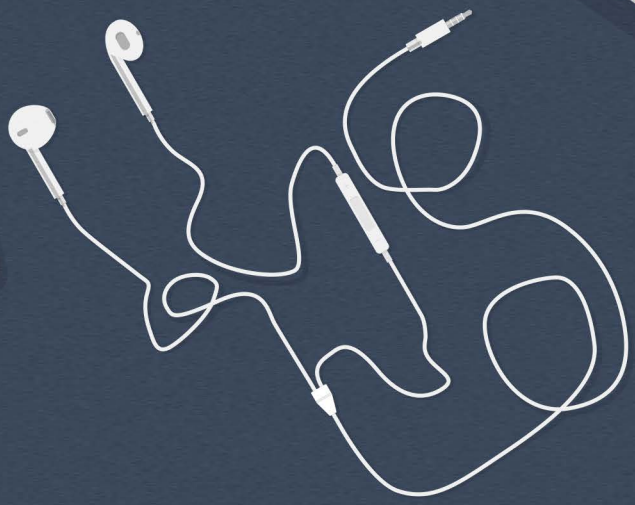
IEEE@UIUC

SPARK

FALL 2014



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sheel shah, chief editor
anant goyal, chief editor
prithwi roy, editor
alyssa romeo, editor
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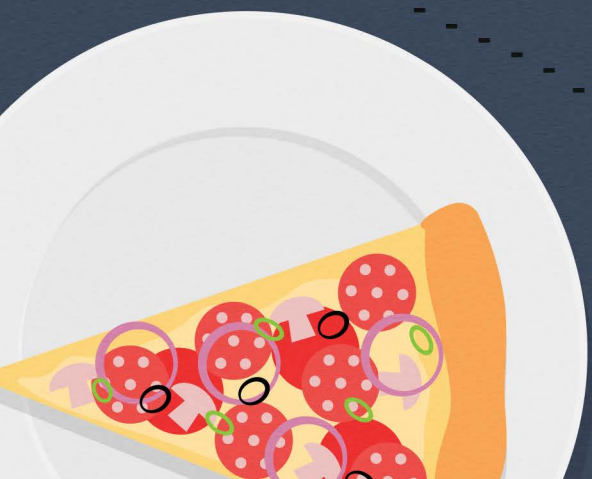
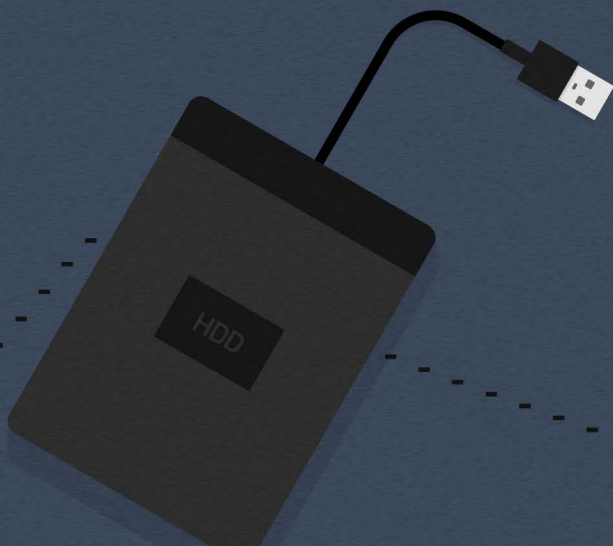
sidharth vaitha, editor
hongsen yang, photography
brady salz, writer



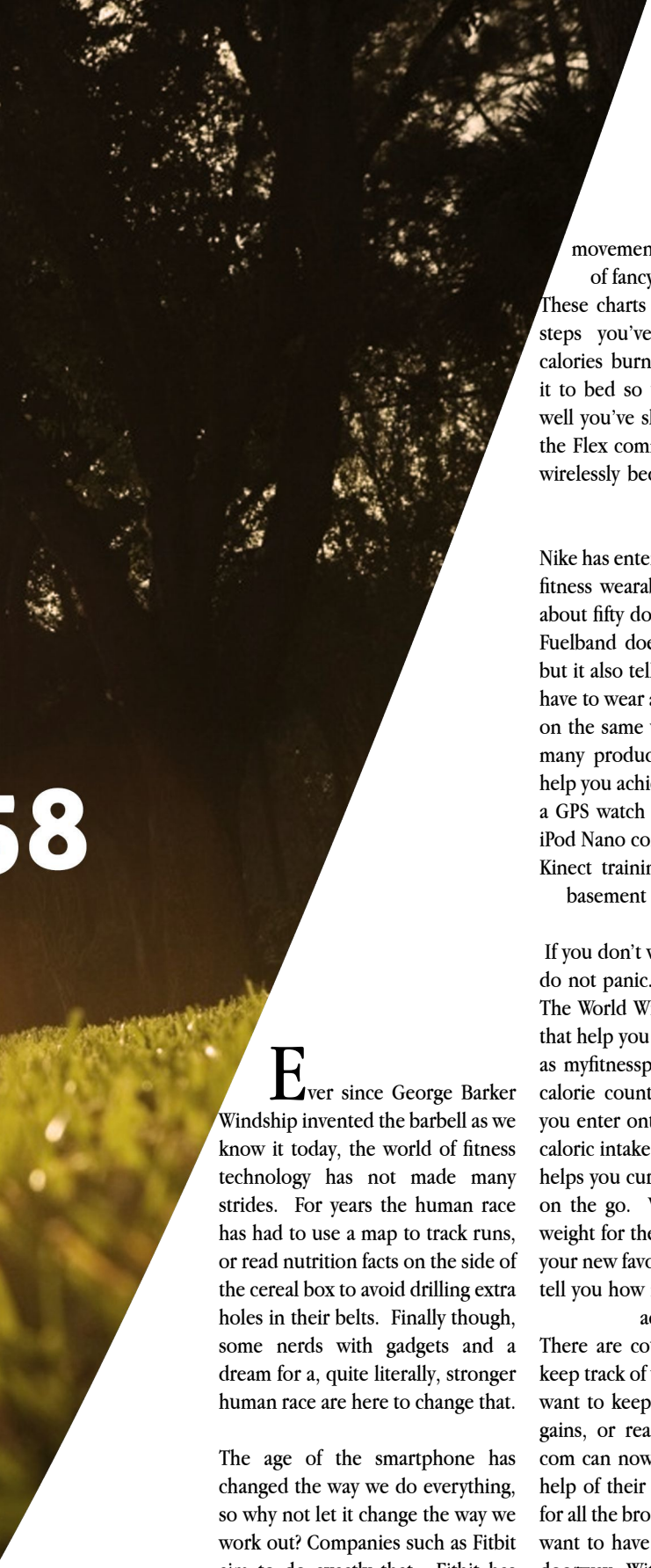
layout

sheel shah



index


FITness
tech
steps13,55
heart rate
distance
goals



Ever since George Barker Windship invented the barbell as we know it today, the world of fitness technology has not made many strides. For years the human race has had to use a map to track runs, or read nutrition facts on the side of the cereal box to avoid drilling extra holes in their belts. Finally though, some nerds with gadgets and a dream for a, quite literally, stronger human race are here to change that.

The age of the smartphone has changed the way we do everything, so why not let it change the way we work out? Companies such as Fitbit aim to do exactly that. Fitbit has created a system that allows you to wear a sleek and stylish wristband called Flex that tracks your vigorous movements and reports it in the form of fancy charts to your phone. These charts will tell you the amount of steps you've taken, distance covered, calories burned, and you can even wear it to bed so the charts can tell you how well you've slept. After the initial set up, the Flex communicates with your devices wirelessly because we've all decided that wires are bad.

Nike has entered the ring as well with their fitness wearable, the Fuelband. At $149, about fifty dollars more than the Flex, the Fuelband does everything the Flex does, but it also tells you the time, so you don't have to wear a fitness bracelet and a watch on the same wrist like an idiot. Nike has many products in their Nike+ line that help you achieve your fitness goals such as a GPS watch that tracks runs, sensors for iPod Nano connectivity, and even an Xbox Kinect training program that turns your basement into a sweatier basement.

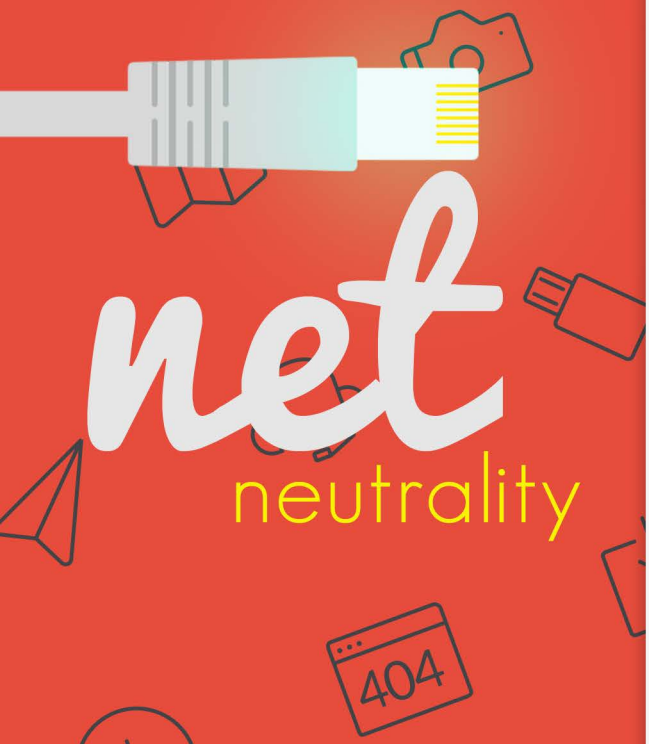
If you don't want to wear a bracelet at all, do not panic. There are options for you. The World Wide Web is littered with sites that help you reach your fitness goal, such as myfitnesspal. Myfitnesspal is a simple calorie counter that translates the foods you enter onto the site into a log of daily caloric intake. They also offer an app that helps you curb your cheesecake addiction on the go. Whether your goal is tolose weight for the beach or bulk up to fill out your new favorite T-shirt, myfitnesspal will tell you how many calories you can eat to achieve your goal.

There are countless options to help you keep track of your calories, but what if you want to keep track of your massive chest gains, or rear 'delt line? Bodybuilding.com can now be in your pocket with the help of their app, Bodyspace. This app is for all the bros and lady-bros out there that want to have difficulties fitting through a doorway. With Bodyspace, you can find new workouts that cater to specific muscle groups and even entire workout routines based on skill level and length of program. You can even design your own workouts and share them with other Bodyspace users, closely mimicking that weird guy at the gym that always hovers around, giving advice to people with their earphones in. With all of these features, you can be the raw-steak-eating muscle-head you've always wanted to be within no time at all.

What if you're the kind of person that looks down at his or her shirt and thinks, "I really wish this shirt had Bluetooth capabilities"? Who am I kidding; we have all thought that at one point or another. Athos is finally here for us with a shirt and pair of shorts that use electromyography, or EMG, sensors to monitor electrical activity in the body. When you exercise, the sensors in the clothes will pinpoint exactly which muscles are being targeted and then calculate the amount of effort the muscles are exerting on a percentage scale. Both the pants and shirt have heart rate monitors and the shirt can even record data on your breathing. The smart clothes will then communicate this data, by way of a small "core", to your smart devices in real time. And don't worry, you can wash it in your washing machine without electrifying your undies.

Even if you don't want to make a purchase, head down to CRCE and try out the new machines by Life Fitness. They count your reps and the time in between sets on a small digital readout and then you can take a picture of the QR-code on the machine to keep track of your workout. Even scales are getting smarter, such as the Smart Body Analyzer by Withings, which can tell you your weight, fat mass, and BMI as well as heart rate. It even does an air quality test of your house with temperature and carbon dioxide levels and warns you if there needs to be better ventilation. This is a huge leap from that clunky scale at the doctor's office that your shoes stick to as you try to step off.

Fitness is no longer a fully organic process. New technology will integrate our devices into our workouts and hopefully get more people to start hitting the track or the weights rather than sitting around scrolling through that hot chick's profile pictures. It is ironic that the devices that made us lazy are now giving us a new outlook on the gym, but in an ever-changing world, we should accept these changes as betterments and try to let our newly toned bods reflect that.



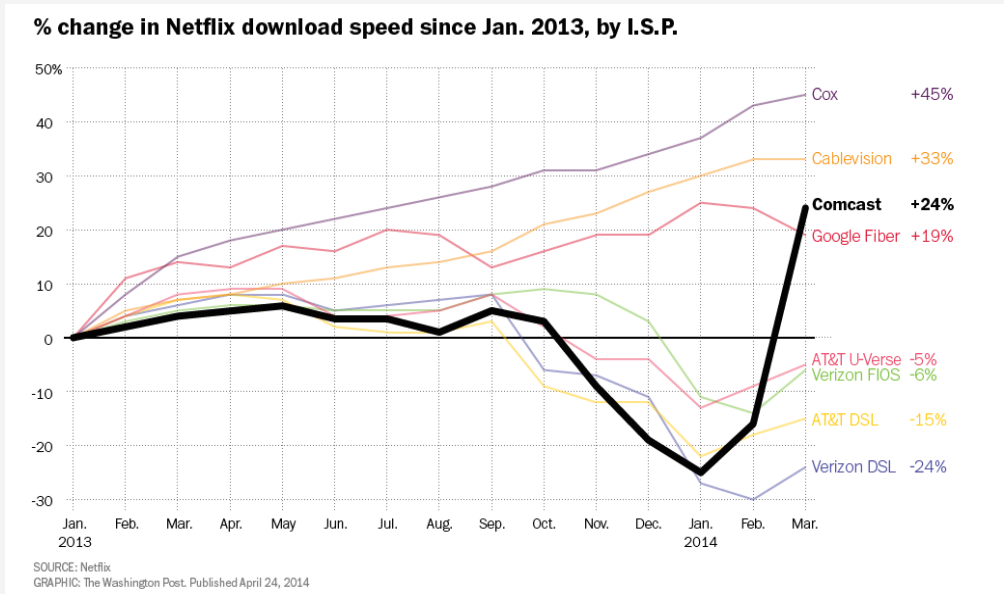
the open internet

One of the most hotly debated topics in the nation today is Net Neutrality. The internet has always been viewed as a global village and a level playing field for all whether it's a multinational company or a small startup. This ability of the internet to equalize the playing field allowing access to content for all is what enabled small startups like facebook to surpass myspace and then turn into one of the biggest MNC's in the world today.

The FCC on the other hand wants a change in that it proposes as system where companies should pay internet service providers like comcast an additional fee to stream content faster to it's users.

This seems like a literal threat from ISP's to company's to pay a fee else they would slow down speeds for the company's users.

For example Netflix might pay a large amount in order to guarantee good streaming feeds for all it's users but the question to be asked is what about a startup? A startup will most likely not be able to afford this speed which implies thanks to the ISP users may mostly be satisfied with the services of an MNC that's already payed the fees since users would blame slow loading of content on the startup rather than the ISP restricting internet speeds on that site.



This essentially boils down to the fact that cable companies offer two speeds of service and if your company wants to ensure the best experience for it's users it essentially has to pay up.Just last year Netflix was negotiating with Comcast for streaming speeds.

The negotiations started around October and guess when Netflix gave in to comcasts demands. That would be right around February when you see a steep rise in speeds.

Most multinational companies such as Google, Facebook, Amazon and Netflix have all signed letters to preserve net neutrality.

So this might beg the question that if everyone is against this how is it actually happening? The obvious benefactors of removing net neutrality are the cable companies. Last year alone comcast spend 18 million USD on just lobbying alone, it seems these companies have the white house under their pockets.

Quite surprisingly the President picked Tom Wheeler a former lobbyist for a cable company to be the new head the FCC. It makes no sense for the organization that is responsible for regulating lobbying is headed by a lobbyist, that's pretty much regulating yourself.

A recent survey showed that 96% of the Americans had access to only 2 major cable providers, Time Warner and Comcast. And whats's surprising is these two providers seem to have agreed to stay out of each others way. Time Warner's in New York, Comcast is in Philadelphia, Time Warner's in LA while comcast is in San Fransisco; essentially you can't buy a comcast in New York. So essentially one cable company seems to have a monopoly over cities as a whole eliminating most competition.

The United States ranks 34 in amount people pay for their internet speeds and yet we receive slower speeds than most countries in Europe or Asia.

While cable companies state that they remain committed to net neutrality or an open and free internet the current government looks set to remove net neutrality.

Capitalism cannot function when there is a monopoly and when that monopoly has significant control over the government. This eliminates all possibilities of free and fair competition.

However as citizens the FCC is willing to consider our opinions on fcc.gov/comments to see what the public thinks and then take a call on whether to preserve net neutrality or not. Personally I believe no one other than the cable companies benefit from eliminating net neutrality and it would only lead to consumers paying higher prices for their internet.


Striking
a new
chord
by prithwi roy

Professor Lippold Haken

At the heart of innovation is the yearning for something new. The world of musical instruments is one that's been around for centuries, largely unchanged. A piano is still a piano and a violin is still a violin. But our very own

Professor Lippold Haken

decided a piano doesn't have to be a piano and a violin doesn't have to be a violin. Why can't a piano behave like a violin, or a voice, or a sci-fi mixture of alien sinusoids? Thus the Continuum Fingerboard was born. He was gracious enough to offer some insight to his creation and about innovating in general.

Questions for Prof. Haken:

How and when did you start your path of innovating? (Was it tinkering? Research?) (When did you realize you wanted to create something new?)

When I was in high school in the mid 1970s, I was introduced to PLATO – and got hooked on new technology, and new possibilities.

How did you come up with the idea of the Continuum? (Would you say you set out to create a new instrument from the start? Did the idea just come to you or were you actively searching for a new instrument?)

When I was in college in the late 70s and early 80s, I was with a group of students designing and building music synthesizers for the PLATO. It was before the days of MIDI and general-purpose music keyboards, so we built music keyboards to go with our synthesizers. Since I had violin and viola background, I thought it would be useful to have continuous-pitch control over the music – that was the beginning idea for the

Continuum Fingerboard.

What kind of help did you receive along the way? What was the most helpful?

Don Bitzer, the director of the PLATO lab and my advisor, was an incredible help and inspiration. His endless optimism and enthusiasm for invention, as well as his support of the PLATO Music Group, made everything possible. In the last 15 years, I have had the privelege of working with world-class musicians. In particular, my close collaboration with Edmund Eagan (of Twelfthroot Studios in Ottawa, Ontario) has helped make the Continuum into a "serious" instrument in the classical sense of musical instruments, rather than another electronic make-it-easy gadget.

What was the most rewarding moment so far in your career as an inventor? (Seeing the continuum in a movie? Concert? Or was there something not related to the continuum at all?)

Making a refined musical instrument – and perfecting it over many years – to the point that serious musicians are practicing it for hours a day, just as they would an acoustic instrument.

What would you tell students with new ideas for revolutionary products that you wish you knew when you were trying to create your own?

When people talk about invention, they almost always mean "make something new that sells big". There are many things worth inventing that do not fall into the get-rich-quick category. Inventing can be a serious hobby, and does not have to be your source of income.

Do you mind giving us any insight into the future of the continuum?

For many decades, synthesizers have been controlled by Midi keyboards – and the performer only starts and stops notes; all the fine structure of the sound is "canned" inside the synthesizer. Much of my current work is on new sound algorithms where the performer's fingers are interactively controlling details of the evolution of the sound. It is a lifelong challenge to make the synthesizer experience closer to the experience of playing an acoustic instrument.

If you'd like to learn more about music synthesis and the Continuum, I strongly recommend ECE 402, which Professor Haken teaches. A short interview is barely the tip of the iceberg and the iceberg is not only about music synthesis, but a very real view at innovation at work.

C

1. Switch - Case

Most of us write switch cases like this -

```
switch(x)
{
        case 1:
                do something and break;
        case 2:
                do something and break;
        ...
        default:
                do something and break;
}
```

Switch - case statements can also be written like this:

```
switch(x)
{
        case 1:
                if(condition)
                {
                        case 2:
                                do something;
                                        }
                else
                {
                        case 4:
                                do something;
                }
                ...
}
```

or instead of using fall through like:

```
case 1:
case 2:
...
case 45:
        do something and break;
```

just use

```
case 1 ... 45:
        do something and break;
```

Most companies nowadays want you to be proficient in coding, especially in C/C++.

We've compiled a list of a few useful tricks that ought to come in handy.

2. Storage of numbers

```
printf("%.0f\n",pow(2,747));
```

This statement will return

```
740298315191606967520227188330889966610377319868419938630605715764070011466206019559325413145373572325939050053182159998975553533608824916574615132828322000124194610605645134711392062011527273571616649243219599128195212771328
```

The exact value of 2^747.
If we try this with 3^747 or any number so large, there will be an error.
This is due to the IEEE Floating point notations.

Tricks

3. Scanning and printing

Very often we want to skip something in the scanf.
In this case, one can just use the '*'.
For example in - scanf("%*d %d", num);
The user inputs two numbers but the scanf ignores the first number.
It stores the second number in 'num'.

If we want to scan a string or hundred letters or until a \n
char a[100];
scanf("%[^\n]\n", a);
This reads until the '\n' and then drops it.

We can get the same result for any character
scanf("%[^a]", a);
This reads until the letter 'a' is typed but stores the a.

Using the same '*' in printf specifies the width of the print.
printf returns the number of characters printed.
Hence using the combination of the two, printf can be used to add two numbers.

```
add(a,b)
{
        return printf("%*d, %*d",a,b,"\r");
}
```

We can even use printf to determine the length of a string.

The %n modifier when used in the middle of a printf stores the number of characters printed.
printf("IEEE%n Spark" &num);
num will contain 4.

the START UP PROCEDURE

Picture an idea you're passionate about

This is always the first step. Get a rough idea, because in reality you'll alter it atleast a few dozen times.

Find an initial fund

You'll need to get some way to start up your product. Try VCs, KickStarter, and even AngelList.

Outline a Plan

Write down who your customers are, what you need, and what your product will be purchased for

Talk directly to customers

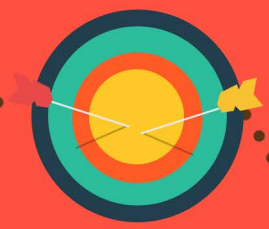
This is to make sure people will actually buy your product, and there's a certain need for it.

Bye Bye distractions

This way you'll only focus on the things that truely matter. It's not worth the struggle to fight your urges.

Aim to appeal only to your target crowd

The truth is you're not going to please everyone. That's perfectly fine. Don't waste your time trying to.



Spend time with other like minded people

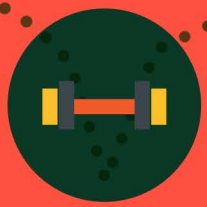
This will not only open doors of oppurtunity, but also provide great examples for you. Look into competitions, incubators, and events for other people with a vision.

It's alright to Fail

You'll have lots of ideas that will fail, everyone does. Find the gem in the heaps of coal. It's okay to adapt your ideas to adjusting markets based on your research.

Study successful people

There are amazing books out there from people that made it. If you're determined, why not use the readily available knowledge out there. See works of Stephen Covey, Richard Branson, and Peter Thiel.

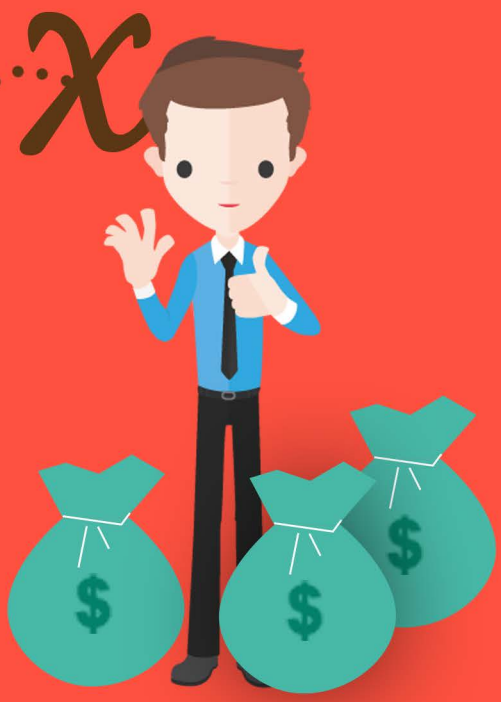


Revenue > Cost

This will enable you to survive in the long run. Cut costs if you're stuggling with revenue, but don't go under

Self-Improvement

The majority of the things you do during the day should add to you as a person. Decide whether you're determined enough to be successful. See you at the finish line.




amplifier
by brady salz

I started off the Amplifiers project a little over a year ago at this point. In the fall of 2013, the department was beginning to gather proposals for the artwork that would go into the new ECE building.

While they undoubtedly received many applications, a few winners were chosen. One such winner was Nicole Beck, an artist based in Chicago. She had a unique idea of representing semiconductor structures, specifically the pioneering work done by Prof Holonyak with the LED. To accomplish this vision, she needed the help of a programmer who was comfortable working with LED strips.

The department suggested that she for help within the student body, and offered to recommend a name or two. I had the good fortune of being recommended by Prof Makela, and there our relationship began.

Over the course of the winter, Nicole explained to me her grandiose vision for the sculptures. We got into the specifics of how the LEDs were going to be chosen based on a combination of what they would represent and what would be feasible for her design. I gave some small input on the overall design of the sculptures, but I was mostly around just for the programming and electronic design.

We bounced plenty of ideas off each other, such as adding sensor input or other kinds of active feedback. As we moved into the spring, we locked in with a design using Phillips Lighting components, with a professional DMX controller at the head of it.

Moving into the summer, we began choosing final dates to get the installation set up. To be completely honest, I was a bit apprehensive at this point. Everything I've learned in engineering suggested that you prototype, then prototype, then prototype, then prototype, and then build, but this was more of a one-shot operation. Not exactly what I was used to, but that's just how it rolls sometimes! In order to facilitate the installation going smoothly, we enlisted the help of a freelancer from Chicago – Troy Fujimura. In the first week of October, we got down to business.

Nicole had the sculptures delivered from the metalworking company, and with the help of some local electricians they began to get everything wired up.

Troy and I went down to the basement, where I got a quick how-to on the DMX Controller, as well as the electrical layout. As a humorous aside, always check your voltage output from mains! We plugged our simple 12V wall wart in, expecting to get 120VAC, and we were greeted with a most unpleasant sound and smell – our transformer exploding.

Turns out we plugged into one of the 240VAC plugs down there, which blew our converter wide open. We did not exactly have time to go out and grab a new supply, seeing as how the sculpture needed to be presented tomorrow. As an Illinois engineering student, I knew failure was not an option. I ran up to the Texas Instruments 110 Lab, and stole one of the bench precision power supplies (TA's, if you're reading this, thanks for not asking questions), as well as a good length of wire from the service shop.

I neglected to mention that the actual controller was around 20 feet up, mounted on the wall. After checking that the outlet was the correct voltage, I plugged the supply and ran the wires up, manually soldering a connection in.

To our great relief, it worked!

For the next few hours, we all got to calm down and just do what I love most - play with the LEDs! We swept across all kinds of hues and patterns, trying to see what output would look best. The dichroic glass that separates

"As an Illinois engineering student, I knew failure was not an option."

the LEDs from the outside has some fascinating properties with the color spectrum, which explains why the colors change so often, and never seem the same twice. After a couple hours, we picked a few of the best patterns and locked them in. The next day, we presented them at the ECE Building Dedication Ceremony, which was an absolute honor on my end. Following that, we ran out and bought a new power supply, as the lab seemed to want theirs back.

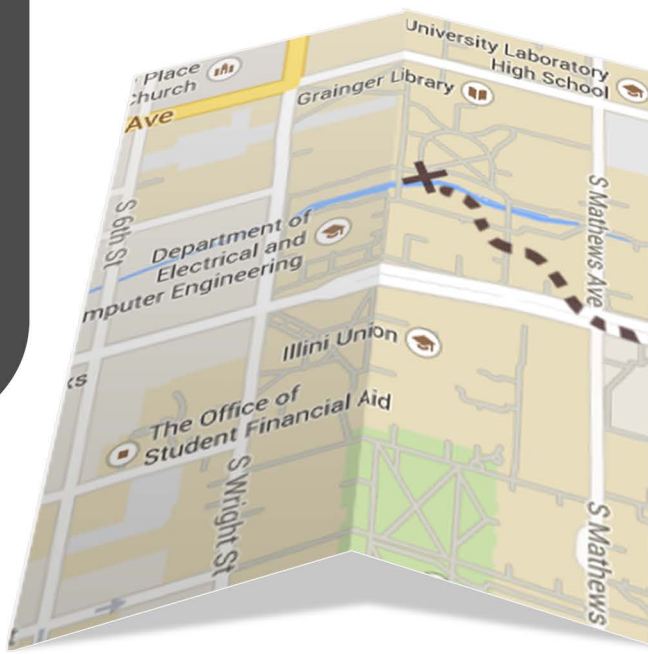
The sculptures can be considered "finished" now, to the extent that any random process is ever complete. Nicole Beck still comes down from time to time in order to request new patterns, or to investigate how it light changes with different weather patterns.

For myself, being able to say I contributed to a piece of this campus, one which will remain long after I've left, is the greatest gift I could ask for. Walking by the sculptures every day, I never see something repeated, an experience which is perfectly reflective of my time in the building.

I can only hope other students are just as inspired by these strange, dancing lights as I was, and wish them the best in their time here.


eceb
photography by Hongsen Yang

50 THINGS on CAMPUS



THE FRESHMAN MANUAL

Ring the Altgeld bells

Dress up Alma

Be on an E-Week Team

Pull an allnighter in a lab

Fall asleep in the Union

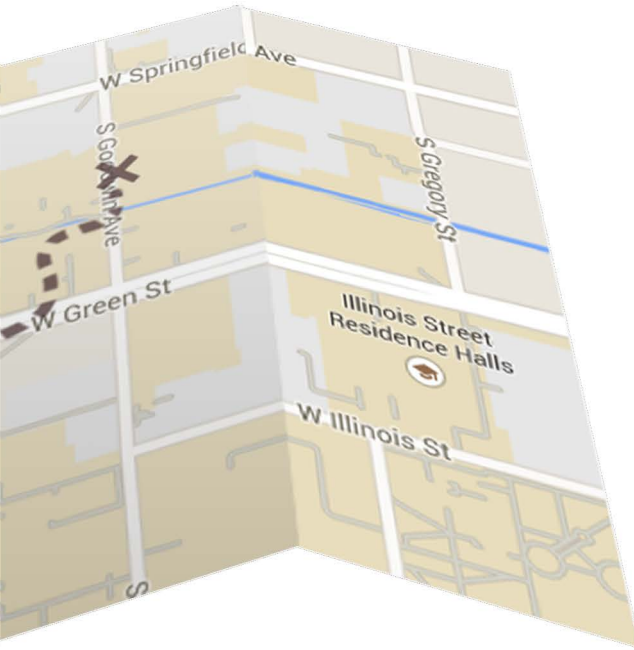
Kiss underneath the Eternal Flame

Eat everything on Green St.

Explore a campus building at night

Go to the Homecoming football game

The Illini Union. Fall Asleep here.



Celebrate Unofficial

Go down the slide at the CRCE pool

Have a BBQ at the Illini Union

Have a bonfire to burn your notes at the end of the semester*

Play basketball at the ARC

Watch an Illini Basketball/Football game

Build a snowman on the Quad

Tailgate / Block

Go bowling at the Union

Play frisbee on the Quad

Go to Red Lion on Friday

Watch a game at Firehaus

Volunteer at iHelp

Rush a fraternity/sorority

Go to a barn dance

Sign up for I-Link

Go to a few tech talks, but not too many

Where your notes should go.

* Please do not have a bonfire

Eat a lot of free pizza

Make friends in class to help you with homework.

Do your homework in office hours

Go Ice skating during Free Skate

Rock Climbing at the ARC

Swim at the outdoor pool

Play Sand Volleyball

Play tennis at Illini Grove

Get to know your TAs

Have picnic at the Arboretum and Japenese Gardens

Don’t go to parties right before or during midterms

Listen to a Dean's distinguished lecture at least once

Don't buy books early as possible. Search AbeBooks.

Make a list of weekly homework deadlines, work in order

Start getting involved to build a college resume, everything from high school doesn’t count after freshman year

Start saving money for next year now

Join an intramural sports team

Do hipster shopping at the RagStock

Search for the ghost in the English Building

Step outside of your comfort zone

Form a startup company with classmates

Enjoy a play, musical, or concert at Krannert

Go to the Holiday Market at the Lincoln Plaza

Start gaze on the Quad

Join a Relay for Life Team and support those with cancer

Run the Christie Clinic Marathon

Get lost in the Armory or Main Library before an exam

Go to Semi-formal or Formal

Eat at the historic Zorbas

Concert at the Canopy

Country night at Kam's

Ride the Rail at Legends

Go to Black Dog

Concerts you can experience at the Canopy

LYTMUS.io

high fidelity hiring

ONE ON ONE CHAT WITH THE CEO

To begin with, can you tell us something about Lytmus.io?

Lytmus was founded to allow talented people to showcase their skills in a realistic environment.

How did you come up with the idea of a fast recruiting system? Was there any inspiration?

The labor market for software is very inefficient —- good people don't get hired and companies face artificial scarcity. Fast recruiting combined with a good signal on how skilled a person is, creates a powerful platform to make the market more efficient.

Since we're focusing all on start-ups this time, can you give us a picture of how you'll went about from idea, to execution?

The founders spent quite a lot of time talking to companies about their interview process, and tried to make sure that there was strong demand for a realistic assessment environment. Then they raised some money and were off the races!

What are your plans for the future with Lytmus.io? Where do you want it to be heading?

We want to change the way jobs are sourced and filtered so that anyone who has a skill, regardless of what school they come from can get a great job.

The companies that you'll are currently recruiting for, how did you'll come across them? What about future companies when you have fresh companies every week?

Given the acuteness of the recruiting problem it was relatively easy to find companies. After our beta period we will be featuring new companies every week.

How did you think of the name Lytmus.io?

We figure out what someone knows…kind of like the way Litmus paper tests for ph.

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