SWCP Portal
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The future ain't quite what it used to be

Tech Overview for 2016

Starting the second half of the second decade of the Twenty-First Century, things should look as shiny and futuristic as the date implies. Exciting progress is predicted for 2016, promising amazing advancements soon in many areas, but you might be struck by a strong feeling of *déjá vu*. Most are for long-desired inventions that have been prophesied for decades, but are still not quite yet here.

This, of course, is nothing new. Transforming fanciful ideas into actual nuts-and-bolts reality is hard, expensive, and fraught with unforeseen difficulties, political and social, as well as the technical ones.

This issue of *The Portal* examines some of the most interesting trends, shaking out real hope from hype. We'll also look at a few things you may have missed.

Disappointing dream vehicles

One prime example of the wish-fulfilment factor getting way out of control was this holiday's most-talked-about gift: the so-called "**hoverboard**". So named after the flying skateboards in the second *Back to the Future* movie made in 1989 but set in 2015, these do not hover or fly at all. They are actually just small-wheeled Segways without any handlebars.

The lack of an easy means to steady themselves makes for hours of videos of riders falling down. So the use of hoverboards is being **restricted**, and warnings issued. Their lithium batteries are also notoriously unstable, sparking sudden, dangerous fires.

Yet, if the tale is to be believed, a "real" hoverboard has been built in Las Cruces. The **Arcaboard** is a personal hovercraft powered by fans, not antigravity. It's heavy, bulky, and noisy, but it *does* get airborne.

The other must-have present, **drones**, also face new **restrictions** from government agencies. Like **lasers**, they can threaten aircraft, but with their ability to **shoot guns**, are even more dangerous – and can also annoyingly intrude into private and public spaces.

Flying cars were also promised **real soon now**, but they don't seem much closer than they were back in the 1960s. Regardless of technical innovations, they probably won't be available until driverless vehicles are perfected. The reason is simple: just imagine the carnage raining down if Albuquerque's lousy drivers – some of the **worst** in the nation – could fly.

But driverless cars loomed large in the news last year, as more and more players enter the field. There are **rumors** of Google and Ford or Toyota joining forces. In any case, vehicles are being tested now in actual street conditions, and being run into by real cars.

Robots racked up **twice as many accidents** as human drivers, so far all minor, but enough to spark a debate among autonomous vehicle developers. The cars are getting hit from behind due to their scrupulous adherance to traffic regulations. The discussion is about whether self-driving cars should pay more attention to actual traffic flow than the law.

Cars are rapidly becoming smart – **automatic parking** capabilities have been in some models for years. New cars are already so connected to the Internet that Tesla downloaded an **autopilot system** overnight that uses the many sensors already built in.

It's a sophisticated cruise control rather than a true driving system, but with each new enhancement, the need for security grows. Several scary demonstrations by academics and researchers last year showed how some new model cars could be **taken over** on the highway by hackers with disastrous results.

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Looking for applications

2015 was touted as the year **virtual reality** finally came of age. Old problems of motion sickness and refresh rate now having been solved, Google made **cardboard headsets** available for Android users.

Along with Facebook's **soon-available Oculus Rift**, the technology seems poised to break out – except nobody has quite figured out **what to do with it** beyond virtual tours and first-person games. At least Microsoft's **Hololens** offers the chance to battle 3D holographically at home without connecting wires.

This experience, which they call "mixed reality gaming" shows that the most important early use of this technology will likely be in *enhancing* reality, rather than *replacing* it. **Google Glass** is already being used by **doctors** to access information during visits. Virtual patients can help them practice surgery, too.

Thinking, talking, killing machines

The biggest potential – and most hype – surrounds robots and artificial intelligence (AI). 2015 seems to have been a **tipping point** for AI. Software algorithms are now busily teaching massive server farms how to interact with novel real-world situations.

It's called "**deep learning**". You want to teach a computer how to spot a cat? Show it thousands of cat pictures and let it sort it out for itself. This kind of self-instruction, which we organic beings do all the time, allows **neural networks** to learn without being programmed step by detailed step. Unlike the earliest forms of AI, which depended on canned scripts and controlled arenas, this is freer and more adaptable.

Error-training corrections may be necessary, but deep learning already powers Facebook's face-recognition technology, voice commands on Android phones, Google searches, even real-time translation on Skype. With the recent embrace of open-sourcing by such tech giants, smart systems are bound to improve and find new niches in almost every field.

Facebook's Mark Zuckerberg **says** he plans to create a robot butler to help him at home. But the potential for truly intelligent artificial systems is expanding far beyond domestic confines. Robots last year were given the ability to **say "no"** to dangerous commands, and even demonstrated **self-awareness**.

Physical robots will continue to proliferate, taking over jobs in many more industries as their abilities grow. Robot hands have been given a human-like **sense of touch**, drones can **navigate around obstacles** or in fleets. Robots are becoming weed-killing **farm workers**, even **hotel clerks and bellboys**.

Yet not everything is sweetness and light. Elon Musk joined together with Stephen Hawking and 1000 other scientists to petition the UN to outlaw **autonomous killer robots**. Musk also **donated** *$10 million* to a global research program to insure that AI only evolves in a humanly-beneficial manner.

Will a backlash emerge? The Marines just shelved their creepy headless **robot mule** as too noisy and hard to repair in the field. And sadly, **HitchBot**, a friendly little hitchhiking robot that safely traveled all across Canada, Holland, and Germany, lasted only *two weeks* in the US before being beheaded in Philly.

Despite such warning signs, the economics behind robots make widespread adoption inevitable. Amazon has been using clever robots since 2012 in its warehouses to **reduce order filling time** from *90* down to *15 minutes*. And this is just the beginning.

What else to watch for

Other often-delayed advances could revolutionize the world. Lockheed-Martin, despite admitting that crucial tools have not yet been invented, claims it's developing power-generating **fusion reactors** that could fit in a large truck. While that seems doubtful, costs of generating **solar power** and other forms of green energy are constantly dropping.

Genetic editing is a new, powerful, and potentially dangerous ability. It's possible with **CRISPR**, a simple technique to edit and insert genetic material into any cell. This makes modifying DNA in infants or adults a real possibility, transforming the nature of medicine, and in time leading to designer babies and enhanced humans – or even a biological apocalypse.

The Internet will continue to expand invisibly around us and penetrate our most intimate environments even as threats also grow. **Closed platforms** may become more common as a result. But researchers are optimistically studying biological models of **infection control** even as hackers' exploits evolve.

The shadow of recent bloody events can be seen in the adoption of **CISA**, a cybersecurity bill feared by privacy activists to allow easier spying on Americans. Whatever else happens, there will be much news about hackers and threats this year, so stay tuned.

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