

*The future might not be so bad after all*

## And now for some good news

Today's world is so fraught with anxiety about everything that even positive news is often regarded with suspicion. What's good for one person or group isn't necessarily good for another, and the media constantly feeds those worries by pointing out the down sides of recent developments, not least in regards to science and technology.

But while it's important to warn of potential dangers lurking ahead, it's not a bad idea to occasionally appreciate the many wonders coming up and the amazing opportunities they will bring. In this issue of the *Portal*, we're going to look at a few reasons to be hopeful this holiday season.

### Apocalypse not

First of all, you can be reasonably optimistic that the world will *not* end this December 21. The fears of the so-called "**Mayan apocalypse**" on that date are due partly to misunderstanding how their calendar works, but also because of a curious astronomical coincidence noticed last century.

The Mayan calendars (they actually used 3) are a marvelous system of interlocking cycles within cycles that can function precisely like an odometer over millions of years. But though the end of the 13th Baktun this month is that of a period that began back in 3114 BC, they believe the world isn't slated for destruction and rebirth again until October 12, 4772; oddly enough, on Columbus Day.

The astronomical alignment is remarkable but it was only discovered by modern radio telescopes. In this era, the Sun at its lowest point does line up with the center of the Galaxy. Yet not only would it have been impossible for the Mayans to imagine or predict, it should have far less effect on anything on our planet than, say, an eclipse. But if you must get all astrological, relax: the **Age of Aquarius** (remember that?) should start soon, if it hasn't already.

### Factories in your closet

The **3D printer revolution** first mentioned here several months ago is already taking off with surprising speed. Very basic home printers for hobbyists are now available for under \$500. A printing filament partly based on plant material has just been developed that mimics wood. With many of the basic patents of the technology ending soon, a flood of innovative new models is to be expected.

The "killer app" for such devices hasn't yet been found, but you can already make your own small replacement parts and toys. Real home closet shops are not far away.



### Faster, smaller, cheaper, and everywhere

Someday you might print out various kinds of robot assistants. Robotics will accelerate the replicator revolution and vice versa through continuing advances in electronics. Despite predictions over the past half-century of the imminent end of "**Moore's Law**," which says that every 18-24 months the number of data-crunching transistors put on a microchip doubles, it's still holding true today.

And the results are obvious. As computers become smaller and less expensive yet more powerful, they multiply and take on new roles. The equivalent of a giant mainframe that once occupied an entire floor now fits comfortably in a shirt pocket. **Tablets** with full-color multimedia capacity and Internet connections are the size of pads of paper they are replacing – and no box of crayons is needed either.

Like 3D printers, **robots** are leaving factory floors for the home. They have become so complex in their interactions with humans that serious discussions have begun about the necessity of installing systems of **morality** in them.

While it's doubtful these will ever be as elegant as Asimov's famous science fictional "Three Laws of Robotics," it is not unlikely that such regulations will shape how our mechanical servants relate to us. But laws for robots may limit humans too. In time, for instance, actually driving yourself in any kind of traffic might be forbidden because of the dangerous unpredictability of human drivers.

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Of course, it's **armed drones** that make a consideration of robot ethics urgent. But it is a sign of how far things have come that some deep thinkers are now questioning not just how a ruthless robot revolution might be averted, but other bad outcomes, such as becoming wards of a suffocating robotic nanny-regime or simply being left behind by uncaring artificial intelligences we have spawned.

## Cyberplanet

You won't be finding intelligent machines just in the form of **humanoid robots** like C3PO, either. One day you might find them in your refrigerator, medicine cabinet, or even in your pants monitoring your medical condition, or perhaps changing your clothes' appearance, function, or shape.

Machine intelligence will not be found in isolation either, but thoroughly linked. The Internet, after all, is a collection of computers talking to other computers. Several hurdles have recently been overcome that will increase that enormously in terms of the amount of devices that can be connected and the speed those connections work.

On the machine side, the number of gizmos that can be hooked up over the Net is now virtually limitless, thanks to the successful roll-out of **IPv6**, the current addressing system's replacement. While some questions may remain about how to switch everything over, it is now possible to connect every one and every thing on the planet. Not only will your refrigerator become smart, you'll be able to talk to it from anywhere – even outer space.

On the human side, **domain names** have also been widely expanded. Writing systems on the Net not based on the Latin alphabet are now allowed too. Yet foreign languages will become less of a problem as computer hearing and language abilities grow. Apps on smartphones can already translate signs and serve as phrasebooks and guides.

Meanwhile, Internet speeds are increasing. It's ironic that the US, the birthplace of so many vital communications technologies, has such slow speeds and limited coverage. That is part of the price of being first adapters: those who use a new technology early always have to pay more than latecomers in terms of initial costs, usage, and upgrading. Finally, however, we're slowly catching up.

Google, for instance, is testing **ultra-high-speed fiber** in parts of Kansas City. It offers blazing 1Gb speed access for just \$70 per month; with full access to cable TV and 1Tb of online storage space for \$120. There's no telling when such will become available in New Mexico, however.

## Life extension

With enough progress in **genetics** and **biotechnology** you might just live to see it. Now that the human genetic code has been cracked, scientists are discovering just how intricate and delicate the interplay between our genetics and environment are. Even now, they can not only pinpoint a number of hereditary diseases but predispositions people may be blissfully unaware of in time to change lifestyles before such tendencies become illnesses. And **designer babies** are likely merely a matter of time.

## Back to the final frontier

Exciting news for many geeks is that the **space program** is coming back. While plenty of ideas have been put out for returning to the Moon or pushing on to Mars since the Space Shuttle program ended, there's been sadly little sign of any forward motion in manned space exploration.

But NASA and Russia just selected two spacemen, Scott Kelley and Mikhail Kornienko, to participate in a **year-long flight** aboard the International Space Station. The study of long-term exposure to zero-gravity and other space conditions will hopefully pave the way for expeditions to Mars.

Such voyagers will have a new way to communicate – by Internet. The Net went interplanetary in October when NASA and the ESA tested **new Internet protocols** that allowed an astronaut in orbit to control a robot made of Legos here on Earth. The DTN (*Delay Tolerant Networking*) protocol allows highly extended waiting periods so that robust connections can be maintained for whole networks of far distant spaceships, satellites, rovers, and bases.

They may have new worlds to aim at. NASA not long ago got two most unexpected gifts from the NRO, the super-secret spy satellite agency: a pair of **Hubble-class space telescopes**. Turns out that they were still unwrapped, never-used spares, just gathering dust in the warehouse even while NASA went through the dangerous ordeal of repairing and rescuing their prize instrument. The space agency is still asking for ideas on what to do with them. Well, they could always rent one out to the paparazzi...

Perhaps they'll be used to look for more **exoplanets**. At least 852 have been found already, including 126 multiple-planet systems and even a few roaming free in interstellar space. A couple of months ago, they discovered one at Alpha Centauri, the closest solar system to our own, about the size of our planet but much too close to its parent star to support life. But it's the most similar exoplanet to our homeworld that they've found so far as well as the nearest.

However, the best news of all is that they may find a way to get there. Our fastest probe, Voyager 1, dawdling along at 38,000 miles an hour, would take 700 years to arrive at the closest star. But scientists are already working on the theoretical physics behind **warp drive**. They now think it might just be possible to get to the stars in a reasonable time using a reasonable amount of energy.

It's looking more like a *Star Trek* future all the time.



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