# DISTRO

062912 #47

DOUBLE ISSUE

USHERING IN A NEW BREED OF POWER PLANTS

THE COST OF CONNECTING IN AMERICAN SAMOA

PLUS:
DIY IN ALASKA

# MADE IN THE U.S.A.★

★ WHILE THIS MAGAZINE WAS CREATED IN THE UNITED STATES, THE PRODUCTS AND TECHNOLOGIES CONTAINED HEREIN MAY VARY IN ORIGIN.

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# high-definition

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XPERIA ion

made of imagination

# ISSUE 47

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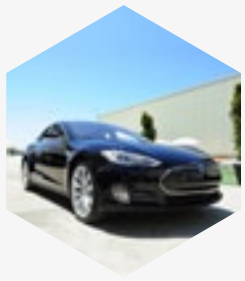
## ENTER









## MADE IN THE U.S.A.



## ESC









*Side Note:* We will not be publishing next week because of the 4th of July holiday.

ON THE COVER:
F22 RAPTOR: LOCKHEED MARTIN/ GETTYIMAGES; CHEESEBURGER, HOTDOG, ARMS: SHUTTERSTOCK

# SKYDIVING WITH SERGEY

DISTRO
06.29.12

EDITOR'S LETTER

**It's been a long month** of posturing and prepping, companies holding event after event and changing up schedules to try and steal the thunder from their competition. When Google got wind that Apple would launch a new mapping application, it threw together a hasty event to show off much of the very same technology built into its own mobile mapping solution. Later, when the tech world was still buzzing about the new MacBook Pro with Retina display, Microsoft whipped the media into a frothy frenzy with its Surface line of tablets.

Now, closing out what has been a truly ridiculous month in the world of consumer electronics, Google's outdone them all with the most outrageous product introduction in the history of consumer electronics. Of course, the products themselves are pretty outrageous, so we don't mind a bit. At the first keynote of the 2012 Google I/O developer conference, Sergey Brin hosted a Google+ hangout with a bunch of dudes wearing Project Glass prototypes. They were live-streaming video from a blimp, which they promptly jumped out of. We got a live, first-person view of it all as they glided their way down to the roof of the Moscone Center.

There were a few other stunts involved to deliver a package to Sergey up on stage, including bicycling tricks

"Google's out-done them all with the most outrageous product introduction in the history of consumer electronics."

and rappelling down the side of the conference hall, all of which served to amp up the crowd to see a product that was, somewhat tragically, up on stage the whole time. Sergey was already wearing a Project Glass device and it seemed a bit silly to go through all that just to deliver another pair. (Admittedly this pair was a different color, a cool shade of blue.)

But, as with so many things in life, this demonstration wasn't so much about the payoff as it was about getting there, with live video streaming every step of the way directly from these amazing glasses that maybe, just maybe, could someday change our lives the way smartphones already have. Indeed, Google's finally ready to let people try them out, or at least ready to take people's money. Google I/O attendees who are willing to fork over $1,500 can get in line to purchase pairs of the glasses to be delivered sometime in 2013. Yes, I put my name down.

But more important to the masses was the announcement of the Nexus 7, a 7-inch tablet from ASUS running a clean build of the latest version of Android. It's 4.1 Jelly Bean and it offers a few key improvements, like the so-called Project Butter, an effort to streamline and smoothen the OS as a whole, theoretically making it a much more fluid experience.

There's also the new Google Now, a series of smart cards and intelligent prompts that promise to make Android a much more proper virtual assistant, telling you when you need to leave your office to get to that meeting on the other side of town and even warning you when there's bad traffic on your commute home — even if you never programmed in your commute in the first place. This is augmented by offline voice recognition, which finally lets you talk to your phone in a land far, far away from the nearest cell tower.

The most important part of this tablet is that it's just $200 — unless you want 16GB of storage, in which case it's $250. Either price is stunningly cheap for what is a properly good little tablet and well and truly a Kindle Fire killer. There's no reason to buy Amazon's offering right now, nor Barnes & Noble's for that matter, but it likely won't be long before the competition there gets ramped up a bit.

# EDITOR'S LETTER

Google also unveiled the Nexus Q, an Android@Home media-streaming device that we're struggling to find a reason for existing. It's shaped like a ball and basically lets you play media from the Google Play store — and nothing else. It's a cool little thing, looking decidedly ominous and futuristic, but it's also a stupidly expensive little thing. It's $300 for a ball that does less than a $100 Apple TV. It's made in the US of A, which is very nice to see indeed, but this is still an odd proposition that we can't imagine anyone on a budget buying.

There were plenty of other little surprises and bits of fun from I/O this week, and it's the "fun" part that really sets I/O apart from the rest. Sure, we get excited at all the big product unveilings — we are, after all, passionate gadget lovers who can't wait to see the next and very best — but Google manages to make it all feel very light and fun. We hope that continues.

This week's Distro is a special double issue (we won't be publishing next week) focused on products like the Nexus Q — no, not illogical and overpriced ones, but things made right here in the US of A. Darren Murph files a pair of stories about tech in America, while I chronicle my trip up to Alaska, following a team of scientists hoping to inspire the next generation of great American engineers. We also have our early impressions of the new Google hardware, eyes-on with Tesla's finally released Model S, another great editorial from Joystiq's Ludwig Kietzmann and a Q&A from former Gang of Four bassist Dave Allen. Now, regardless of where you are, enjoy this slice of high-tech Americana. D

> "It's $300 for a ball that does less than a $100 Apple TV."

*Correction: In Issue 46, we incorrectly stated that the battery life result for the Motorola RAZR Maxx was 4:30. It was actually 16:30.*

TIM STEVENS
EDITOR-IN-CHIEF,
ENGADGET

# ENTER

DISTRO
06.29.12

EYES-ON

## TESLA MODEL S

*Tap for detail*

ROOF WITH A VIEW

AT YOUR FINGERTIPS

THE LITTLE THINGS

**THE DESIGN**
According to its lead designer, Franz von Holzhausen, Tesla's homegrown EV is meant to "embody the grace and performance of a world-class athlete."

**THE BILL**
Starting at $49,900

PHOTOS BY WILL LIPMAN

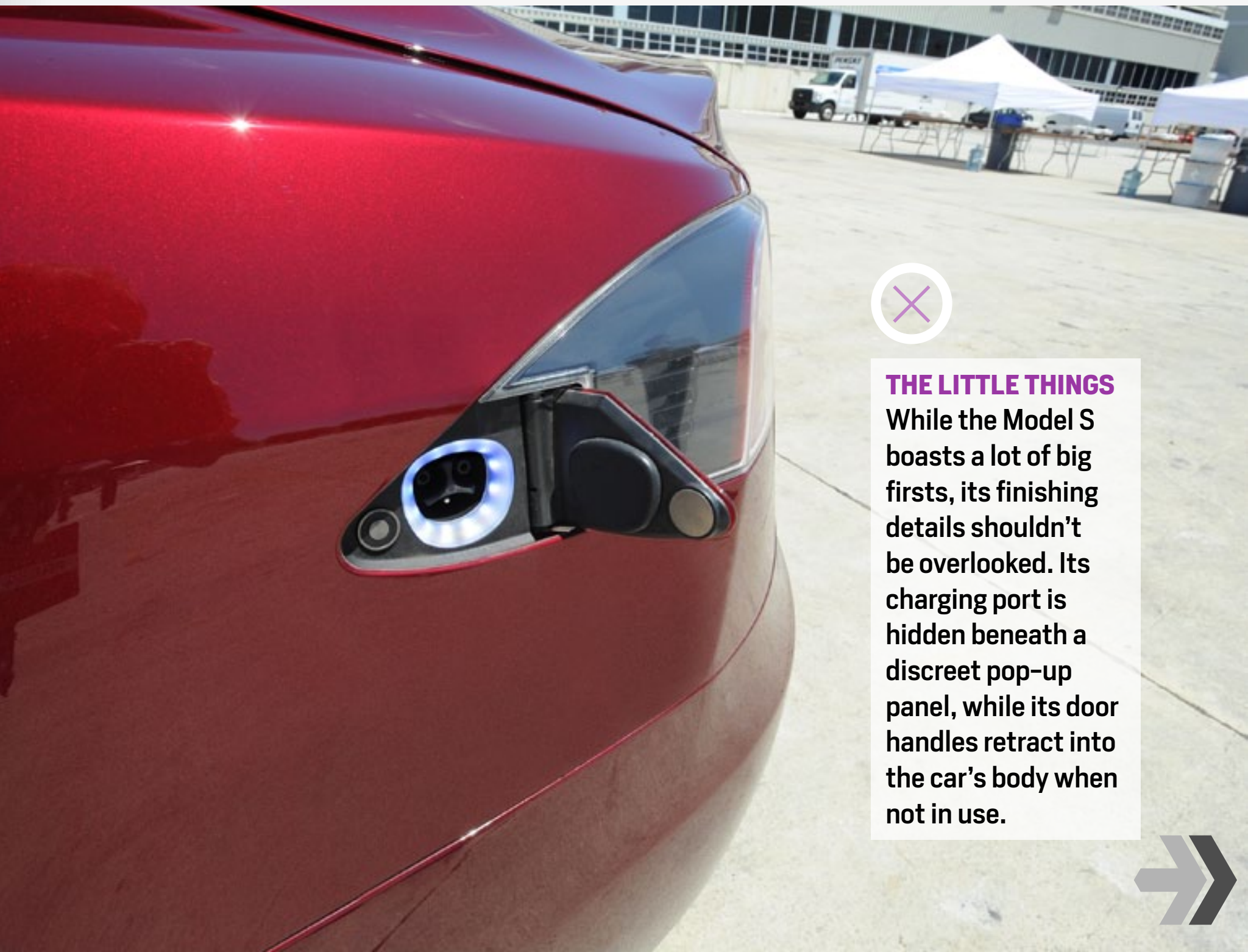
**ROOF WITH A VIEW**
According to Tesla, the optional, all-glass panoramic sunroof opens wider than any other with just a swipe of the touchscreen.


**AT YOUR FINGERTIPS**

This 17-inch touchscreen is the heart of the Model S interior. It controls everything from music to maps and offers in-car access to the web. The display is powered by the outfit's in-house OS and a Tegra 3 SoC.

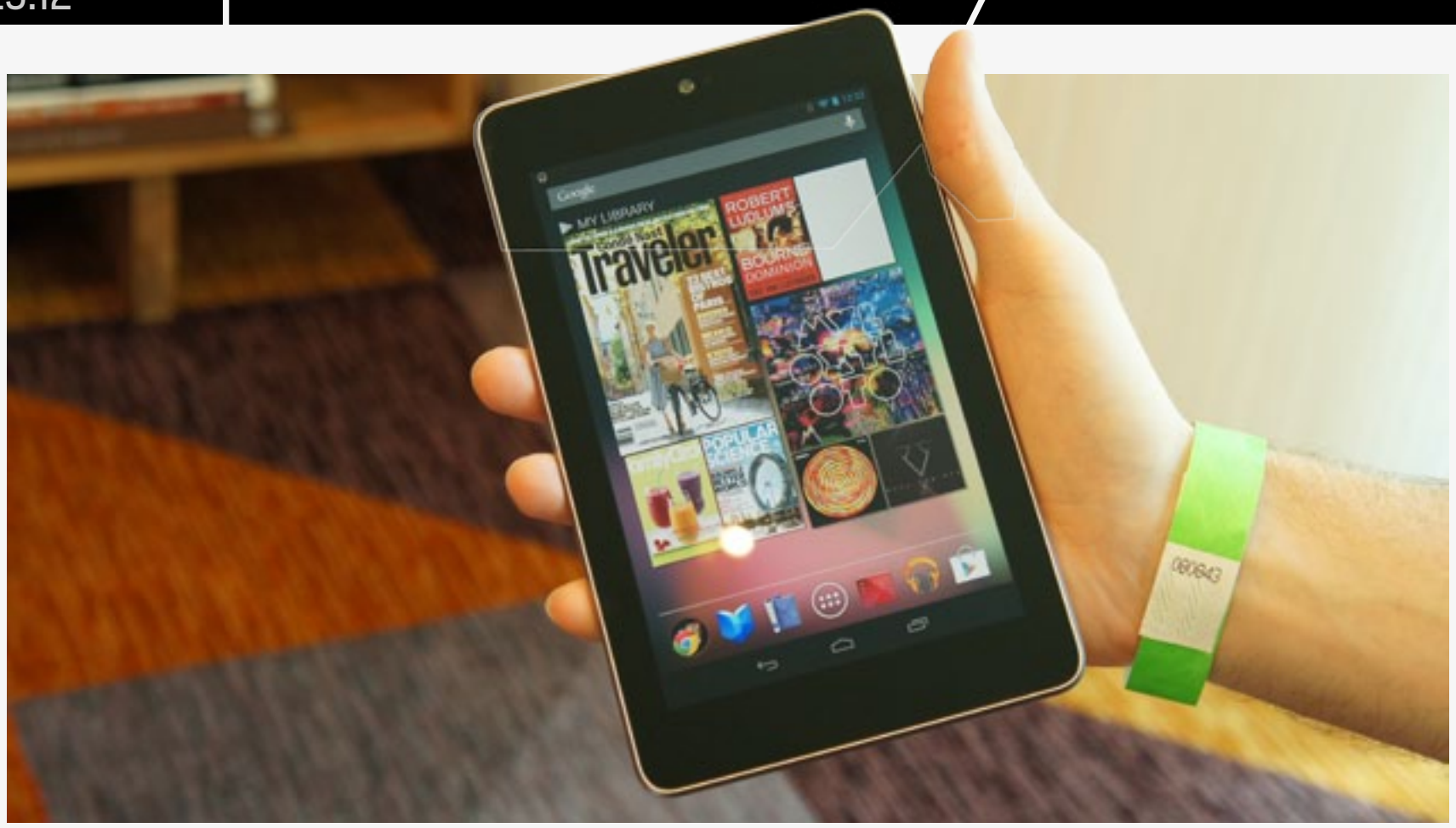

IN USE


IN MOTION



### THE LITTLE THINGS

While the Model S boasts a lot of big firsts, its finishing details shouldn't be overlooked. Its charging port is hidden beneath a discreet pop-up panel, while its door handles retract into the car's body when not in use.




# NEXUS 7 TABLET

Click on product name to read the full review

**Meet the Google Nexus 7,** an ASUS-designed device with minimal branding and a clean version of Android 4.1. The pricing is the real show here, especially compared to the Kindle Fire's price tag with dated software. The tablet feels good in the hand, though it's a bit on the chunky side — just fractionally thinner than the Fire but noticeably lighter than Amazon's tablet. That IPS panel looks great from all angles, showing good brightness and solid contrast even in a brightly lit room. Performance is aiming high, not besting the latest of superphones like the Galaxy S III or the HTC One X when doing things like launching apps or websites, but still very quick and responsive with most tasks — more so than the Fire in most cases.

**PRICING:**
$199 (8GB) & $249 (16GB)

**AVAILABILITY:**
JULY 2012

**THE BREAKDOWN:**
THIS ISN'T A TOP-TIER TABLET, BUT AT FIRST GLANCE, WE'RE IMPRESSED CONSIDERING THE PRICE.

# NEXUS Q SOCIAL STREAMING DEVICE


**The idea is that your friends** and family can use their Android devices to build up a playlist of music or videos. You can connect to multiple Qs simultaneously, sending separate media to each of them, so this could enable easy, whole-home streaming. Each Q will have to have its own internet connection, since the content isn't actually pushed from your device, it's pulled from the cloud. Yes, it'll have to download them all again, which could be a problem if you're on a bad connection. On the backside, you'll find HDMI and Toslink outputs on the spherical surface. The top is split and can be used like a volume knob, with the space separating the two halves punctuated with LEDs that glow during playback. Only slightly distracting.

Click on product names to read full stories

**PRICING:**
$299

**AVAILABILITY:**
JULY 2012

**THE BREAKDOWN:**
AT $299, IT'S A TOUGH SELL AGAINST THE $99 APPLE TV, BUT THIS STREAMER HAS ITS ROOTS IN THE USA.

# Kickstarter by the Numbers

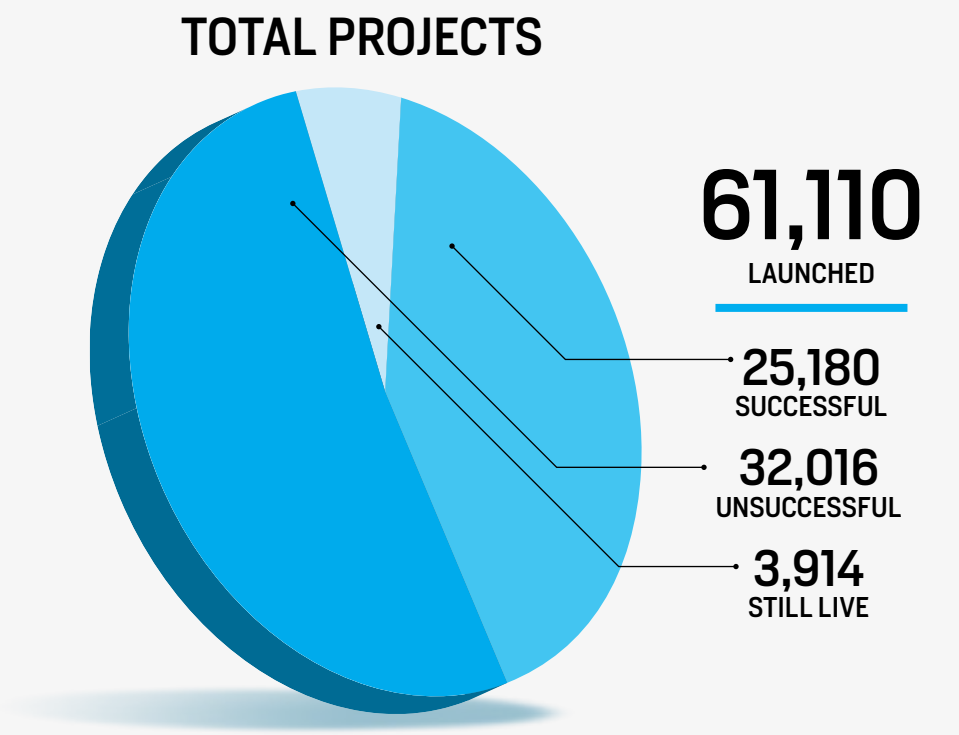
**Every time we boot up a** browser there appears to be a new iPad mount or Arduino creation on Kickstarter, but just how many projects have there been to date? How many were successful? And how much might that microfunding startup be netting in commission cash? You can find all those answers through a new Kickstarter stats page (and some number crunching on a calculator), updated daily with key raw data that's tallied, and broken up by category as well.

As of June 25th, 61,110 projects have launched, of which 25,180 (44.02 percent) were successfully funded, 32,016 failed and 3,914 were currently active on the site. Of the $264 million that's come in, $221 million has been in the form of "successful dollars," representing $11.05 million in income for the company itself, based on a five-percent commission rate — roughly the same amount raised for Pebble, a single project. Speaking of million-dollar-plus projects, there have been a total of seven, including one in the Music category, three in Games, two in Design and one in Comics (Pebble falls within the Design category, not Technology).

*—By Zach Honig*

*All numbers as of June 25th at 10 AM ET. Success rate percentages were figured by dividing successful projects by the number of projects that have already reached their deadline.*

SOURCE: KICKSTARTER



## MUSIC

54.18% ★
Success Rate

**14,568**
LAUNCHED

7,432 SUCCESSFUL
6,285 UNSUCCESSFUL
851 STILL LIVE
$39.76M SUCCESSFUL

## PUBLISHING

31.76%
Success Rate

**6,462**
LAUNCHED

1,859 SUCCESSFUL
3,994 UNSUCCESSFUL
609 STILL LIVE
$10.42M SUCCESSFUL

## ART

48.24%
Success Rate

**5,597**
LAUNCHED

2,548 SUCCESSFUL
2,734 UNSUCCESSFUL
315 STILL LIVE
$10.96M SUCCESSFUL

## THEATER

63.92%
Success Rate

**3,163**
LAUNCHED

1,908 SUCCESSFUL
1,077 UNSUCCESSFUL
178 STILL LIVE
$8.01M SUCCESSFUL

## GAMES

33.86% ★★★
Success Rate

**2,313**
LAUNCHED

708 SUCCESSFUL
1,383 UNSUCCESSFUL
222 STILL LIVE
$27.04M SUCCESSFUL

## DESIGN

35.21% ★★
Success Rate

**2,072**
LAUNCHED

674 SUCCESSFUL
1,240 UNSUCCESSFUL
158 STILL LIVE
$33.09M SUCCESSFUL

★ = Project with $1M plus raised

## PHOTOGRAPHY

38.28%
Success Rate

**2,058**
LAUNCHED

751
SUCCESSFUL

1,211
UNSUCCESSFUL

96
STILL LIVE

$3.74M
SUCCESSFUL

## FOOD

40.83%
Success Rate

**1,864**
LAUNCHED

697
SUCCESSFUL

1,010
UNSUCCESSFUL

157
STILL LIVE

$6.43M
SUCCESSFUL

## FASHION

27.12%
Success Rate

**1,582**
LAUNCHED

390
SUCCESSFUL

1,048
UNSUCCESSFUL

144
STILL LIVE

$2.68M
SUCCESSFUL

## COMICS

45.37% ★
Success Rate

**1,444**
LAUNCHED

602
SUCCESSFUL

725
UNSUCCESSFUL

117
STILL LIVE

$5.69M
SUCCESSFUL

## TECHNOLOGY

28.71%
Success Rate

**1,216**
LAUNCHED

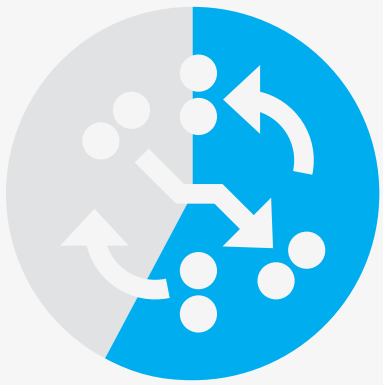
331
SUCCESSFUL

822
UNSUCCESSFUL

63
STILL LIVE

$11.71M
SUCCESSFUL

## DANCE



69.14%
Success Rate

**890**
LAUNCHED

578
SUCCESSFUL

258
UNSUCCESSFUL

54
STILL LIVE

$2M
SUCCESSFUL

★ = Number of projects with $1M plus raised

# DISSONANCE IN DUBAI

DISTRO 06.29.12 | ENTER | REACTION TIME

BY LUDWIG KIETZMANN

***Spec Ops:*** *The Line* is explicit about its intentions and inspirations, sometimes to a fault. It's truly a gritty shooter, and not because you're steering a bipedal meat chunk with a scraggly soul patch. The conflict feels isolated and inescapable, with a sand-drowned Dubai hemming in soldiers who only hope to survive and follow orders as best they can. You have permission to take this game seriously.

That's why it's disappointing, and often baffling, when *Spec Ops* underlines its themes with an orange crayon. The discovery of a strung-up, mutilated corpse is meant to shock, but the scene feels deflated alongside an achievement notification that essentially says, "War is terrible. Have 10 points!"

That's the moment in which *The Line's* internal tug-of-war becomes plain as day: the grounded, provocative story that exceeds expectations, versus the emblematic action game. *Spec Ops* needs a mechanical hook to match

*Spec Ops: The Line* loses points for a labored message.

its well-realized desert battleground, something that hasn't been eroded by years of games that play just like it.

The beautiful, buried city of Dubai is a paradise of waist-high detritus and abandoned automobiles, all perfectly placed to guide you through waves of faceless enemies. "How many Americans have you killed today?" the game asks (in a loading screen). "Do you feel like a hero yet?" *Spec Ops: The Line* stirs you with dark questions and asks about your role in the forced conflict that sustains games like it, but never prods you in the way that's most important to the medium. It's still a smooth sequence of shootouts, ammo roundups and flashy set pieces, albeit one that delivers a message.

There's no sense in executing *Spec Ops* for being a competent, stylish shooter, but the perceptible complacency in game design feels utterly jarring against the chin-stroking prompted by the premise. As with *BioShock*, there's some satirical dissonance between the narrative and the structure of the game itself, but seeing what they did there isn't enough to anchor the whole thing. When one character suggests that the killing would stop if only you weren't so intent on completing your mission (and the game), it feels like a veiled request to put the controller down. It does tempt for a moment, because there isn't one playable bit in this shooter that hasn't been done elsewhere, and better.

As Captain Martin Walker and his three-man squad, you're trying to cut

## 6 NEW GAME RELEASES FOR THE WEEK OF JUNE 29TH

Click on games to buy

**SPEC OPS: THE LINE**
Xbox 360 / PC / PS3 – $60

**THE AMAZING SPIDER-MAN**
Xbox 360 / PS3 – $60


**PENNY ARCADE'S ON THE RAIN-SLICK PRECIPICE OF DARKNESS 3**
PC / Xbox 360 – $5

**BATTLEFIELD 3: CLOSE QUARTERS**
Xbox 360 / PC / PS3 – $15

a righteous path through depraved circumstances. As the player, you're shepherding two extra guns that frequently become stuck on walls and crouch on the wrong side of cover, while Nolan North yells about headshotting hostiles. Cue the on-rails sequence, curse the distant checkpoint, take down that helicopter and get to the RPG. Oh, and hey, provocative question: How many exploding barrels have you killed today?

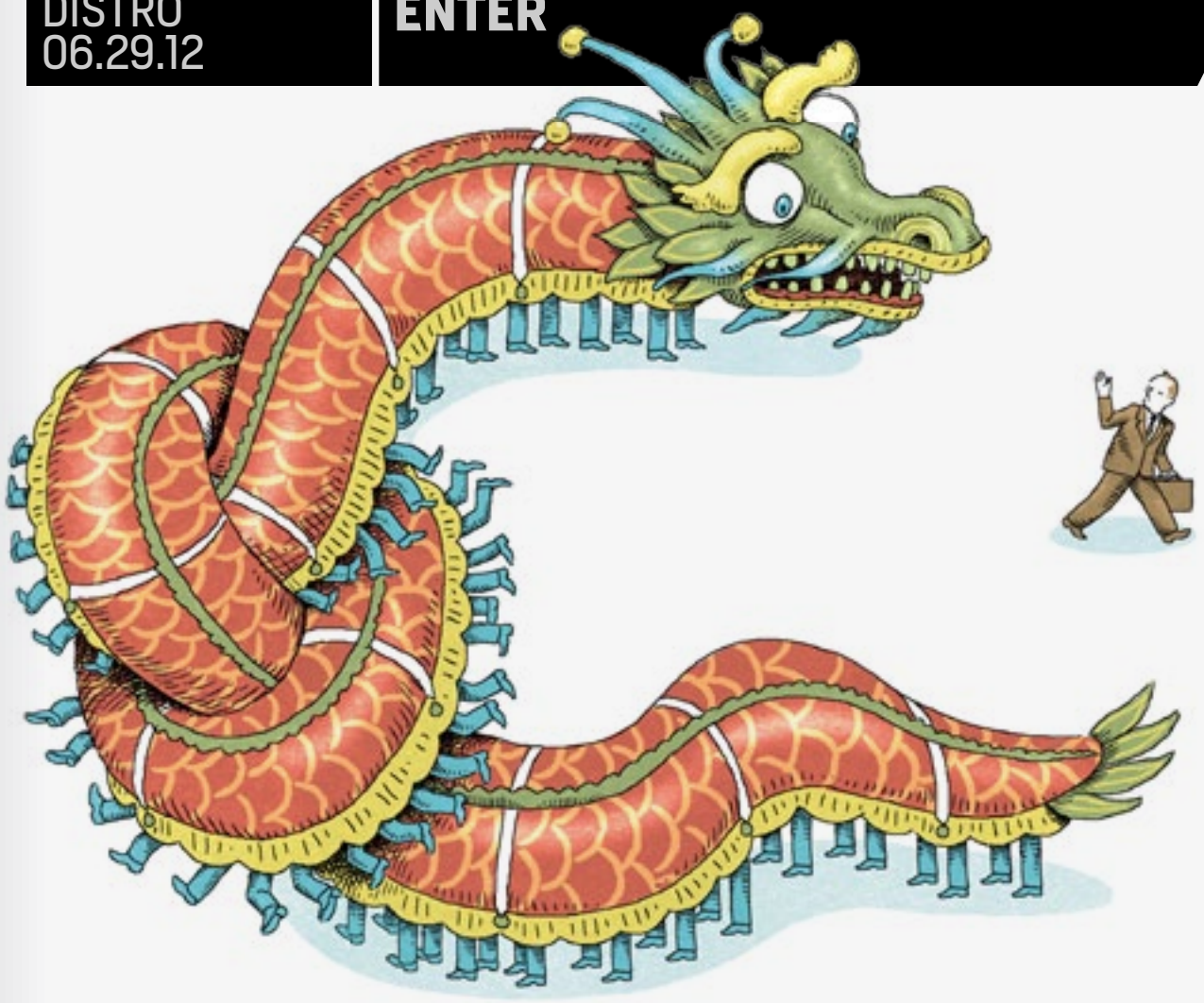
The murky moral choices faced by Walker can't help but stand out in this sea of sameness. They develop organically, devoid of a binary good / evil system, and mark the few moments where your actions and the story truly intersect. The game's best, bravest sequence marches you through a disaster of your own design — followed by a (dun-dun-duuuun!) cutscene which simply must illustrate THE CONSEQUENCES for you. It's another boneheaded example of *Spec Ops: The Line* taking a disquieting idea, circling it and putting it under a magnet on your fridge.

*Spec Ops: The Line* is the kind of game we think we want. It aims to be thoughtful and mature as it ponders our recurring role as the trigger-happy mass murderer. And yet it casts us in that same spot again, making a boring job out of it and highlighting why even "stupid" games can better engage, entertain and challenge. Heavy subject matter makes *Spec Ops* lopsided in a different way, and that's not really a win for games. D

**SKYRIM: DAWNGUARD**
Xbox 360 - $20

**MASS EFFECT 3: EXTENDED CUT**
Xbox 360 / PC / PS3 - Free

Screenshots of a war-torn Dubai from *Spec Ops: The Line.*



# Small U.S. Manufacturers Give Up on 'Made in China'

by David Rocks and Nick Leiber
*Bloomberg Businessweek*

**We've devoted** a lot of space to manufacturing in the United States this issue, but we're hardly the only ones who have tackled the subject as of late. Just last week, *Bloomberg Businessweek's* David Rocks and Nick Leiber looked at how small manufacturers in particular have bucked the trend of offloading manufacturing to China, and reaped some benefits as a result. One example cited is LightSaver Technologies, which found that the trade-offs of working with China (including 3 AM phone calls) just weren't worth the savings in manufacturing — savings that aren't what they used to be. Another, guitar pedal maker Pigtronix, found that it was able to produce smaller quantities of products more easily in the US, reducing the risk of it winding up with unwanted inventory.

ILLUSTRATION BY WESLEY BEDROSIAN

## RECOMMENDED READING

Click on headlines to read full stories

**Can We Build Tomorrow's Breakthroughs?**
by David Rotman
*Technology Review*
We've featured this one before, but it remains as relevant as ever, offering a look at how manufacturing and innovation are inextricably linked, and what it means for the US if the capabilities of the former can't meet the demands of the latter. That includes new areas like next-generation batteries and solar panels, which are at risk of going the way of LCD manufacturing.

**Made in America: Small Businesses Buck the Offshoring Trend**
by Brendan I. Koerner, *Wired*
Like the *BusinessWeek* piece, this look at the state of US manufacturing from *Wired* early last year found that smaller businesses are resisting the move to China more than larger ones. One such example is headphone manufacturer Sleek Audio, which found it was able to offset US-based manufacturing premiums by relying on automation as much as possible.

**Is There a Future for 'Made in America'?**
by Bruce Stokes, *The Atlantic*
This feature from 2010 that first appeared in the *National Journal* looks not just at technology manufacturing, but the broader US manufacturing industry, and finds both some cause for concern and cause for hope — the latter of which includes applying new technologies to decidedly old industries, like steel.

**Building Teslas at the GM Plant that Refused to Die**
by Micheline Maynard, *Forbes*
It may not be built from 100-percent American-made parts, but Tesla's new Model S is assembled in the US, and done so at a plant that has quite a history: GM's former NUMMI plant in Fremont, California. This *Forbes* piece offers a brief look back, and there's a full *This American Life* episode on the plant linked within for those curious to learn more.

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# connection

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XPERIA ion

made of imagination

# MADE IN THE USA

# Made in America

## Could Your Next Phone Be Homegrown?

By Darren Murph


**"Made in America."** For some reason, my parents — and the parents of many of my peers — take great pride in seeing that phrase. I've seen people buy inferior products just because the label on the back proclaimed that it was thrown together in one of our 50 great states instead of across some imaginary line in "another country." Part of me wonders if people actually check to see if said claims are legitimate. As a business graduate, I fully understand the importance of producing goods within one's borders. There's a delicate balance that needs to be struck between imports and exports, and a huge part of a nation's economic growth hinges on how well that balance is executed. I suspect the generation before mine remembers a very different America than the one I've grown up in — one where smokestacks outnumbered high-rise buildings, and

one where jobs requiring steel-toe shoes were more lauded than those requiring a fancy degree and "knowing the right guy." Manufacturing was the backbone of America through some really, *really* trying times, and there's some sense of national pride that comes along with images of swinging hammers and climbing ladders. "We built this country," as they say.

For the past score or so, the issue of manufacturing in America has been a prevalent one. Millions upon millions of manufacturing jobs in our country have been lost in the realms of textiles and furniture. But recently, the political scope that typically dodges the world of consumer electronics has found its sights set squarely on a field that we as gadget journalists cover. Some might say that Apple's recent dealings with Foxconn helped to bring the issue to light, but honestly, those jobs were being shipped elsewhere long before the iPod came to fruition. Based on statistics gathered by the US Department of Labor's Bureau of Labor Statistics, employment in the country's wide-ranging manufacturing sector fell below 12 million in 2009. It was the first instance that the figure had dipped below 12 million since 1946, and it capped off a 24-month slide of manufacturing jobs that began at the tail end of 2007. Think about it this way: from December 2007 to December 2009, the US economy lost around 89,000 manufacturing jobs *every month*. If you didn't understand why folks were concerned, perhaps you do now.

Back in 1979, manufacturing kept nearly 20 million Americans employed.

Today, according to the National Association of Manufacturers, that figure is closer to 12 million.

In February 2011, the manufacturing conversation truly hit home for me in terms of my work coverage. As he'd done in prior years, Barack Obama attended a dinner in which a number of Silicon Valley's wealthiest gathered around for grub and confabulation. Each luminary was tasked with asking the president a single question. As fate would have it, Obama actually interrupted the late Steve Jobs in order to pose an inquiry of his own: "What would it take to make the iPhone here in America? Why can't that work come home?" According to a fellow guest quoted by *The New York Times*, Jobs was crisp and direct in his response: "Those jobs aren't coming back."

Baizhu Chen, a professor of clinical finance and business economics at USC's Marshall School of Business, further substantiates the dire claim. In a February 2012 piece for *Forbes*, Chen offered this:

"America does not produce iPhones here because we, the average middle-class American family, demand that Apple outsource its production to China. The 10 largest shareholders of Apple are all either mutual funds or institutions. The largest shareholder is Fidelity, and the second Vanguard. If Apple is not able to generate good returns for the average American, we will punish these mutual funds by moving our retirement money to somewhere else. So who decides to locate the manufacturing bases of Apple, Dell, and Nike to China or other countries? Average Americans, who seek high returns on their investments."

That's tough to argue with. He also points out that while manufacturing has sunk in America, it's not like our nation has become a textbook example of lost hope. In 1900, 60 percent of Americans lived in areas classified as "rural." Today, that figure has reduced to 16 percent. Cultural expectations have changed. Demand has changed. Nations like Cambodia, Thailand, India, Sri Lanka, China and Bangladesh (just to name a few) have risen up and provided real supply to meet real demand for lower-cost manufacturing. Chen continues: "The average manufacturing wage in 2010 is about $2 in China and $34.75 in America. By locating the same iPhone factory in America, Apple would add more than $25 billion in labor costs a year, which would completely wipe out Apple's 2010 profit of $14 billion. Had we made the iPhone here in America, we would have deprived Apple of the resources to employ highly paid

The company has around $100 billion in cash. Can't it *afford* to suck it up and employ Americans to build iPhones?

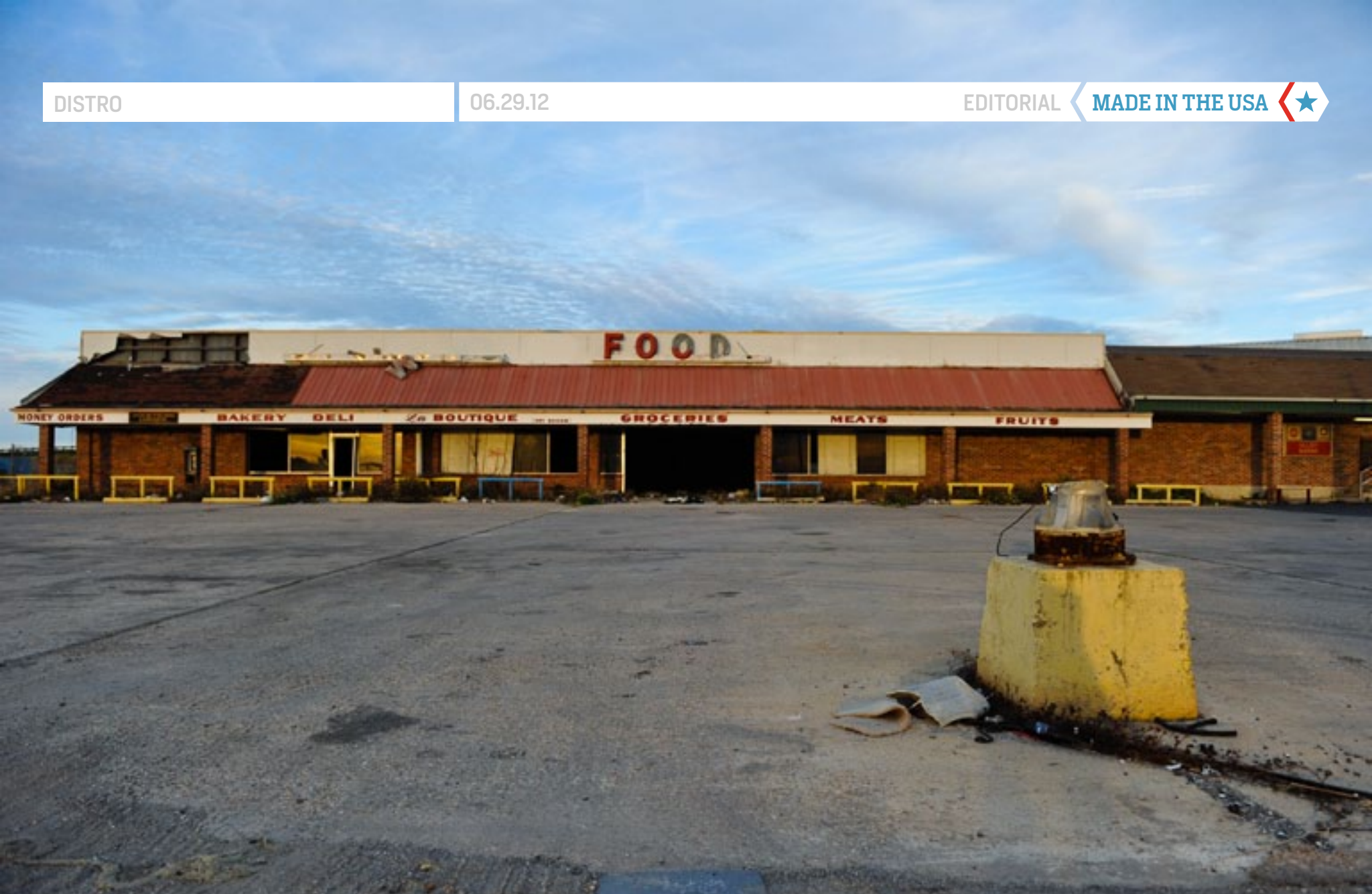
engineers to design, professionals to market, and young associates of Apple Stores to sell the cool products. Apple might have been bankrupted a long time ago."

The issue came up once more just a few weeks back at D10. There I sat, just feet from Apple CEO Tim Cook, as hosts Walt Mossberg and Kara Swisher asked Cook if any of Apple's products could, in fact, be made in America once more. Clearly, many companies outsource production to lower-cost nations due to America's own postulation. The majority of consumers outright refuse to pay more than a few dollars for a smartphone case, as an example. Given America's minimum wage of $7.25 in 2012, one can see how impractical it'd be to have an American make such a commodity. But Apple ... Apple is being viewed in a different light. The company has around $100 billion in cash. Can't it *afford* to suck it up and employ Americans to build iPhones? Perhaps. But that's asking an unfair question. Apple is a for-profit company, with shareholders that task it with maximizing profit via any and every legal means possible. *Choosing* to add labor costs that aren't clearly necessary to raise quality would be a strike against the company's leadership — in the eyes of investors, at least. All that said, Cook still asserted that he "wanted" there to be Apple products manufactured in America. As it stands, many pundits are focusing on two lines found on the backs of several of Apple's products: "Designed by Apple in California. Assembled in China."

Cook did shed a bit of light into the supply chain, though. Turns out, the CPUs for the iPad and iPhone are built in Austin, Texas, while the glass used on the latter is constructed in Kentucky. He added: "We will do as many of these things as we can do [in America], and you can bet that we'll use our influence to do it." That's a starkly different tone than the one exerted by Jobs just a year (and change) earlier, and while he may very well be pacifying the mobs, there's arguably a fighting chance for manufacturing to rise once more in the nation I call home.

American innovation is doing a fine job of killing its own manufacturing jobs.

In the midst of all the negativity, one statistic you rarely hear is this: "The United States is the world's largest manufacturing economy, producing 21 percent of global manufactured products." That comes directly from the National Association of Manufacturers, which also points out that China is second at 15 percent and Japan is third at 12 percent. Taken alone, US manufacturing would be the ninth largest economy in the world. Yes, these figures are coming from an entity that strives to portray our manufacturing in the best possible light,




but still — that's fairly impressive. The "worry" that I so often hear is that China and Japan will eventually topple America in this race. But frankly, American innovation is doing a fine job of killing its own manufacturing jobs. My parents grew up in Lexington, North Carolina. That's a stone's throw from High Point, which remains home to Furnitureland South, as well as 45 other furniture outlets. That's a lot of stores in a small place, but it used to be *much* more significant. Locals in the area often reminisce about the times when job security was a given and entire families would raise four generations in the furniture business. It was central NC's gold rush. Eventually, however, *machines* far from the rolling hills of Guilford, Randolph and Davidson counties agreed to produce high-quality living accessories for a great deal less money. Or, were programmed to do so.

It's easy to fall prey to the nightmare scenario belief — that manufacturing in America can only get weaker from here. But I'm a man of hope. A realist, yes, but also a man that has lived long enough to know that slides on a macro scale rarely continue in the same direction, at the same speed, forever. The Boston Consulting Group is on a similar wavelength in a research report entitled "Made in America, Again: Why Manufacturing Will Return to the US." In it, the paper's three authors — Harold


L. Sirkin, Michael Zinser and Douglas Hohner — proclaim that "China's overwhelming manufacturing cost advantage over the US is shrinking fast, (and) within five years … rising Chinese wages, higher US productivity, (and) a weaker dollar … will virtually close the cost gap between the US and China for many goods consumed in North America."

What's difficult to slice out of studies like these are data *specific* to the universe of consumer electronics. The pragmatist in me sees more components designed and built here in America, but fewer full assemblies in the years ahead. It's difficult for me to wrap my mind around the ability of Foxconn to build a factory anywhere in the United States where upwards of 300,000 of my countrymen would flock to work 16-plus hours per day, six days per week, for the bare minimum wage and a scaled-back (or practically nonexistent) benefits package. Some manufacturers have had success in outlying territories — places like Puerto Rico, Guam and Saipan — but even the smattering of garment factories on the latter island weren't able to compete on cost, and were largely shuttered in the past five years.

For any significant change to occur, and for electronics manufacturing to return to the US in any meaningful way, it would take a catastrophic upending of our existing culture. American consumers, en masse, would have to universally agree that paying many times more for an iPhone built within US borders was worth the premium. Apple shareholders, en masse, would have to universally agree that paying orders of magnitude more for American manufacturing was a wise use of funds. Or, of course, the government would have to step in and force the hands of those in power, given that the existing economic variables would likely never produce a situation where American manufacturing of electronics would make pecuniary sense. Something tells me this nation isn't truly ready for any of those scenarios to occur, but a lot can change between now and the future. D

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*Darren holds the Guinness World Record for being the most prolific professional blogger on planet Earth. He's also an argonaut.*

# New Energy

## The World's First SOLAR-GEO HYBRID PLANT Blooms in the Nevada High Desert

By Jason Hidalgo

**Drive west** on US Route 50 through a stretch of Nevada highway known as "The Loneliest Road in America" and you'll eventually find yourself in the rural county of Churchill. Once a solitary leg in the Pony Express route, irrigation transformed swaths of Churchill's high desert areas into thriving agricultural communities more than a century ago. Fast forward to today and Churchill finds itself playing host to yet another interesting dichotomy — a first-of-its-kind power plant that generates electricity by harvesting renewable resources from both earth and sky.

It all started with the development of Enel Green Power's 33-megawatt Stillwater geothermal plant in 2009. The technology works by drilling wells to access hot water trapped underground and converts the resulting heat energy into electricity. The successful launch of a geothermal facility is usually reason enough to celebrate, given the high cost and upfront risk that comes with drilling and developing the resource. The region, however, also happens to have an abundance of one more renewable asset: good, old-fashioned sunlight. Northern Nevada's annual average of more than 300 days of sunny weather already helped Churchill score a major coup in 1996 when it landed the Navy's Top Gun fighter pilot program. Traces of the Navy Fighter Weapons School — now located at Fallon Naval Air Station just 15 miles away from Enel's Stillwater facility — can easily be seen via jet trails that paint the skies above the plant like white streaks on blue canvas.

With a steady supply of sunshine and more than 100 acres of land at its disposal, Enel decided to conduct an experiment. It installed a cluster of 89,000 solar panels across the Stillwater facility's dry landscape. The result is what both the Italian company and the US Department of Energy call the first hybrid solar-geothermal plant of its

kind in the world. The solar facility, which was formally inaugurated in May, now adds 26 megawatts of peak energy to the facility — enough to power 16,000 homes prior to factoring in the geothermal plant's output. For an industry still struggling to secure a foothold against cheaper, conventional sources of energy, such as natural gas, proponents say the creation of out-of-the-box projects such as the Stillwater hybrid plant are crucial in moving renewable energy development forward.

"One of the main challenges is making renewable energy really sustainable and this plant is a great example of a perfect and symbiotic combination of two complementing energy sources that people can rely on daily," said Peter Krause, segment manager of Siemens' Industry Automation Division. "Without projects showing that something like this works, I don't think we can get the traction we need in the industry — or the true reach that renewable energy could have in the future."

## AN ELECTRIC COMBINATION?

The concept for a solar-geo plant has been percolating for some time, said Francesco Venturini, CEO of Enel Green Power's North America operations.

"The idea has been out there for a while," Venturini said. "Other companies have tried to do it in a smaller size but (we're) the only ones to be able to do it in this scale."

A network of pipes snakes along a solitary dirt road leading to the Stillwater hybrid plant's geothermal facility in Nevada.

"Without projects showing that something like this works, I don't think we can get the traction we need in the industry — or the true reach that renewable energy could have in the future."

The logic behind combining solar and geothermal power makes sense when one thinks about the strengths and weaknesses of both technologies. In the last few years, solar power has grown by leaps and bounds, thanks to a quick development turnaround, relatively low upfront risk for investors and a sharp drop in the price of solar panels. In 2011, for example, new solar capacity worldwide grew by 54 percent to 28 gigawatts, according to data from *Bloomberg New Energy Finance*. Utilities also like solar because it delivers the most electricity during hours of peak energy demand. Given how power companies have to operate 24 hours a day, however, they also require a constant and stable energy source.

"If there's cloud cover solar panels don't work as efficiently," said Michael Yackira, CEO of major Nevada utility NV Energy. "Of course, when it's dark, there's no solar at all."

This is where having a geothermal component comes into play. High upfront development costs and the risk of multimillion-dollar losses from a project that does not pan out have caused geothermal to lose ground to solar and wind power. If a project is successful in finding a viable underground resource that can produce the necessary megawatts, however, geothermal becomes the more ideal resource.

"Geothermal isn't as dependent on Mother Nature as wind and solar so it's on all the time," Yackira said. "It also has a lower price, which is great for our customers. We would love to have as much geothermal power as we can get."

Although combining an intermittent power source such as solar or wind with a 24/7, or "baseload," source isn't necessarily new, the DOE says that the Stillwater facility is the first to use renewable sources for both. Typically,

Solar and geothermal installations stand side by side at Enel's Stillwater facility, producing 59 megawatts of clean energy.

baseload capacity is provided through conventional sources such as coal and natural gas. As the race for developing renewable energy technology heats up worldwide, however, projects such as Stillwater are no longer a convenience but a necessity, said US Energy Secretary Steven Chu.

"As the first of its kind in the world, this project demonstrates how we can tap renewable energy sources to provide clean power … and deploy every available source of American energy," Chu said. "The facility is expanding domestic renewable energy sources and helping … build the infrastructure we need to stay competitive in the global race for clean energy technologies."

The DOE also has another reason for touting the project. The Stillwater plant received $40 million from the federal government's American Recovery and Reinvestment Act — the same program that was put through the wringer last year following the Solyndra debacle. After receiving a $535 million loan guarantee through the Recovery Act in 2009, Fremont, California-based Solyndra filed for bankruptcy two years later.

The Solyndra scandal is seen by those in the renewables sector as a case study for the highly politicized atmosphere surrounding their industry in the United States. Paul Thomsen, public policy manager for international geothermal de-


With a population of 24,810 residents, Churchill County, NV plays home to the world's first solar-geo hybrid power plant.

veloper Ormat Technologies, says he has seen the impact of politics firsthand after being named in a report by the House of Representatives' Oversight Committee. Thomsen lamented the blanket coverage that incidents such as Solyndra receive while successful projects barely get a peep. Thomsen mentioned three Ormat projects in Nevada — McGinness Hills, Jersey Valley and Tuscarora — that are slated to generate 121 megawatts of total power once they all come online. The projects received $350 million in partial loan guarantees from the Recovery Act.

"With the Solyndra issue, so much of the press was on the negative side of the loan guarantee program," Thomsen said. "The federal government didn't even give us money for those three projects. It only ensured that we got a lower interest rate (for our loan)."

## POLITICAL FOOTBALL

Standing just a few feet away from the Stillwater facility's battery of solar panels, Nevada Governor Brian Sandoval is all smiles. Sandoval remembers attending the second grade in the nearby town of Fallon just 10 or so miles away. Now he's being subjected to learning of a more technical kind. This includes details about how Siemens supplied its latest photovoltaic inverters and medium voltage step-up transformers for the project. According to Krause, the PV inverters — which convert the DC power from the PV solar modules to AC power that can be fed to the grid — have a conversion efficiency rate in excess of 98 percent. The project was a top priority for Sandoval, who launched a big push to beef up Nevada's green sector after the housing market crash and 2008 global financial crisis brought down its four major industries — gambling, tourism, housing and construction.

"This facility was permitted and brought into production in just six months," Sandoval said. "When people throughout the globe see what we accomplished here, they will see that our state is setting a good example."

Nevada's renewable portfolio standard target of 25 percent by 2025 has gone a long way in expanding the state's

green sector in recent years. Northern Nevada, the center of the state's geothermal activity, already gets about 24 percent of its energy from renewable sources — far above the national average of 13 percent. The Nevada legislature has also enacted several measures for fast-tracking renewable energy development in the state.

The state's push for green energy, however, also exposes some of the challenges for the sector. Efforts to boost transmission capacity and install new power lines statewide are proceeding a bit slower as environmental concerns are weighed. One is the impact of development on declining sage grouse populations. The solar-geo plant itself is near the Stillwater National Wildlife Refuge, a wetland that attracts more than 20,000 waterbirds such as black-necked stilts and long-billed dowitchers. Nearly 48 million acres of the state — 67 percent of Nevada's land — is also administered by the Bureau of Land Management. Many of the state's renewable resources are found within BLM land, requiring federal approval for any development.

Meanwhile, the global financial crisis of 2008 continues to cast a shadow on development as securing investment capital and financing remain difficult. For renewable start-ups, the impact boils down to high capital costs, which can be seen in the form of high interest rates for loans. The impact is especially being felt in the geothermal sector due to its higher upfront risk during development. Just doing exploratory drilling to verify a geothermal resource can cost up to $15 million, according to a risk mitigation report by Deloitte Development LLC. The sum is large enough to discourage potential investors who have concerns about a project failing to find sufficient geothermal resources after spending all that money.

> "When people throughout the globe see what we accomplished here, they will see that our state is setting a good example."

"We're hearing from a lot of companies about how tough things are right now across the board," said Karl Gawell, executive direc-

tor of the Geothermal Energy Association. "When you look at longer-term trends where you have climate change and energy security driving the market, I think people in the industry feel fairly comfortable. It's with the shorter-term trends where you see a lot more uncertainty."

Support from the federal government in the form of tax credits and loan guarantees helped lead to a boom in renewable projects in the last few years. Those programs are set to expire after 2013 and likely won't be renewed due to the political football being played in Washington, D.C., developers said.

"There might be a chance for an extension, but no one is counting on it," said Brian Fairbank, president and CEO of Vancouver-based Nevada Geothermal Power.

The renewable energy policy's murky future will likely lead to a slowdown in development in the short term. The fact that 2012 is a presidential election year in the United States makes the outlook even less clear, industry insiders say. Just as the unknown can spook the stock market, uncertainty can have a serious impact on developers with a keen eye on their bottom line. In the case of companies such as Enel, inconsistent support for the clean energy sector could mean holding back on potential projects as it balances its role as a developer with the need to maximize returns for its investors. Geothermal development would especially be affected because it presents the highest development risk compared to other sources of renewable energy.

"To be competitive, we need some support, and in the United States, the support comes and goes," Enel's Venturini said. "As developers… we need a better understanding of what the next steps are going to be and what the future is going to look like. For a project like this we invest hundreds of millions of dollars, and before you make that big an investment, you want to make sure that the return for the stakeholders is there." D

Off-road vehicles allow staff to more easily navigate across the dirt and gravel at Enel's Stillwater solar-geo plant.

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*Jason Hidalgo is a Contributing Editor at Engadget who has won national and international awards for business and health reporting.*

# The Most Expensive Internet in America

## Fighting to Bring Affordable Broadband to AMERICAN SAMOA

By Darren Murph

# "You could argue that there's some value in it."

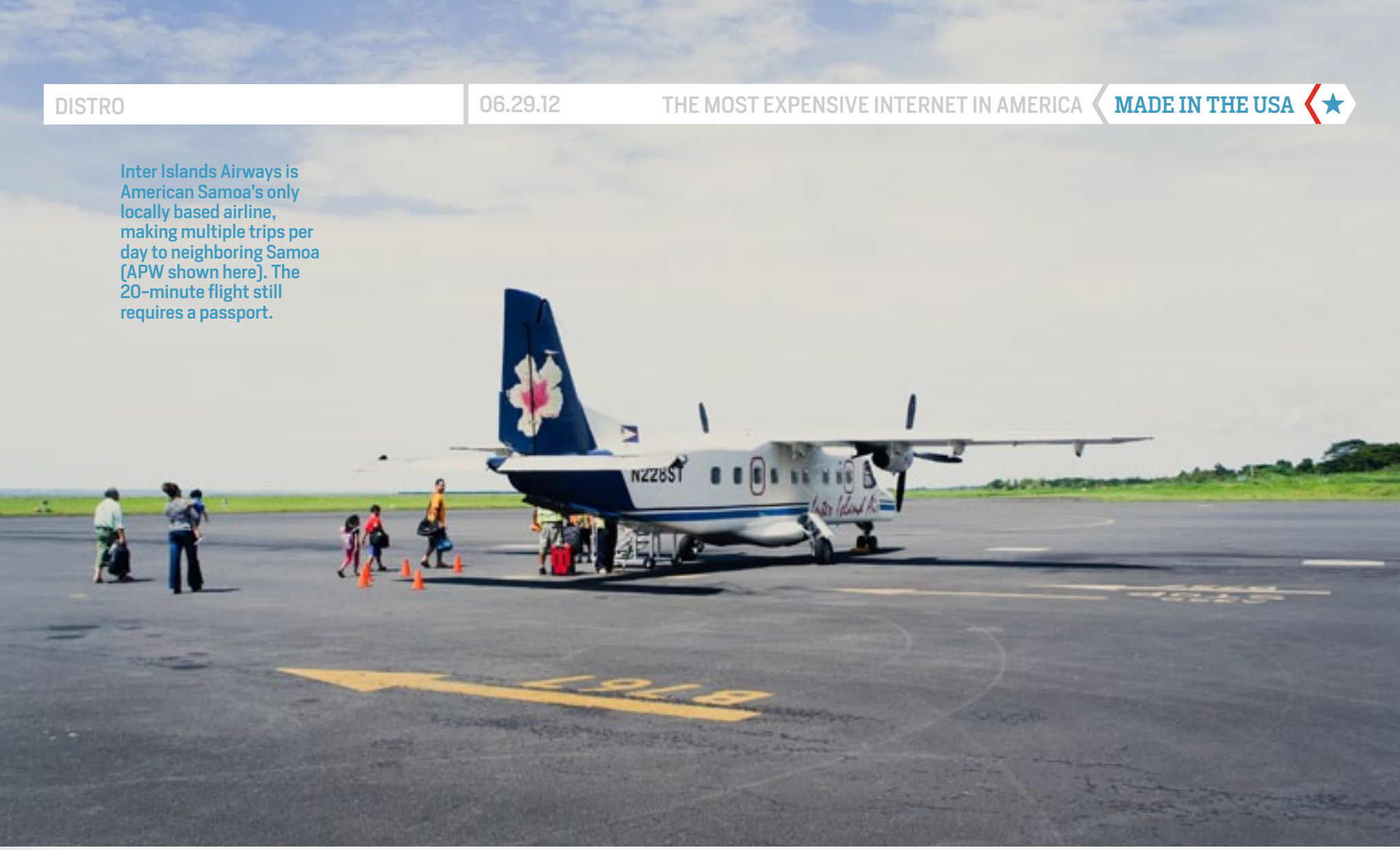
That's New York City Mayor Michael Bloomberg, speaking candidly during a recent interview at D10 in California. The topic of conversation? Widespread WiFi, and whether or not the government should be the one thinking about its future ubiquity. More specifically, if WiFi hotspots should be treated like "roads or water supply," as aptly stated by *AllThingsD's* Kara Swisher.

This obviously isn't the first time such an idea has crossed the minds of those connected to Washington, D.C. Muni-Fi (municipal wireless networks) projects were all the rage a few years back, but one spectacular failure after another swiftly extinguished that momentum. In more modern times, America (as well as other nations) has sought to solve the "rural broadband" problem, bringing high(er)-speed internet connections to places with a higher bovine population than human.

But bringing broadband to places like rural North Dakota seems like an easy chore to a small, but passionate, group of 60,000 living some 4,770 miles from San Diego, California. American Samoa may be an unincorporated US territory located closer to pure bliss than the hustle and bustle of Wall Street, but it's no doubt being taken into consideration in recent mapping projects aiming to pinpoint the areas most lacking in terms of digital infrastructure. Unbeknownst to most mainlanders, this fragile island chain is home to the most expensive internet in America, and the political issues surrounding it are astonishing.

I recently traveled to Pago Pago, with unlocked smartphone in hand, after a brief (and stunningly beautiful) flight from neighboring Samoa. At the time,

**Worlds Away**
You'll spend roughly six hours on an infrequently scheduled Hawaiian Airlines flight to cover the 2,500 miles between Honolulu, HI and Pago Pago, AS.

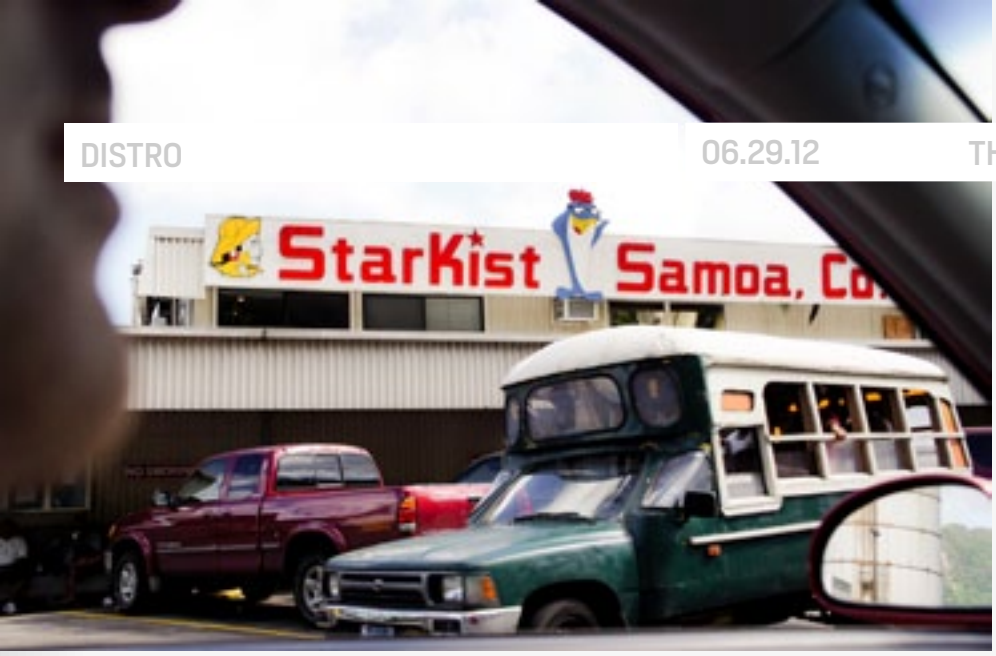




Inter Islands Airways is American Samoa's only locally based airline, making multiple trips per day to neighboring Samoa (APW shown here). The 20-minute flight still requires a passport.

I was floored at how modern the digital infrastructure felt. I checked into a hotel with *gratis* broadband internet in every room, and within 20 minutes, I had a BlueSky SIM card in my Galaxy S II sucking down HSPA+ at (comparatively) affordable rates. It was around $25 for half-a-gig of data, with no peak-use limitations as I saw in Samoa.

As it turns out, however, full-time residents have a much tougher time securing fast, reliable access. A government source was kind enough to answer a wealth of questions on the matter, as was One Economy's Daniel Calarco. For those unaware, Calarco's organization is mapping the broadband infrastructure and creating a report about barriers to internet adoption in American Samoa for the US Department of Commerce. Before diving in too deep, it's important to get a better understanding of the island group itself. Home to fewer than 60,000 residents total, there are only two flights per week to Honolulu, and outside of daily flights to neighboring Samoa (APW), there really aren't any other options for access. Put simply, this place is *remote*. Not Pitcairn Island remote, but still remote.

There's a huge amount of importance placed on family across the island, and a major swath of its residents are employed at the StarKist tuna plant in central Pago. The culture, goals, economic expectations and world view of residents are drastically different than those of most mainlanders. As an example of how tightly knit this place is, an entire memorial (the Leone Memorial Garden) was erected to immortalize the memory of 11 people who were killed






StarKist employs over half of American Samoa, and the McDonald's in Pago Pago is always crowded. Partially for cheap eats, but partially for the free (and comparatively fast) WiFi.

in Leone in the catastrophic 2009 tsunami.

That said, it's a progressive place. Many of its youth aren't satisfied with keeping an island mindset — they aren't eager to reject their culture, mind you, but they're visibly hungry to learn more about the outside world. The PacRimEast cable, originally laid in 1993, was one-upped in 2009 by an ASH undersea cable that increased bandwidth from 20 Mbps to 1 Gbps. But in reality, consumers aren't seeing a huge improvement in what's offered. Our source says he pays $75 per month for a wireless Motorola Canopy-based system that provides him with 256 Kbps down and 256 Kbps up. Thankfully, there's no usage cap on that. If it were available, he'd be able to opt for a cable service that provides 1.5 Mbps down and 512 Kbps up, but that costs $150 per month and has a 25GB monthly cap.

Our source aptly points out that the AS government and BlueSky Communications received a $10 million loan to redeploy the PacRimEast cable between Hawaii, American Samoa and Samoa, and it seems that it's trying to recoup those costs by charging an exceedingly small population an exceedingly large amount per month. A $10 million hit to the population of Seattle would be paid back in no time; but with fewer than 3,000 American Samoa households purchasing broadband on a monthly basis, the payback period is many times longer.

*Q&A with Daniel Calarco Below*

# Q&A w/ Daniel Calarco

**No doubt,** those rates would probably make the average mainlander balk, but have a think on this: since American Samoa has a GDP per capita of roughly $8,000 and an unemployment rate near 30 percent, high-speed internet is simply out of reach for the vast majority of Samoans. Further leaning on One Economy's findings, the average measured download speed is 66 Kbps (just 7 percent of the FCC's minimum standard for broadband) in American Samoa. Even looking at Guam, the US Virgin Islands and the Northern Mariana Islands, American Samoa has the highest calculated cost of internet in all of America — by a long shot. To help add even more perspective to the matter, I spent a bit of extra time interviewing One Economy's Daniel Calarco.

**Could you explain a bit about your job, why it was created, and what your personal and professional goals are?**

My job as director of international programs is to oversee our work outside the mainland US to help low-income people improve their lives via information technology. This includes oversight of projects in the Americas, the Middle East, Africa and South Asia, but the three projects in the Pacific are ones that I work the most on right now. These are projects that aim to create a national broadband map. The US Department of Commerce issued RFPs (requests for proposals) for each state and territory to create their portion of the map. Most states had a large state entity like a public utilities commission or a state university carry this out.

American Samoa's youth aren't straying from their roots, but they're well aware of the outside world available to them. The availability of HSPA+ causes these kiddos to line up around the block to reload their Bluesky SIM cards.

Since there is no equivalent agency in the small territories, One Economy bid on and won these contracts as part of a consortium of partners.

Personally and professionally, I would like to see people around the world get access to affordable computers and internet. I think there is a lot we take for granted in America, not the least of which is our access to information. When I have a question about something like health, finance or education, I can find the answer easily online. People around the world face so many barriers, whether it is reliable electricity, access to a computer, affordable internet, or even content online in their local language (you would be amazed at how little content there is online in languages besides English and romance languages). I want to help break down these barriers so that everyone can have access to the same wealth of information we have here in the US.

**Is home-based "broadband" available all across Tutuila (American Samoa's main island)? What about availability across the Manu'a Islands (sparsely populated gems some 70 miles east of Tutuila), including Ofu-Olosega?**

It's probably better to show you than tell you about it. We have created a public web portal that displays maps of broadband in AS (http://asbb.broadmap.com/publicmap/).

If you click on the coverage tab, you can see exactly where there is and isn't broadband according to the ISPs. We're working to incorporate community

feedback via town halls since much of the rationale for the map is to ensure that what the providers are telling us is accurate. About 8 percent of residents of American Samoa report that they cannot subscribe to broadband because it is not available in their area.

**How many companies offer home-based broadband across American Samoa?**

Two: BlueSky and ASTCA (American Samoa Telecommunications Company).

**Do you know if similar rural broadband initiatives exist for other outlying US territories, such as Guam and the US Virgin Islands?**

Schools in all the territories qualify for the e-rate program for lower cost connectivity. The federal government has sponsored several programs under the Broadband Technology Opportunity Program, of which One Economy has received funds to expand rural broadband access.

**Does the government currently subsidize the cost of home-based broadband for American Samoans? Is that a consideration? What are your personal feelings either way on that?**

Not as far as I know. ASTCA is still kind of a quasi-governmental organization even though they are technically privatized. If they are operating at a loss, then one could say that they are subsidizing internet at home, but I don't know enough about their financials. My opinion is that the reason why costs are so high have to do with what's called "middle-mile connectivity." The only undersea cable connecting American Samoa links American Samoa to Hawaii (called the ASH Cable). It was privately funded by BlueSky (with the AS Government also footing part of the bill) and as a result, they are trying to make back the millions they invested. However, with fewer than 10,000 households in American Samoa, the numbers just aren't there for sufficient economies of scale for a privately funded cable. In my opinion, the federal government should buy out BlueSky's share of the ASH cable and take over the cable. The cable will never make back the money invested.

**Do you think tech companies like Google would invest in internet in American Samoa? Do you think private technology companies should consider such a thing?**

I think private companies might invest in American Samoa from a corporate social responsibility angle. But as things stand, it doesn't make sense from a business point of view. With 55,000 residents and 10,000 households, it is simply too small a market.

**Do you believe there's an education / marketing issue here, or is it mostly cost? In other words, do residents simply not know that broadband is available, or is it so costly that only 2,000 or 2,500 residents actually get it?**

I don't believe this is an education issue. In our survey, we asked almost 1,700 households questions about their attitudes. About 200 said they did not subscribe because they were not interested. Most of the others that did not have broadband stated they did not

Tethering wasn't a familiar term on American Samoa even five years ago. Thanks to newly installed 3G cell towers, it's enabling communications in a way that mainlanders would call commonplace.

subscribe because it was too expensive, it was too slow, it was not available in their area or some other reason (lack of computer, lack of electricity, etc.).

**Have you seen BlueSky's wireless / cellular HSPA+ network act as a replacement for hardline connections for some individuals? Do you think there's reason to believe that wireless will slip in and become more important than wireline given all the deployment headaches?**

This is definitely happening. About 20 percent of subscribers use a mobile network as their primary means of connecting to the internet. This could be on a smartphone, via a dongle for PCs or via BlueSky's WiFi hotspots.

**How has internet access impacted the American Samoa economy, and how do you think it will impact the islands in the future?**

I don't believe it has had an enormous economic impact, at least in terms of employment and livelihood. The major employers remain the tuna cannery and the government, both of which would continue to exist and operate here without the internet.

Instead, I would say that the lack of high speed internet has had a profound effect on the economy. There have been several attempts to set up a call center for outsourcing. American Samoa has many advantages in terms of a literate, native English-speaking population that is seven time zones off from the East Coast of the

US — they could certainly do some business process outsourcing via call centers and it would be advantageous given their location. However, the individuals who were trying to start the call centers have cited the prohibitive cost of broadband as the single greatest barrier to them starting the business.

**Is low(er) cost home-based broadband something that residents are clamoring for? Do you see real demand from the people?**

Definitely. Over 400 of our survey respondents stated that cost is the factor keeping them from subscribing to broadband. Residents are willing to pay up to around $50 per month; however, in order to get true "broadband" even by the lowest standards, one would probably need to spend around $200 a month.

**Anything you wish I had asked?**

I would ask: "Why is the cost so high here when other places like Hawaii, Guam, and even the Mariana Islands have much more affordable broadband options?" The answer is a bit nuanced, but if I had to boil it down, I would say it comes down to the "middle-mile" connection — the link between American Samoa and Hawaii. Other states and territories have either larger populations or they tap into cables going between larger population centers. Guam, for example, sits on cables that go to Hawaii, California, Japan, China and Southeast Asia. As a result, Guam does not have to foot the bill for the hardware connecting them to the worldwide web — they can free ride on the bandwidth from cables going from the US to Asia.

American Samoa's cable is a dead end. It goes from Hawaii to American Samoa, and then AS has a cable to Independent Samoa, but that's about it. It's a multi-million dollar, 2,500-mile cable that has to be paid for by a few thousand customers. Thus, there are not a lot of people to share the cost. Meanwhile, the costs for the cables that go through Guam are spread over literally hundreds of millions of households in Asia and North America. American Samoa needs to plug in to a network like the Southern Cross that connects Australia, New Zealand, Fiji, Hawaii and the Western US in order to spread the fixed costs of the undersea cabling over more households.

Bringing down the middle-mile costs will likely bring down the cost to consumers. If the ISPs try to continue to charge prohibitive rates, other ISPs may enter the market to undercut them, so long as they have access to affordable middle-mile connectivity. Lower-cost internet will certainly lead to greater broadband subscriptions. People want the internet; they access it at schools, cafes, work, McDonalds — they just can't afford it at home at the prices the ISPs charge. D

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*Darren holds the Guinness World Record for being the most prolific professional blogger on planet Earth. He's also an argonaut.*

# Into the Wild

## Cultivating the NEXT GENERATION OF AMERICAN SCIENTISTS One Weather Balloon at a Time

By Tim Stevens

**At first it was faint** — a blurry smear bisecting the sky above, running roughly north to south and flanked by a second, even more indistinct line to the west. Soon, though, both lines began to change, coalescing and intensifying into bright green streaks impossible to miss and difficult to ignore.

As the night began to expire and the morning matured, those lines grew brighter and brighter and then, without warning, they started to dance. Numbing feet and chilly fingers forgotten, bundled-up onlookers looked skyward to gasp and laugh out loud as the evergreen, spectral curtains far above began to waver and move, blown by a fickle celestial wind. Waves traveled from north to south and back as the luminescent lines above twisted, forming glowing knots of purple and red before slowly spreading out, covering the night sky in green, bright enough that even the snow-colored landscape glowed like an emerald wonderland. Gradually, the motion stopped and slowed, seeming to stall in the sky above, exhausted before — encore; the heavenly dance began anew.

As locals and tourists alike developed stiff necks while admiring the show, completely enraptured by the aurora borealis, members of Project Aether couldn't be bothered to look up. They were scrambling on the ground, feverishly

assembling and tweaking two rigs that were also destined to create a show in the sky. The team's creations were made of carbon-fiber tubes, exotic material conventionally lashed together with PVC junctions, string and duct tape. A *lot* of duct tape.

The tape was mostly for attaching the payload, blue insulated lunchboxes of the type often seen stuffed in the back of corporate refrigerators. Inside were not leftovers, rather a block of pink insulating foam with cavities carved for all manner of things: patriotic flags, plastic Easter eggs, scientific equipment and, usually, one or more GoPro cameras — the same sort you might have seen dangling conspicuously from the helmet of your favorite extreme athlete.

The string on the rigs, meanwhile, attached the entire contraption to a weather balloon. Torn from silvery packages, each of two balloons that would be launched that night were coupled with a large tank of helium and slowly filled, swelling to roughly 6-foot diameters before being sealed off with zip ties and, yes, more duct tape.

The first rig's lines were attached to the first off-white orb, now eager to climb. A few quick and deftly tied knots made everything level. Gyros on and quietly whirring, GoPros recording and mutely blinking red, one team-member grabbed the whole contraption and gingerly held it up toward the green inferno in the sky above.

A typical DIY rig, launched and eventually retrieved by Project Aether via helicopter.

"FIVE, FOUR, THREE, TWO, ONE!" the team counted in unison and then, a silent count later, the rig was set free, pale white weather balloon shoved upward by the dense, cold Alaskan air around. Its silent departure was a slight anticlimax to the flurry of activity leading up to its release. The white balloon quickly became a shrinking black orb above, blocking out an ever-smaller arc of the sky.

Within moments it was gone and, a few minutes later, its larger

sibling followed, both on journeys that would take them to the edge of space, atmosphere left mostly below. But they wouldn't be one-way journeys. Those balloons stretched and swelled in the chilly vacuum and finally burst upwards of 100,000 feet above the ground, sending the payloads tumbling down, slowed by two homemade parachutes, bleating GPS coordinates all the way down. Over the course of two weeks nearly 20 balloons would make this trip, soaring to incredible heights while being carried away by the wind before finally crashing to the ground and calling home for a pickup. At that point the task of finding the rigs — and the valuable scientific payloads onboard — began.

## THE PROJECT

Project Aether is the creation of Ben Longmier, a man with a strong affinity for the fun, hands-on science experiments he conducted as a kid. Though Ben completed his grade school studies 12 years ago — going on to a Ph.D. in plasma physics from the University of Wisconsin, Madison — he's still a guy with an overwhelming sense of wonderment at it all. Tall, blonde and built of sturdy, Midwestern DNA, you only need to ask a brief question about outer space to bring a youthful look of excitement to his face.

Project Aether's Ben Longmier prepares to launch a Project Aether weather balloon into the Alaskan sky.

He may know the answer to just about any question you throw at him, but that answer is always delivered such that you'd think he was just learning the answer himself.

That enthusiasm is infectious, and it's exactly what he's hoping to spread thanks to his work up in Alaska — and elsewhere. Though his full-time occupation sees him running the propulsion lab at the University of Michigan's Aerospace Department (he recently left a gig at Ad Astra Rocket Company, where he fine-tuned plasma-powered rockets), expanding kids' excitement of science on a broader scale is a very personal mission that's taken form in Project Aether.

The balloons sent into the chilly Alaskan nights are certainly vessels for scientific discovery, carrying fascinating experiments aloft that help us to better understand what's behind the dazzling light show those in the north have been enjoying since the dawn of time. One experiment, relying on tinfoil balls, measured the conductivity of the air during auroral outbreaks. Another tested a low-cost and Arduino-powered altimeter while a third carried blocks of Aerogel, hoping to scoop up a few micrometeorites before coming crashing down.

> Seeing 1080p clips captured at 100,000 feet, where the sky is black and the Earth curves away below, gets your attention. And, once you have a kid's attention, teaching them about the science behind what they're seeing becomes a lot easier.

Then there are the cameras, of course, collections of modified and unmodified GoPro HD Hero2's that ride along to tell the researchers what the northern lights look like from within and, more importantly, how the rigs behave at extreme altitudes.

But those cameras provide a third, even more valuable service: inspiring and teaching kids. The balloons deliver amazing footage from amazing heights that even the most science-averse student can't help but admire. Seeing 1080p clips captured at 100,000 feet,

Ben, Tim and two crew members take a break at Project Aether HQ.

where the sky is black and the Earth curves away below, gets your attention. And, once you have a kid's attention, teaching them about the science behind what they're seeing becomes a lot easier.

For years, interest in so-called STEM disciplines (Science, Technology, Engineering and Math) has been waning among American students. Classroom curricula has gradually become more advanced, but so too has it become more distanced from practical reality. Getting a 10-year-old to appreciate concepts like the density of a gas affected by temperature is difficult. Getting that same 10-year-old excited to calculate the right amount of helium to inject into a balloon she's going to launch 20 miles into the air is, however, rather easier.

It's this captivation that has brought teachers like Elizabeth Henriquez and Rosanna Satterfield to the project, both from New Jersey and looking to develop curricula that can be shared. Both teachers help with the preparation of the rigs that will be strung from balloons and with the processing of the retrieved payloads, but during the days, while many members of the team are sleeping off a late night launch or hunting in the wilderness for a plain-

tive GPS signal, these two could often be found Skyping updates to students back on the east coast.

The teachers' goal was to engage while educating. As a project, the team has done just that, sharing lesson plans with schools around the US and abroad, plans they're more than willing to share with anyone who stops by the project's website, projectaether.org.

## THE AIR RETRIEVAL

I joined members of Project Aether at their temporary home base while in Alaska, an otherwise quaint B&B in Fairbanks that looked to have been occupied by a science-loving, yet heavy-drinking, fraternity. Long-empty bottles of IPA sat next to still-warm soldering irons and well-loved bread-


The helicopter that would deliver Tim and the Project Aether crew to their first retrieval.

boards. Disconnected gyroscopes could be found scattered about, looking like incredibly fine toys, and everywhere you looked was a GoPro or three. Dozens of the things were about, some mounted and ready for launch, some still frosty and cold after trips through the stratosphere — and some in various states of disassembly, IR filters being extracted to extend low-light recording sensitivities.

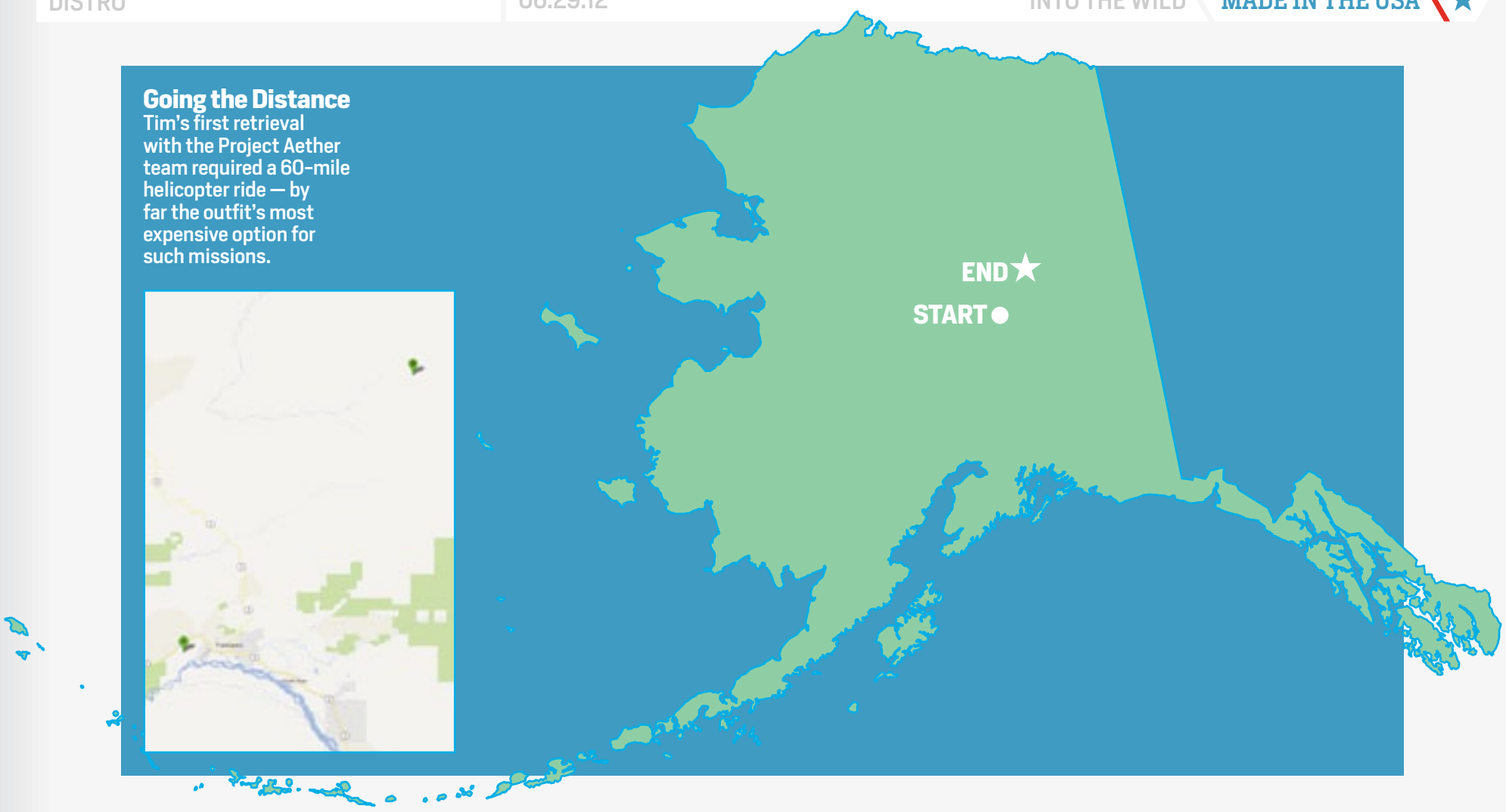
Over the course of the two weeks the Aether team set up its residence, many students with many experiments filtered through the house. Two of those students, John Guthery and Frans Ebersohn from the rather more temperate graduate program at Texas A&M, had been there for days when we came knocking. From the house, they tracked the various payloads scattered to the winds across the central Alaskan wilderness. Coordinates were relayed back to the team through a number of means, most straightforward being simple Spot transmitters, which rely on satellite connectivity and integrated GPS receivers to transmit coordinates back to home base.

Like any good spacecraft, there are redundancies, however. Inside a waterproof yellow Pelican case lives a GPS unit, broadcasting its location directly over long-range radio. Should that system fail, a third, simpler solution is duct-taped to the side of the rigs, the sort of beacon often used for directionally tracking wildlife — of which there is plenty to be found around these parts.

The view from the Project Aether helicopter.

That third system was something of a last resort, and not one we'd need to use for my first retrieval with the team. GPS coordinates were successfully received from the Spot transmitter, passed from John to project leader Ben.

Ben showed me the exact location using an incredibly powerful piece of software that is, thankfully, free for all: Google Earth. With the coordinates punched in to the app we got a dramatic fly-




**Going the Distance**
Tim's first retrieval with the Project Aether team required a 60-mile helicopter ride — by far the outfit's most expensive option for such missions.

over of the White Mountains, zooming in on the location. The first balloon was resting on a ridge about 60 miles to the north. It was a long, *long* way from the closest road so hiking in was impossible, while a lack of snow in the area meant snowmachines (also known as snowmobiles or sleds in more moderate latitudes) were right-out.

So John and I headed down to a small local airport for the team's most impressive, yet also most expensive, option: a helicopter. A tiny, four-seat chopper sat in the sun on the landing pad while Mike Terwilliger, its lanky and incredibly affable — yet sidearm-packing — pilot awaited our arrival. He gave us a quick safety briefing, described a number of exciting ways to be dismembered or decapitated by either or both of the craft's two spinning blades, then helped us climb in the cabin.

The engine was disconcertingly reluctant to fire but the thing eventually shuddered to life and, after a few moments of dial-checking and knob-fondling, Mike swept us upward and on our way. I had my Delorme PN-60 handheld GPS on me, into which I'd plugged the coordinates, and I must confess to feeling a bit like an explorer in a videogame as I watched the distance to our target decline and

the waypoint indicator stay pegged straight ahead.

The Trans-Alaska Pipeline and countless exhausted gold-mines swept by below us, plus many more natural sights, like a pair of moose meandering through bare trees, hunting for tender bark to nibble on. As the hills rose up toward us the timber line fell below and it was clear we'd not need the snowshoes stuffed in the back of the 'copter. Most of the ridges on the mountain were covered rocks, not snow.

Getting closer, Mike relied on John and I to call out direction and coordinates and, as we swept around a small ridge, I spotted a fluttering bit of orange off to the left. It was one of the rig's parachutes, each one hand-sewn by Ben's mother.

It was clear that Mike would be able to land not far from the DayGlo fabric. As he looked for the best spot to set down he filled our ears with yet more austere descriptions of ways to die, most focusing on jumping out of the door too quickly, thus causing the helicopter to become unbalanced and flip over the other way, crashing in what would be a presumably spectacular way.

Thankfully we didn't have to worry about that, as he found solid ground and set us down with the incredibly deft touch of an Alaskan bush pilot. With a nod, he said it was safe to disembark but that he wouldn't be shutting the thing down, meaning the main rotor / decapitator above would be spinning away. I ducked as I stepped out of the side door and succeeded at my primary objective: evacuating the helicopter without having my head removed from my shoulders.

I did, however, fail to accomplish a secondary objective: doing so gracefully. My foot went into a surprisingly deep patch of snow as soon as I stepped out and I tumbled forward, a proudly clumsy moment captured by two of the half-dozen GoPros stuck in various

Tim's first retrieval with the Project Aether crew, found using GPS coordinates from an on-board Spot transmitter.

places around the craft.

John more efficiently stepped out of the back door and the two of us scampered up the hill to the payload, parachute fluttering wildly in the now turbulent mountain air. We only had to cover about 150 feet up to the thing, which I collected with satisfaction, he with pride. It was his altimeter that was taped on the side of what we had located, and he hadn't seen it since it disappeared into the sky days earlier.

## THE SCIENCE

Balloons that float do so for a very simple reason: they're filled with a gas that's less dense than the air around them. Blow into a balloon and it won't have any particular desire to rise (unless you let go of the nozzle, of course). Pump it full of something like helium or hydrogen, however, and it will certainly show a strong inclination to go up and up until it reaches an altitude where the air is just as thin.

Helium is what the team used for the most part, first relying on small canisters anyone can purchase for a birthday party, then later moving to bigger, industrial-sized tanks. They used some hydrogen, too, but only after making all the requisite Hindenburg jokes.

On the ground, the balloons were filled with just enough gas to lift the rigs, and little more. This often left the latex things looking just a bit flaccid on the ground, but this is for good reason: as the air gets thinner the force compressing the helium or hydrogen inside weakens. This causes the balloon to expand as it rises until, ultimately, it bursts. It's not the weight of the rig that dictates the maximum altitude; it's the maximum volume of the balloon carrying it aloft.

A deflated weather balloon buried in the snow after a successful trip to the edge of space and back.

While the experimental payloads varied widely depending on

their nature, the preparations for the cameras were largely consistent. The blue lunchboxes provided a small amount of insulation, but pink polystyrene foam did the bulk of keeping things safe, while a handful of disposable hand warmers helped to keep things somewhat toasty when the temperatures dropped to -40 degrees Celsius.

As I mentioned earlier, many of the GoPros were modified to remove their internal IR filters, hoping to boost their nighttime sensitivity. But beyond that, they were mostly left alone. The waterproof cases were often filled with nitrogen to help purge any water vapor that might form droplets on the way up, but otherwise, they were off-the-shelf units.

## THE LAND RETRIEVAL

While the helicopter trip was a true highlight, I later was able to follow along for another journey. A payload was located at a distance just a few miles from the launching point. Its coordinates on Google Earth placed it up a short

The team sets out for a second snowshoe expedition, following a failed attempt at an earlier land retrieval.

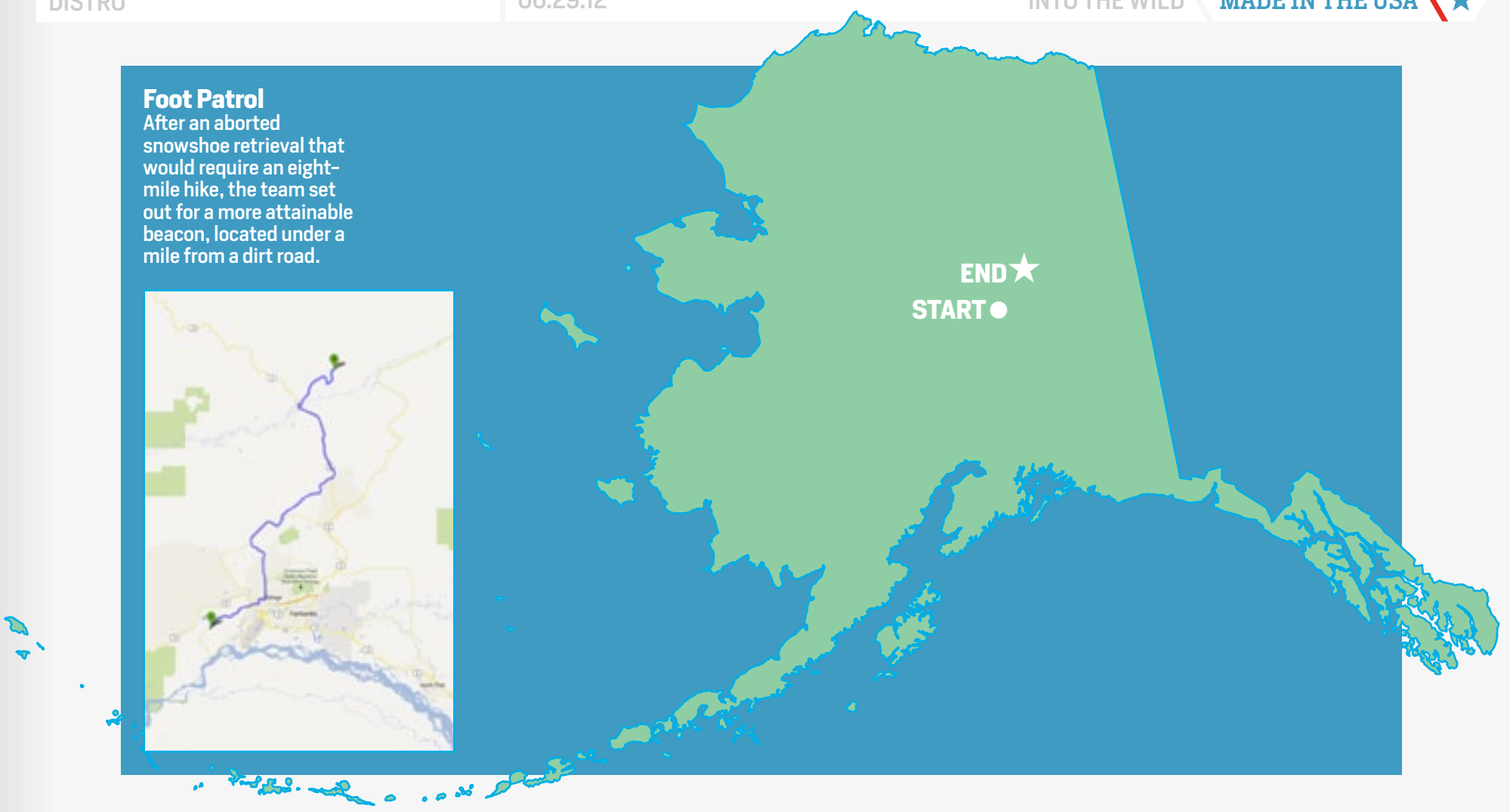
ridge, a locale that, with a little snowshoeing, should be easily reachable. Easily, but slowly, with early estimates figuring this would be a 10-hour snowshoe into the wilderness — if everything went well.

Team-member Mark Tronicke and I looked at the map, searching for the best point of access. Mark, another affable teacher from New Jersey, was the team's de facto wilderness expert, having survived a night amidst the snow and the trees when an earlier snowmachine retrieval turned into a far more arduous trek than anticipated. With his disconcerting tale fresh in my mind, not to mention the memory of the massive grey wolf tracks I'd seen just a few days earlier trekking around Denali, I prepped my gear and my snowshoes. I stuffed my pack with as much fluids and food as I had on-hand while trying to shake the gnawing thought that I might not be quite ready for a 10-hour backcountry slog through waist-deep powder and what could be a tricky river crossing. Just the same, the adventurer in me ensured I didn't fret too much — I wasn't going to sit out this attempt.

Mark, John, Frans and I hopped into an SUV and headed up to what looked to be the best access point: Murphy Dome. This was actually the launching point we'd used the night before, a clearing on top of one of the highest hills close to Fairbanks. With few nearby trees and little in the way of light pollution it was a great place to launch a balloon and to enjoy the aurora. Unfortunately, it wouldn't prove to be a good start for our retrieval.

> While there are surely more barren places in the world than Alaska, it's hard to imagine one's self being more isolated than while trekking through the wilderness there ...

We quickly found two problems. First, we couldn't get nearly as close to the beacon as we'd hoped in the team's rental SUV, which was crippled with both front-wheel drive and some EPA-friendly all-season tires. We knew we might be able to drive down closer to the beacon, but we'd




have to wait until summer to drive back out again. Second, early eyeball estimates of the distance had been way off. *Way* off. Instead of the planned three-mile (one-way) hike, our two handheld GPS units agreed it was over eight miles to the beacon. It was approaching noon and even in a place where the sun doesn't set until 9:30, if we set out then we'd never make it back before nightfall. We'd be lucky to get back by the following morning.

While we discussed alternate means of access — snowmachines looking to be problematic thanks to the water crossing, helicopters difficult due to the tree density — we reluctantly scrubbed the first approach and headed to a separate beacon hoisted aloft in an earlier launch. This one was far easier to access, conveniently under a mile away from a dirt road that wound itself up, down and around various hills before depositing us at the home of a local who had, earlier in the week, offered some lasagna made of moose meat to the team-members when they secured permission to chase down the rig. The moose had been "bagged" in her back yard, naturally.

We set off past her house, tracking through wet powder that was usually at our knees, sometimes deeper. Again

our GPS devices were our navigators, counting down the distance and keeping us headed in the right direction as Frans broke the trail up front, cracking jokes in a mock Austrian accent borrowed from the "Pumping Up with Hans and Franz" SNL skit from the '80s. The accent was so pervasive that the entire team couldn't resist a more guttural way of speaking, so much so that John was now called Hans most of the time.

It was beautiful country, completely silent and not a single structure in sight despite our vantage point offering views for hundreds of miles. While there are surely more barren places in the world than Alaska, it's hard to imagine one's self being more isolated than while trekking through the wilderness there — and that's despite fairly prevalent cell reception in the greater Anchorage area.

We each took turns tumbling into the occasional powder wells that we found along the way, Frans more stable than the rest thanks to his carbon fiber pole used as a walking stick, me a little more unsure thanks to the decidedly non-waterproof Canon 5D Mark II slung around my neck. It was slow progress but we found the device with

Project Aether's Frans, Mark and John after a successful mission.

little trouble, partially buried by windswept snow, the plastic figure of the team mascot, The Little Prince, still attached to the outside. What a journey he'd taken to the stars — or nearly there, anyway.

## THE RESULTS

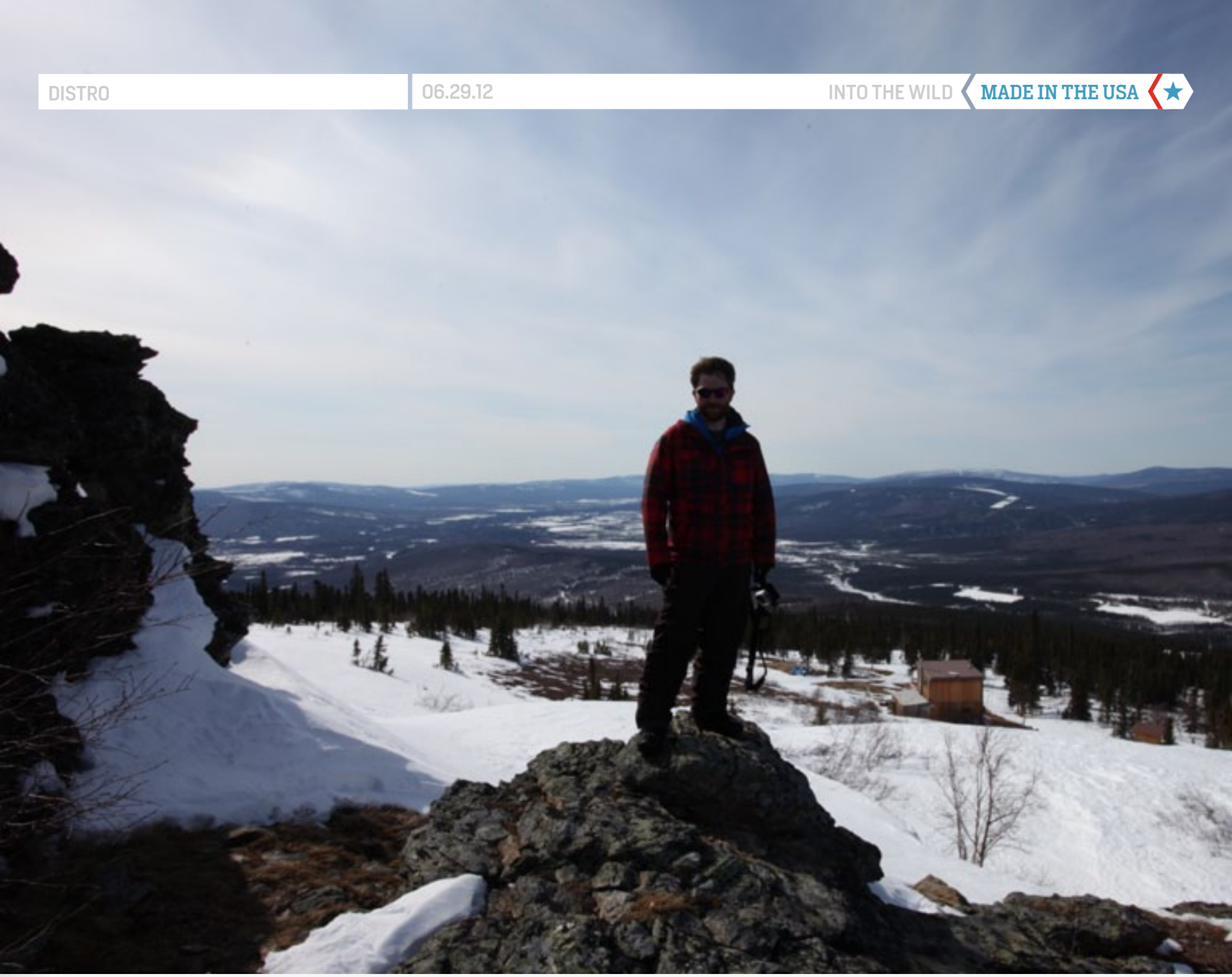
As thrilling as the retrievals can be, there's nothing to match the excitement of uncovering the data that lay inside. While much of the science would take time to evaluate (like the results of Frans' atmospheric conductivity test) it took no time to appreciate the footage that came from the many cameras that were hoisted aloft.

GoPros from a given launch are stacked up next to laptops before being cracked open like reluctant polycarbonate oysters, the chilled gas inside creating something of a stubborn vacuum that's difficult to break. Frigid SD cards are then pulled from cameras and plugged into laptops, each with folders containing hours of footage or thousands of still photos, depending on the camera configuration.

As the memory card contents were opened, typically scattered across a handful of folders, the crew gathered around to marvel at the sights captured from great heights — each surely hoping to enjoy such views themselves someday but, for now, having to make do with a 1080p digital proxy. Daytime launches showed spectacular vistas, flowing cloudscapes left far below or the craggy peaks of the breathtaking Alaskan range turned into so many tiny crumples of white paper.

Nighttime launches, of course, showed less detail of the ground, but it was these the team studied most intently. They were, after all, hoping to get a glimpse at the aurora borealis from within. And they succeeded.

One of the last balloons to be launched, sent aloft on the spectacular night described above, captured a series of images of the bright green and purple swaths of color that flamboyantly danced across the sky. The tiny sensors of the helmet cameras struggled to capture them with the same brilliance as the (relatively) huge DSLR sensor we used on the ground, but capture them they did and see-



Tim following the snowshoe expedition.

ing those lights from that perspective — to the side rather than far above — made the entire team's eyes light up in wonderment.

As they flipped from one photo to the next, they made the same boisterous exclamations that the tourists standing on the hill had made days before when watching the light show in real-time. The members of Project Aether, of course, had missed most of the colorful dancing lights above while they prepared the rigs that would be launched into them, but now the team's payback was sweet. They were getting to watch that same show from a very, very privileged perspective. D

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*Tim Stevens is Editor-in-chief at Engadget, a lifelong gamer, a wanna-be racer, and a born Vermonter.*

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## LOCKHEED P2V-5 NEPTUNE


**This Lockheed P2V-5 Neptune, originally intended for maritime patrol and anti-submarine warfare, is now grounded at Floyd Bennett Field (New York City's first municipal airport) as part of the National Parks Service's Historic Aircraft Restoration Project (HARP).**

PHOTOGRAPH BY NATHAN KENSINGER

# VISUALIZED

# DAVE ALLEN

**The former bassist for GANG OF FOUR and digital branding expert lets loose on iPad magazines and AT&T.**

The beloved Commodore 64 home computer of the '80s.

**What gadget do you depend on most?**
My iPhone 4, Nike+ FuelBand and my Kia Optima Hybrid.

**Which do you look back upon most fondly?**
The Sinclair ZX80 and the Commodore 64.

**Which company does the most to push the industry?**
For gadgets it's Apple. For great beer it's Deschutes Brewery ;)

**What is your operating system of choice?**
Mac OS X Lion.

**What are your favorite gadget names?**
Roku, Arduino and MakeyMakey.

**What are your least favorite?**
Anything with the brand name Windows in it.

**Which app do you depend on most?**
In order:
1. Dropbox
2. Evernote
3. Instagram
4. Google
5. GasBuddy
6. ING Direct Free ATM Finder

**What traits do you most deplore in a smartphone?**
AT&T.

**Which do you most admire?**
Utility and ease-of-use.

**What is your idea of the perfect device?**
My stove-top espresso pot.

**What is your earliest gadget memory?**
My tricycle followed by my algebra calculator.

# Which do you most despise?

## iPad “magazine” apps.

**What technological advancement do you most admire?**
The steam locomotive and the internet, two once-in-a-hundred-year inventions.

**Which do you most despise?**
iPad “magazine” apps.

**What fault are you most tolerant of in a gadget?**
None, it’s 2012, there are no excuses.

**Which are you most intolerant of?**
Connectivity issues.

**When has your smartphone been of the most help?**
Teaching class at the University of Oregon, I sometimes forget my laptop and iPad. The iPhone and Dropbox / Evernote come to the rescue, allowing me to project my class presentations.

**What device do you covet most?**
It most likely doesn’t yet exist.

**If you could change one thing about your phone what would it be?**
The swiping action. It’s fast becoming passé. Check out the lovely app Fish: A Tap Essay.

Click on icon to buy

**What does being connected mean to you?**
Responsiveness.

**When are you least likely to reply to an email?**
On a plane.

# Examining Google's Outrageous I/O Keynote

Brin pulls "a Kanye" with Google Glass during keynote.



**On the heels of big events** from Apple and Microsoft, Sergey and co. got their time to shine at the Google I/O event this week in San Francisco. The show kicked off with a keynote that featured insight into Android Jelly Bean, the unveiling of the Nexus 7 tablet and Nexus Q media streaming device, and a seriously amazing demo of Project Glass, among others. But was the two-hour-and-change press conference enough to push Google out in front of the competition?

## DARREN MURPH

It's sort of insane to think about how much Google revealed at its opening I/O keynote for 2012. Upon initial digestion, I'm most impressed by Glass, but perhaps more depressed about it than most. Why? As I see it, it's a really, really long way from reality. The skydiving demo was monumentally impressive, but we know almost nothing about how it happened. Will Google pony up for unlimited LTE data for Glass wearers? What happens when you venture into the wilds of Yellowstone where there's no signal? Is there even infrastructure in place today for hordes of Glass wearers? I'm delighted that Glass is a real project at Google, but I'm trying to push it to the back of my mind for the next decade — I doubt we'll see anything of substance on the mainstream front for a majorly long time, but I'd *love* to be proven wrong, and I can't wait to test out an Explorer Edi-


Darren Murph throwing down $1,500 for Google Glass.

tion in 2013.

That aside, the Nexus 7 just feels like a rehashed Kindle Fire. A powerful one, yes, but it really doesn't strike me as the device that'll change the tablet game. Had ASUS somehow managed to hit the $99 price point (even subsidized with ads), then I'd be singing a different tune. I'm also distraught by how ecosystems truly are taking over, and sadly, diverging from one another. I feel like I'm being forced to get with the Google+ program or else miss out on loads of amazing Google content. And until Facebook allows me to port over *years* of memories, I'm not going anywhere. I'm stuck.

I couldn't be happier about Jelly Bean. The features shown on stage are truly terrific, and the offline voice dictation and more useful voice searching both one-upped Siri in my mind. Part of me wishes the brains behind this stuff and Siri would just come together to create one all-encompassing ball of awesomeness, but I'm betting the SEC wouldn't take too kindly to that idea. Or most sane people, actually.

## ZACH HONIG

OK, so now Microsoft's scramble to announce Surface last week seems a bit more justified. But, just a bit. Those Windows 8 tablets have little in common with Google's budget offering, but I suppose the fact that the Nexus 7 also offers a touchscreen, web access and video playback makes it a threat to Microsoft. But will Surface have an impact on Nexus? That's a bit less likely — unless the software giant plans to steal Google's thunder with a sub-$200 price tag of its own (which, based on the hardware we saw last Monday, would drop the company's margins far into the red). Both companies are targeting entirely different segments, with Surface aiming for price-elastic businesses and professionals, and Nexus 7 destined for the sensitive consumer market — the folks who would otherwise be picking up a Kindle Fire.

It's that slate's fate that's a bit more questionable. A $199 7-inch tablet from a household name is what gave the Fire mass appeal, despite its locked-


Hugo Barra introduces the Nexus 7, a Kindle Fire competitor.

down OS and hefty build. Now, Google is stepping in with an arguably stronger offering in the Nexus 7, with a 1280 x 800 IPS display, quad-core Tegra 3 chipset and, perhaps the biggest feature of all, Android 4.1. That's not to mention the NFC functionality, accelerometer, GPS, magnetometer and gyroscope that combine to deliver an experience that goes far beyond content consumption. For reading books and watching flicks, the Fire's still got it, but if you're looking to do all that and more — for the exact same price, mind you — that aging tablet is about to be extinguished. I'm a Kindle Fire owner myself, and while I don't plan to unload that seven incher on Craigslist, my Nexus 7 order is signed and sealed — and I'll be counting the days until it's delivered.

## BRIAN HEATER

Sure, he's got one of the best jobs out there, but I don't envy Vic Gundotra — not this week, at least. The Google exec joked about his "Taylor Swift moment" and like the "Love Story" singer totally hijacked by a bit of unscripted Kanye craziness, it was hard not to feel for him. After all, he was tasked with presenting one of the least sexy announcements of this week's press conference (Google+ Events), only to be interrupted by co-founder, Sergey Brin, who hit the stage with Project Glass on his head, introducing a demo that em-

Brin applauds a successful Google Glass skydiving stunt.

ployed skydivers leaping from a blimp above San Francisco, bike riders and rock climbers rappelling down the side of Moscone Center.

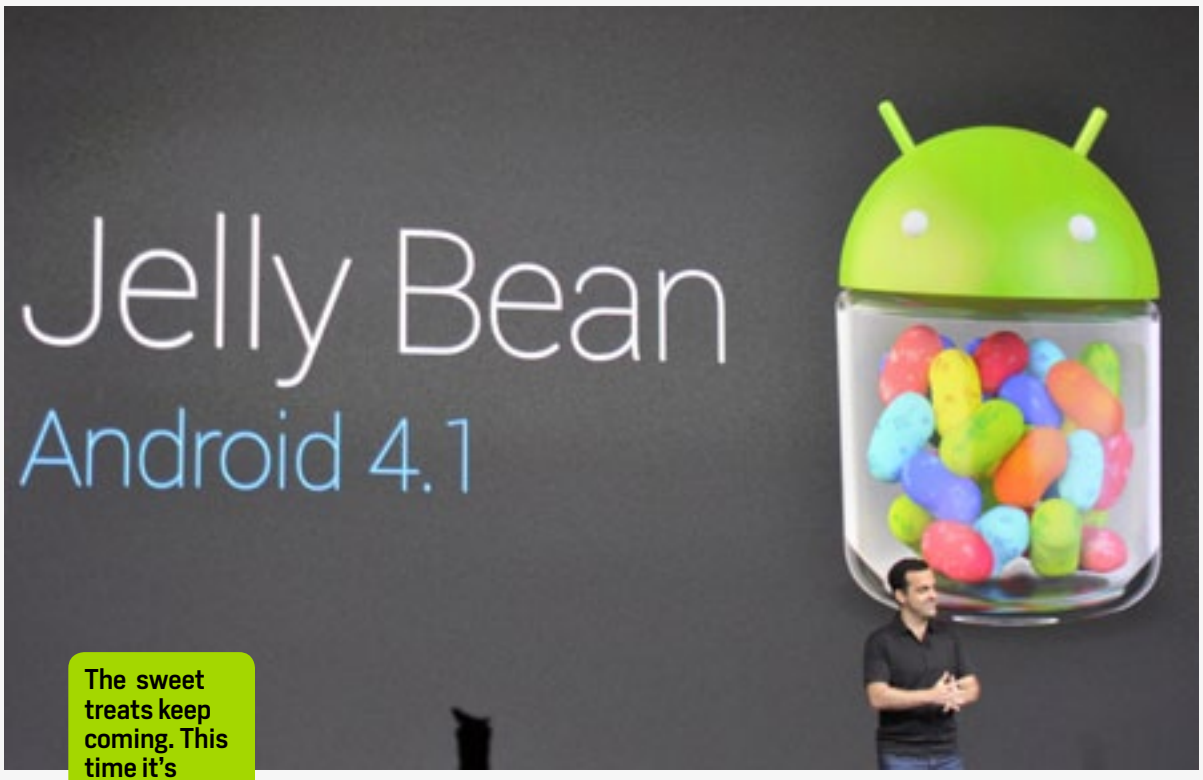
Granted, Project Glass isn't nearly as polished as Jelly Bean or either of the new Nexus devices, but it marks a return to the risk-taking company we all fell in love with, the Google that predates the shutdown of labs, a company focused not just on innovation, but way-out-there innovation. "Jetsons stuff" as our own Darren Murph put it during our liveblog. Project Glass is a reminder of what Google was when it started, so it's only fitting that Brin was there to oversee it. It's also a solid reminder of the role Brin has taken on since co-founder Larry Page took over CEO duties from Eric Schmidt, as the guy who gets to ride around in self-driving cars and the like.

Best of all, the company capped that portion of the presentation by letting the crowd of devs know that it's not simply a pipe dream, with early Glass developer units shipping next year. Well played, Google.

**BILLY STEELE**

Even though we'd seen just about everything Google had to offer in the hour leading up the I/O keynote, I must say the Glass move to Kanye the keynote was a welcome surprise. As a semi-jaded Verizon Galaxy Nexus owner, I'm stoked to

hear that the Android 4.1 update will begin rolling out next month. I don't expect it to cure my connectivity issues, but at least I'll have the freshest un-skinned version of Google's prized OS, right? Google Now is going to be an immensely helpful tool — especially when I'm traveling in an unfamiliar city and need to keep transportation details handy. After announcements like this one for Jelly Bean, I'm reminded of how few Android handsets actually sport the latest operating system. If history is any indication, those about to be ushered into the bowl of tasty candies will be even fewer than those that received a ticket to the Ice Cream Sandwich shindig.




The sweet treats keep coming. This time it's Android 4.1.

I'm going to reserve judgment on the Nexus 7 ... for now. The folks from Mountain View showed us just enough to highlight the strengths while providing some rather stiff competition for the Kindle Fire. However, the camera didn't look particularly impressive (I know, it's a tablet — but still) and I'm not completely convinced the reading software offers a better experience than Amazon's option. The gaming demo *looked* pretty good, but we'll have to see just how well it performs when the Engadget crew puts it through its proper paces. Sure, the Nexus Q is quite dapper and I'm thrilled to see it being made in the States, but for what it is, I'm left wondering if folks will commit $300 to the cause. Right now, I'm thinking not.

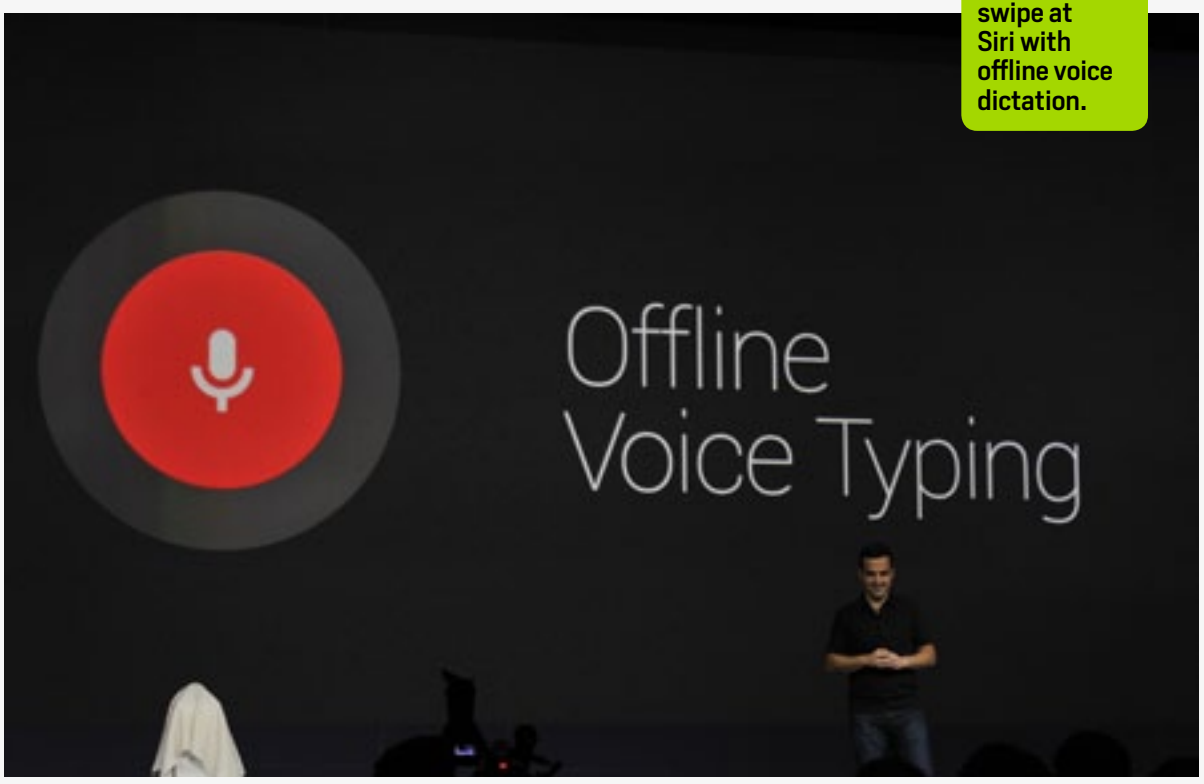
So, about that Glass demo. I don't think I've seen a better or more entertaining method for an outfit to showcase how new tech can be used than with skydiving, mountain biking and rappelling. I mean, we were really only lacking some pyrotechnics of some sort (planned, of course) to cover all of the bases. Kudos to the crew for making folks eager to drop $1,500 on a pair of specs that aren't even 100 percent finished yet. Tim Cook may need to go all X Games at Apple's fall event to keep up — something along the lines of Red Bull's New Year's events, perhaps.

**SARAH SILBERT**

I'll hand it to Google — a skydiving stunt, well-produced videos showcasing Project

Glass and fun on-stage demos added up to a string of announcements that surpassed the pre-I/O hype. That keynote may have left me feeling exhilarated about the company's latest developments, but once that buzz wore off and Mountain View's hardware offerings reverted back to their life-like dimensions, things looked a little less thrilling. The blogosphere's early consensus on the Nexus Q media player seems to be a resounding "meh" and what else could it be, given that $299 price tag? The Nexus 7 tablet looks more promising, as the Tegra 3 processor, NFC capability and 1280 X 800 IPS-based display all smack of a high-quality product. Just like Microsoft throwing its weight behind Windows 8 by outing the Surface slate, Google unveiling its own tablet to launch with Jelly Bean is a great way to show users exactly how it intends for the OS to be experienced.

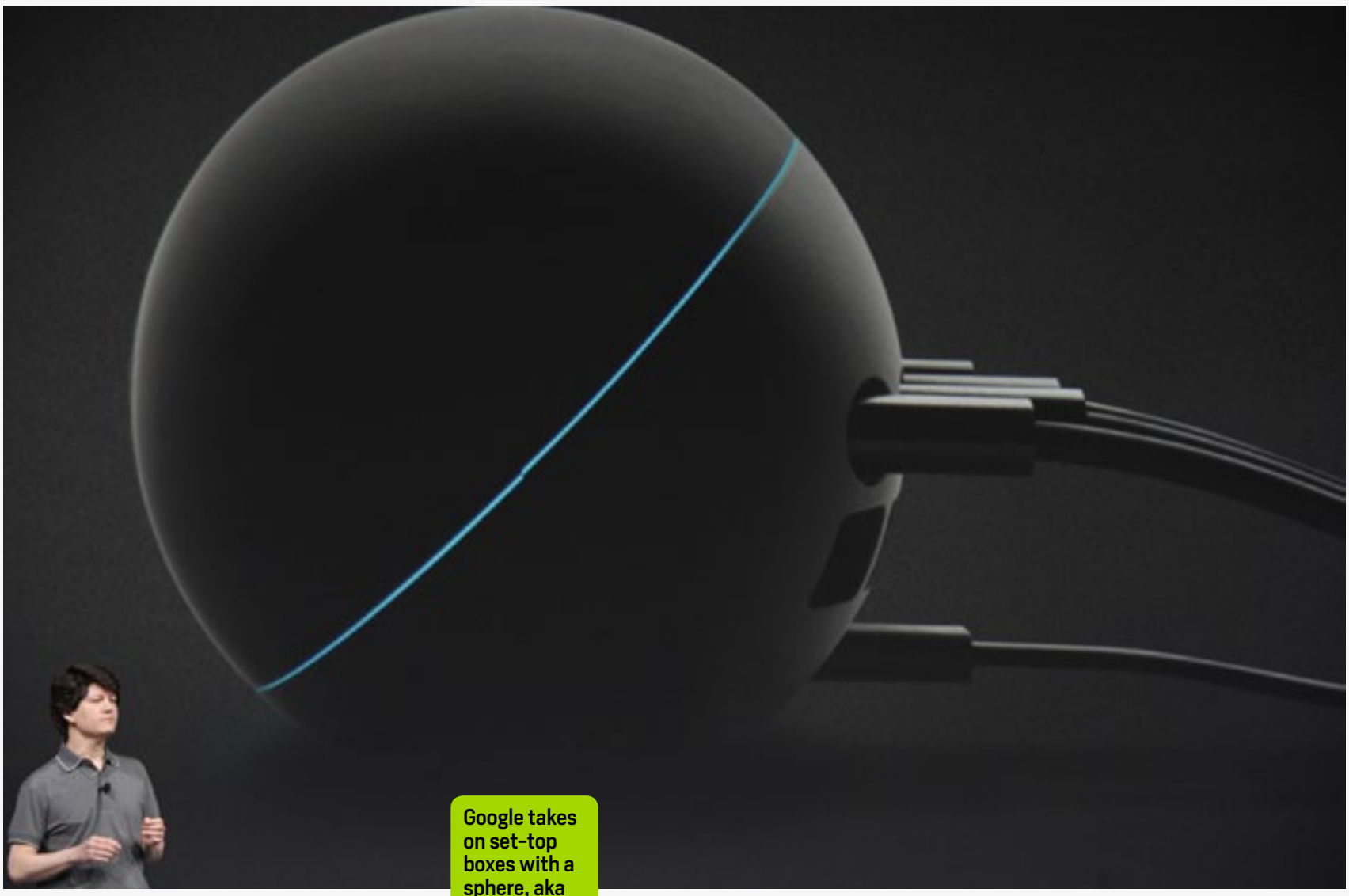
And really, it was the software Google introduced that has me the most stoked. Android 4.1 looks delicious, with offline voice input, dynamic new search functions and a slick retooled notifications system. Google is streamlining and enhancing its OS in all the right ways, and I imagine Android's notorious "learning curve" is leveling out in the process. As nice as Jelly Bean looks, though, I know it'll be ages before it makes its way to my Galaxy Note. Sure, there are far more Nexus S, Galaxy Nexus and Xoom owners out there, but one of the OS' strengths is its presence on such a wide variety of devices. Unless Google's going to commandeer both the hardware *and* software sides of its Android ecosystem, it needs to work with carriers, hardware manufacturers and developers to roll out its latest software to many more handsets — and stat.




Taking a swipe at Siri with offline voice dictation.

## RICHARD LAI

This is, without a doubt, the funnest Google keynote ever, and most of the fun stemmed from the fact that Project Glass was used as a helmet cam to broadcast live video feeds from the sky. Yet I'd be lying if I told you I wasn't disappointed. For something that has so much potential, Google's stunt did a terrible job at convincing me that this is the future. What does the interface look like? What does Sergey want to do with



Google takes on set-top boxes with a sphere, aka Nexus Q.

these glasses? What are the other applications? There's just so much more that I wanted to see in live action. But hey, Sergey's obviously very excited about it and couldn't keep it to himself, so we shall see where his team ends up in a year's time.

On the brighter side, Jelly Bean looks like it's set to reduce the dumbness of Ice Cream Sandwich, and that's exactly what Android needs to shed its nerdy image. On top of the improved graphics performance, I'm particularly excited about the smarter widgets and input methods, while offline Google Maps and Google Play's new content types will also give Android a nice little boost. Naturally, this makes the highly affordable and lightweight Nexus 7 even more appealing to newcomers, though I do worry about the tablet's lack of a rear camera and SD card slot. These cost reductions may make sense to increase market penetration, but with internal storage limited to 16GB maximum and no neat way for expansion (let's face it: OTG is not a pretty alternative), comes a dilemma: you need a personal hotspot to access the rest of your content in the cloud while mobile, but that sucks up a considerable amount of bandwidth, and not everyone can afford unlimited tethering (if you can, chances are you already have a tablet). This means that the Nexus 7 may struggle to get people to use the tablet

outside the home, and perhaps it would make sense for carriers to bundle it with an unlimited mobile hotspot plan at lower rates.

And lastly, the Nexus Q. Even though it's marketed as a more capable and hackable streamer than the Apple TV, its $299 price tag will be a big obstacle for most people. But then again, this futuristic-looking device isn't made for "most people." Buddying up with the renowned Triad Speakers (I know these guys, and they mean business when it comes to audio), Google clearly wants the Nexus Q to be seen as a high-end smart entertainment hub; and by taking advantage of users with a higher budget, the company will slowly turn Android into a cool party machine. Seriously, the more I look at the introduction video clips, the more I want to try it with a bunch of friends. That said, I still hope the Q will get subsidized in the near future, which would obviously require the multimedia part of Google Play to do *very* well. So start spending, folks!

## DON MELANSON

There were a lot of big developments to digest during Google's I/O keynote, but one small, almost throwaway line stood out to me. While running down the specs of the Nexus Q, Google's Matt Hershenson noted that the device has a micro-USB port to support future accessories and "encourage general hackability." With an audience primarily made up of developers, that statement was unsurprisingly greeted with a round of applause. It's also something you don't usually hear a large company say about a big new product — Microsoft and the Kinect comes to mind, but Redmond's embrace of DIY culture only came after hackers and modders had their way with the device.

It's not all that surprising coming from Google, though. This is the same company that's doing some very public experimenting of its own with Project Glass, a product that Google is more than happy to show off in a decidedly unfinished state (albeit on its own terms) to garner feedback. It also announced at I/O that it will finally be putting the device into the hands of at least some developers next year in the form of the $1,500 Glass Explorer Edition (so far only an option for those actually in attendance at I/O). That's not quite a "Hacker Edition," but Google did say that it's doing so in an effort to let folks "help shape it."

Of course, those are just a couple of examples from one corner of Google, but it's at least somewhat encouraging that, as it has an increasingly bigger hand in hardware development, it's seemingly intent on leaving a small crack open for developers, DIYers and hackers to keep their hands in things as well.

## MICHAEL GORMAN

What a day. Google unloaded a lot on us at its opening Google I/O 2012 keynote, with a trio of hardware highlights and a new version of its mobile OS. Jelly Bean's

not the revelation that ICS was, but it'll make living in Google's growing ecosystem a bit easier with Google Now, its improved home screen and refreshed notifications system, among other additions. Jelly Bean's first residence, the Nexus 7 tablet, however, has the potential to be a much bigger deal. Naturally, everyone's comparing the thing to the Kindle Fire, and while the screen size and price tag are the same, such a comparison strikes me as somewhat inappropriate.

The Nexus 7's a proper tablet providing the full, stock Android experience and new, if not bleeding-edge, quad-core silicon — not some bit of last-gen hardware running a closed custom OS. Because Google and ASUS are selling a quality, 7-inch slate with an HD IPS display for the same price as the Fire, they stand a good chance to get a meaningful number of new folks on the Android tablet bandwagon. Android slate sales have lagged since they first hit the market, but Amazon showed that such devices can be sold in bulk when the price is right, and the Nexus 7 provides an even better value proposition than its Kindle competition. Now, I'm not saying it'll overtake the iPad in market share, but I could certainly see the Nexus 7 chip away at Apple's lead in the tablet space. I can honestly say that this is the first Android slate that has me truly tempted to part with my own cash.

As for Google's other Nexus reveal,

Soaking up the applause, following a spectacular PR stunt.

the Q, I'm left wondering how it'll be received by the buying public. Sure, the hardware is slick, sturdy and handsome. And, I'm enamored with its encouragement of real, human-to-human social interaction through an "everyone's a DJ" party approach to music streaming. The problem is, such functionality is being pitched as the Nexus Q's *raison d'être* and at $300 a pop, I'm not sure how many party people will find it worth the money. Most of the time when I'm listening to tunes at home, it's just me and my dog, and he's yet to express displeasure with my DJing skills or demonstrate he knows how to use Android. My point is, I don't see the soiree sphere aspect holding *that* much appeal, particularly in light of cheaper options that can do what the Nexus Q does while also granting access to content outside the Google ecosystem. That said, I love that it's built right here in the USA, and I dig its 25-watt amp that provides a quality audio punch. I'm also looking forward to seeing what comes of the "hackability" and accessories enabled by the micro-USB port — but for now, you can count me among the Nexus Q skeptics.

Lastly, Project Glass, the unexpected star of day one of the Google I/O 2012 show. What an entrance! From Sergey Brin hijacking the day's proceedings to the skydiving, biking and rappelling that brought several pairs of Glasses to the stage, it was an incredible PR stunt. And it worked. The buzz around Project Glass is now louder than ever, and Brin further fed the hype by allowing I/O attendees to pre-order a developer pair of the tech specs for $1,500 each. We also got a few more tidbits about the forthcoming optics, namely that Google's still experimenting with connectivity options and various control inputs (touch, voice and head gestures). Like Brian, I love seeing Google on the bleeding edge of innovation with Project Glass, but unfortunately, all those unresolved issues mean that we won't be seeing hardware on the heads of consumers any time soon. Good thing I'll only have to wait a year to get my mitts on a pair ... I know a couple guys with specs on the way.

## JON FINGAS

Best Google event ever — if not one of the best tech events for anyone, in terms of pure showmanship. Most of the two hours was pure meat, and even if you argue that most of the Project Glass segment was fluff, it was exciting fluff.

The highlight is definitely the Nexus 7. Yes, it's a cheap tablet with no rear camera and no SD card slot. But it remains true that you're looking at a $199 tablet with a quad-core processor, a high-quality display, and the latest version of Android. How can you ignore that? Despite Google's lack of marketing reach, this is by far the best value for the money in Android tablets. Android 4.1 fixes a lot of the chronic performance issues that have dogged An-


Google's latest lineup: Android 4.1, Nexus Q and Nexus 7.

droid while one-upping (if very clearly riffing on) Siri. The one catch is that I can't see Google suddenly moving the needle on Android market share — the Nexus 7 is being sold at cost, and any retailers that carry it will certainly push the price out of that magic zone.

If there's a deeper concern, it's the Nexus Q; not for the $299 price (it's a more self-contained device than the Apple TV), but for what it says about Google's ecosystem. Remember Android@Home last year? Nothing materialized from third parties, and here we are a year later with the only halfway-related accessory coming from Google itself. Either Google took the reins shortly afterwards, or it was met with dead silence from third parties. Whatever you think of Apple, it has no trouble marshaling accessory support, and that goes a long way towards courting fence-sitters. I hope Google isn't leaning too heavily on the Nexus Q to prove that Android can do whole-home media, because it's too expensive and too Google-specific (what, no DLNA or Netflix?) to really fly. D

# REHASHED


BRIN

The week that was,
in 140 characters or less.

# LIVE FROM GOOGLE I/O


GUNDOTRA

**@MikeIsaac**
Standing in a cluster-F of a "line" to get to my I/O seat, and news is breaking from everyone offsite. Why am I here again?

**@inafried**
Dear google people, please stop singing and clapping. We'll use Google+ just make it stop #io

**@zpower**
meanwhile, not a hint of a message on how 4.1 will get to other android devices quickly. and that's because google doesn't know or care.

**@nickbilton**

(I'm so excited about the Google Glasses I want to ReTweet my own Tweet of me wearing them!)

**@LaughingStoic**
Breaking: Oprah sues Google for giveaway infringement

**@saschasegan**
Glasses will cost $1500 and will ship in early 2013. SRSLY.

**@tayhatmaker**
Parachuting, augmented reality, bmx bikes... put a fork in me #io

**@omarelakkad**

Infants everywhere should take out a restraining order against tech industry marketing departments.

**@mattbuchanan**

So Apple, Microsoft and Google all design their own hardware for phone, tablet and living room. Welcome to the next wave.

# WHAT IS THIS? TAP TO FIND OUT

# APPLE-1

**MODERN EQUIVALENT:**
Mac Pro

An Apple-1 motherboard recently fetched an astounding $374,500 at auction, but back in 1976, when the joint effort of two Steve's and a Ron went on sale, that same board would have cost $666.66. The original computers were sold without a monitor, power supply, keyboard or case. Sotheby's estimates that there are fewer than 50 known Apple-1 computers still in existence and only six in working condition.

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