Newton's laws, or curating them

Might actually be good to post the ones we like on MERLOT and invite folks to give them stars according to quality.

Or some other way of crowdsourcing quality of materials :) not sure quality perception is context-free, tho

Cormier*, Mitros*, Pritchard*, 2014

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This post is visible to everyone.

Examining the Small Signal Model for a MOSFET

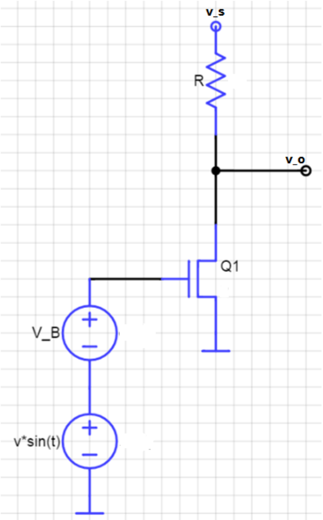
1 Vote

discussion posted 5 months ago by [redacted]

Week 8: Large Signals for Mosfets

[I am unsure if this would be better placed in week 6, and simply either create an imaginary device with the mosfet characteristics or explain the large signal model for the mosfet.]

In this exercise, we will examine how accurate the small signal model is for the following mosfet amplifier:



For this problem we will assume that the mosfet is in saturation and has a parameter of K and threshold voltage of V_T. In addition, we will assume that the small signal driving the circuit is a sin wave, in the form of $v * sin(t)$, there is a bias voltage of V_B, there is a resistor with value R, and that the circuit is being driven by a constant voltage of V_S.

1. We will begin by analyzing the circuit with the small circuit model. Find the operating point of circuit in terms of the circuit parameters K, V_T, R, v, V_B, and V_S.

[Answer: $V_O = V_S - R * \frac{K}{2} * (V_B - V_T)^2$]

2. Now find the small signal response of the amplifier in terms of the circuit parameters K, V_T, R, v, V_B, and V_S.

Mitros, 2015

Cohorts & Teams in edX courses

Leslie Gerhat, Product Manager, edX
lgerhat@edx.org

DANCE @ CMU
5/14/2015

Cohorts & Teams in edX courses

Cohorts & Teams enable **social learning experiences** in edX courses by providing **smaller, more personalized group opportunities** within a larger course.

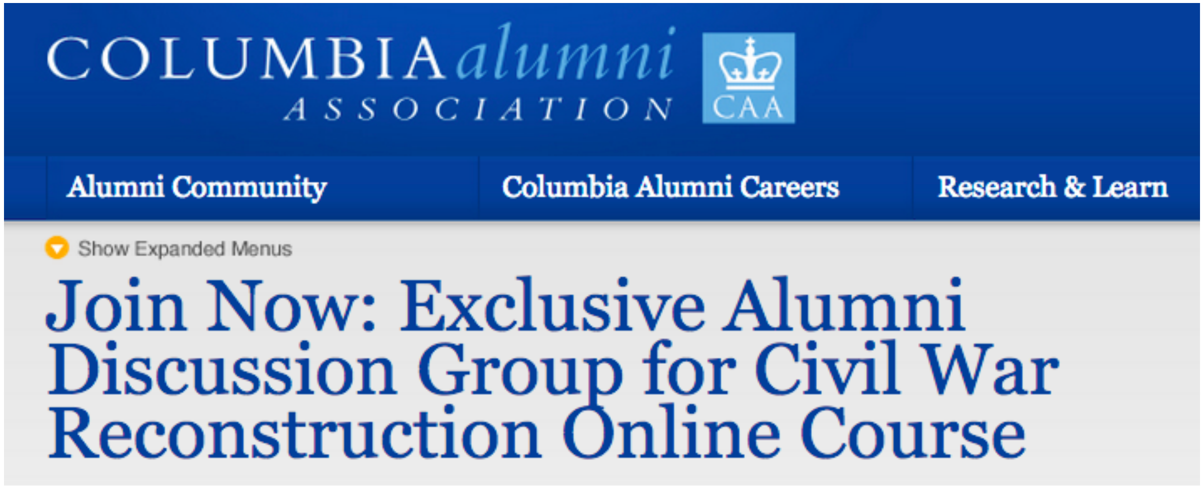
Cohorts

A cohort is a **segmentation** of learners within a course that **shares a course experience** with their group of learners, by engaging in the **same content and communication**. Learners can also engage in the **wider learner community**.

Cohorts

Enable student ***communities***

- Bring together **alumni** for greater engagement
- Provide enhanced support for **teachers**



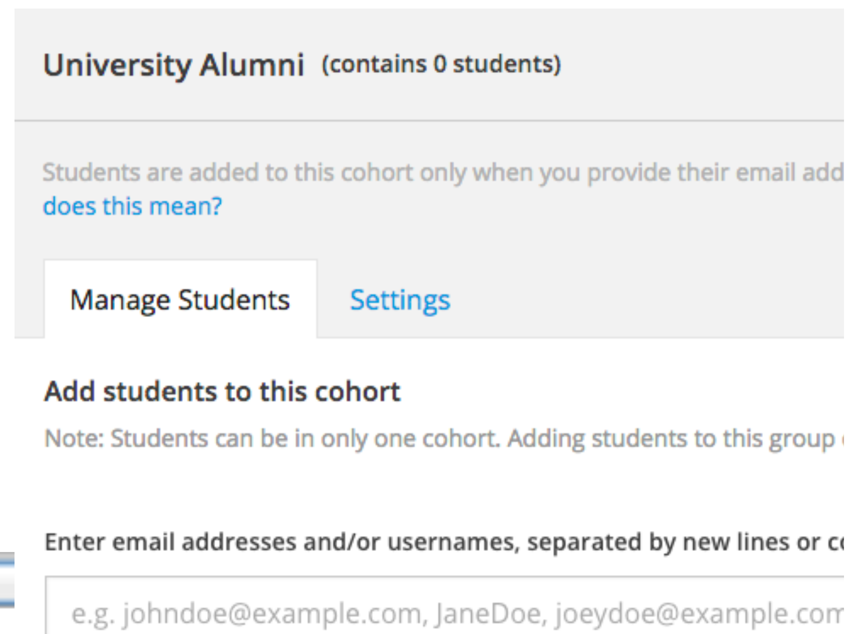
Cohorts

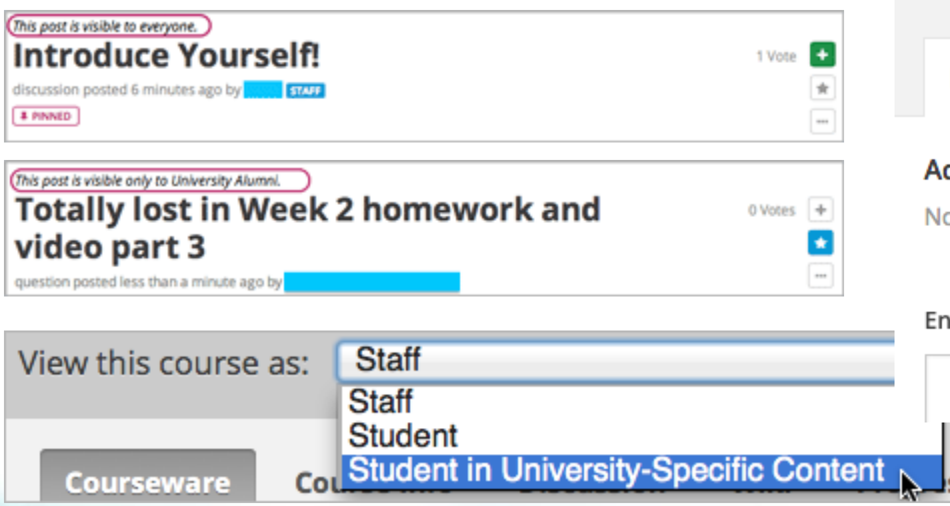
"I graduated in 1978... and always regretted not taking that [Civil War and Reconstruction] course. This was my chance. " -- Columbia Alumnus

"It was terrific asking Eric [Foner] questions in a very intimate setting." -- Columbia Alumnus

Cohorts

- **Targeted content** can be delivered to learners in a cohort.
- **Segmented discussions** enable smaller, more personal conversations.
- **Instructor tools** provide easy setup and administration of cohorts.





Teams

A team is a **segmentation** of learners within a course that **shares a learning experience**, by engaging in a **targeted project or activity** for a **limited time period**.

Teams

*Enable group **learning experiences***

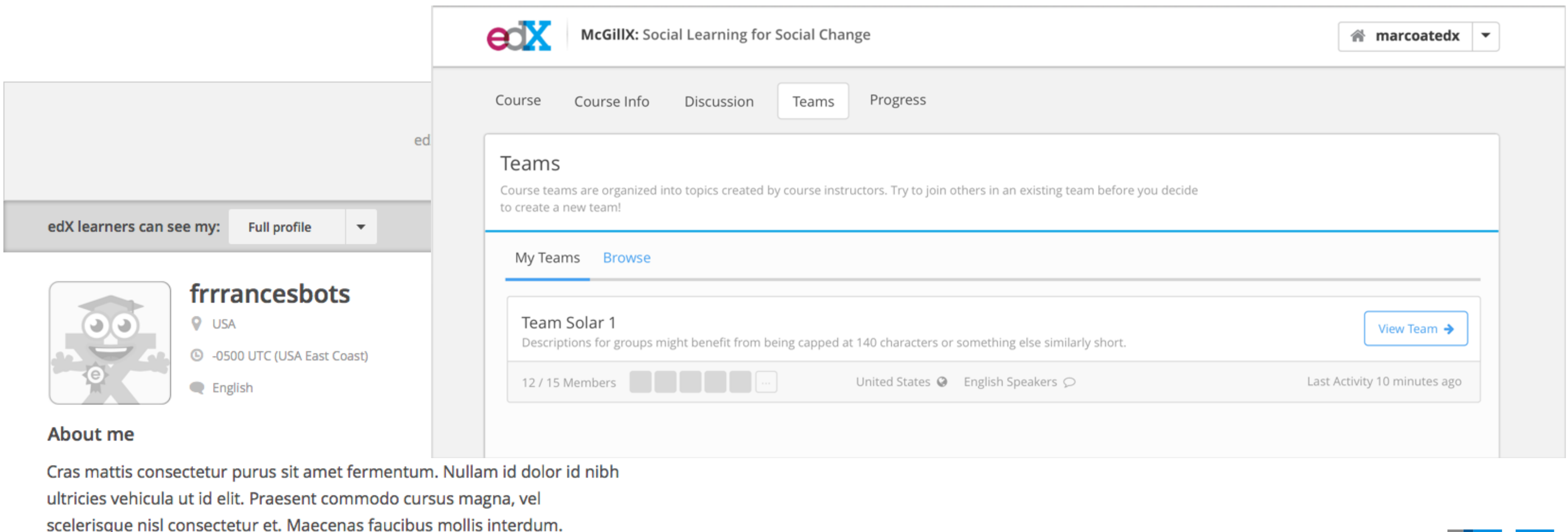
- Learners participate in **group projects**
- Learners form **study groups** for support

McGill UNIVERSITY

edX

Teams

- Learners can **find and form teams with other learners** with shared interests
- **Small group discussions** to enable communication
- Integration with **third party tools** to encourage collaboration



Resources

- Cohorts & Profiles are available now in Open edX
  Cohorts documentation
  Profiles documentation

- Teams will be available in Open edX at the end of 2015

Extending Open edX

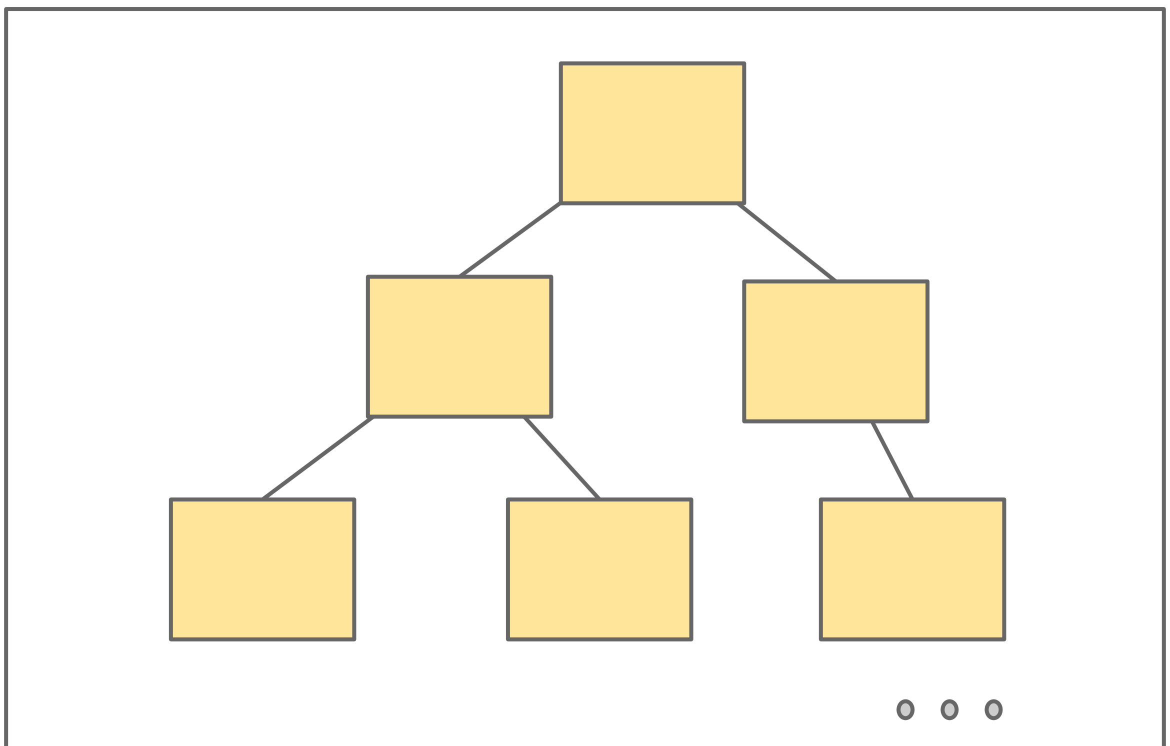
Ned Batchelder

Goals

- Quick overview of interfaces
- Quick overview of process

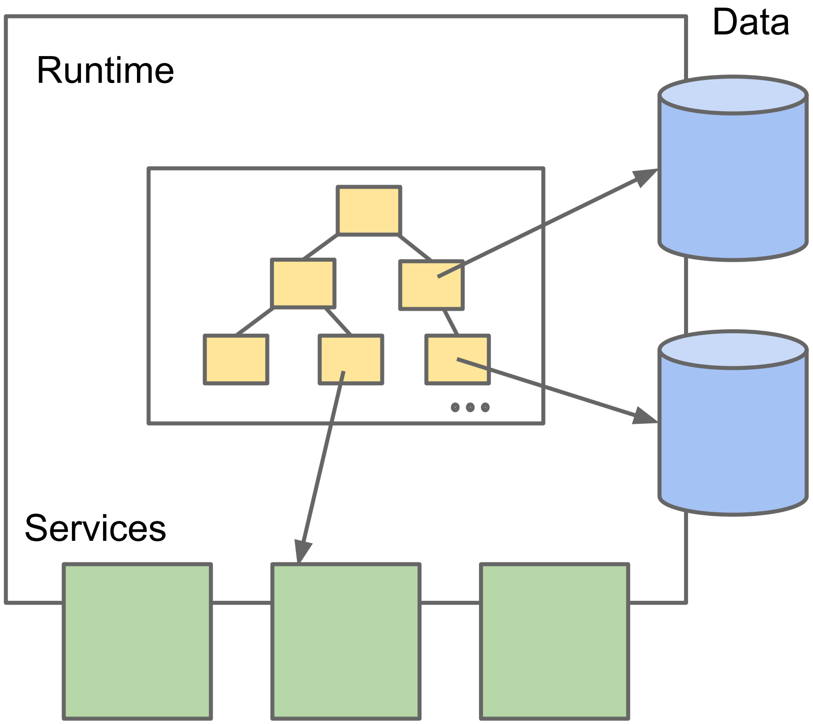
A course

- Built of XBlocks
- Like <div>'s in HTML



XBlock runtime

- Container for XBlocks
- Provides service abstractions (+ data)

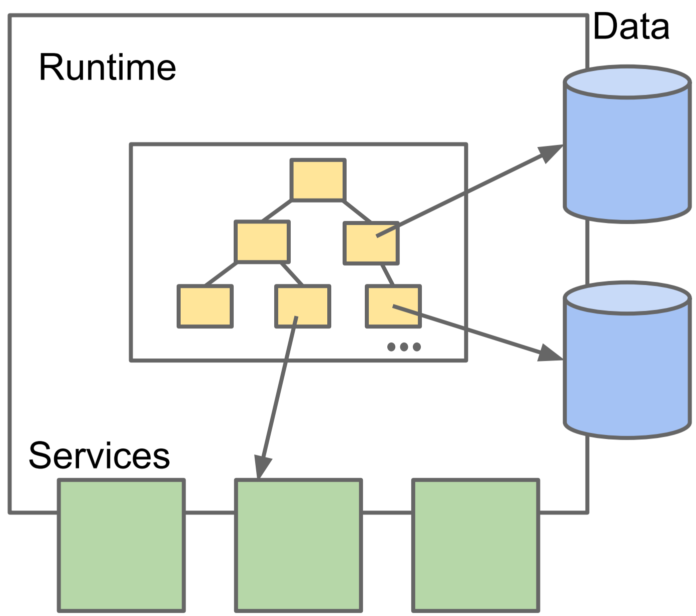


LMS

- XBlock runtime
- Provides:
  - User registration
  - Progress tracking
  - Grading
  - Forums
- Data storage
  - Course in Mongo
  - Student data in MySQL
  - Abstracted away by XBlocks

LMS: much more stuff...

- Registration
- Profiles
- Cohorting
- Instructor Dash
- Reporting
- Commerce
- Certificates
- Analytics



- Grading Queue
- ORA
- Progress
- Forums
- Wiki
- Translation
- Theming

Studio Internals

- Courses are still XBlocks!
- Mongo database shared with LMS

Changing things

how can I implement my idea?

Extension Points

https://github.com/edx/edx-platform/wiki/Five-ways-to-extend-edX

- XBlock
- LTI
- JSinput
- OLX
- Core code

XBlock

- Most likely choice
- Create new courseware components
- Designed for third-party devs
- http://xblock.readthedocs.org

What is an XBlock?

- A Python package
  - runs on the server
- A class providing:
  - Data fields
  - Views for presentation
    - produces HTML + CSS
  - Handlers for user input
- A web app, one div at a time
  - Uses existing assets and skills

LTI

- External standard
- Loosely coupled integration

JSInput

- Make a new Capa InputType with pure JS
- Good for new problem types
- http://edx.readthedocs.org/en/latest/course_data_formats/jsinput.html

OLX

- XML representation of courses
- Import/Export courseware
- Manipulate outside of Open edX

Hacking core code

- Can change anything!
- Not easy
- Very few docs

Contribution

how can I get my idea to others?

XBlocks

- Don’t need to be contributed to edX
- Designed to be installed separately

Contributing to core

- Talk to us
- Make a pull request
- Work with reviewers
- Merge!

Getting help

- Docs
- IRC channel #edx-code on Freenode
- Mailing list: edx-code on Google Groups:
    - https://groups.google.com/forum/#!forum/edx-code
- Please ask!

Questions?