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SOME MOST SIGNIFICANT INVENTIONS OF RECENT YEARS

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Today we find ourselves between a forest and ocean – a forest of new knowledge and the ocean of needs. We are generating more new knowledge in one year than we generated in a full decade less than a half – span ago. In fact, if you look upon the last 50 000 years of man's existence in terms of life-spans, the speed of our progress – the pace of change is readily apparent. Because 800 modern life-spans would bridge more than 50 000 years. But of those 800 people 650 would have spent their lives in caves or something worse; only the last 70 had any truly effective means of communicating with one another; only the last six ever saw a printed word; only the last six had any real means of measuring heat and cold; only the last four could measure time with any precision; only last two used an electric motor; and many of the items that make up our material world were developed within the life-span of the 800^{th} person (Rubtsova M. G.). Today the progress doesn't go spontaneously, its development is in the limits defined by the government as perspective. Such inventions are often called "innovations". Some innovative fields in our country are: informational-telecommunication systems; nanosystem and material industry; living systems; rational nature management; energetics and energy saving; security and counteraction to the terrorism; future-technology armaments, military and special technologies.

The main breakthrough directions are "energy to every house", combination of virtual reality and everyday life, outer space and robots.

Nowadays our world is technically developed and automated. It means that we have a whole system of theoretical sciences describing different phenomena and its industrial application. It is commonly believed that pure research tends to be methodologically superior to applied one. Applied research has the advantage of being able to formulate criteria of its own efficiency in terms of the objectives for which the problem is being investigated. Because of lack of specific objectives, in pure research such criteria cannot be formulated as explicitly. Consequently, in pure research many implicit assumptions are made about the conditions under which its results may be applied. In applied research these assumptions are frequently found to be unrealistic. But you can't deny that applied sciences are of prime importance especially in the technical sphere without which nobody can do.

There are absolutely different directions in equipment developments. Here are some examples taken from recently published "Popular mechanics", "Popular science" and "Times" journals and newspapers. Philips' LED bulb(alternative to the common 60-watt one) which emits the same amount of light as its incandescent equivalent but uses less than 10 watts and lasts for 25,000 hours — or 25 times as long. Another invention used in our everyday life is a folding electric bicycle YikeBike. You don't even have to pedal and you lean left or right to steer, and it even comes with electronic antiskid brakes. It weighs roughly 9 kg and runs with a top speed of 20 km/h on a lithium phosphate battery that can be charged to 80% capacity in 20 minutes. The greater velocities are possible with the High-Speed Helicopter. Usually helicopters are used for hauling cargo and rescuing mountaineers. But if it's necessary to cover a long distance fast, planes are preferable, as helicopters today struggle to top 290 km/h. Sikorsky's X2 Technology helicopter aims to annihilate that speed barrier. Unlike ordinary choppers, which pair a single rotor on top with an antitorque tail rotor, the X2 has two main rotors spinning in opposite directions and an airplane-like propeller at the rear. This highly stable setup should allow the X2 to cruise at a zippy 467 km/h — about the same speed as some small turboprop planes. The best and fast enough surface transportation is the Nissan

Leaf. It's not the world's first electric car, but, launched in August, but it is the first fully electric vehicle built for mass production for the global market. To help drivers shift their thinking from gas to green, Japan's third largest automaker has about 30 partnerships worldwide focused on developing an infrastructure of battery-recharging stations to keep electric vehicles on the roads. The car's top speed is more than 145 km/h, and its range is 160 km on a full charge. Nissan will produce 50,000 Leafs each year at its Oppama plant, southwest of Tokyo, starting in the fall of 2010. And one more interesting invention is Controller-Free Gaming. Since time immemorial one barrier that has stood between gamers and total Tron-like immersion in their video games has been the controller: the joystick, trackball, mouse, light gun or whatever. This year Microsoft demonstrated a technology, code-named Project Natal, that enables players to control games using only body movements and voice commands, no controller required — the gamer's body becomes the controller. Project Natal uses several cameras, plus a highly specialized microphone and a lot of fancy software, to track the gamer's body and interpret his or her voice.

Development of medicine is one of the most important fields for everyone living. An AIDS vaccine is not exactly a novel invention, but one that's designed to fight HIV certainly is. More than 20 years after the AIDS virus was identified, researchers have devised the first immunization to protect people against HIV infection. A six-year trial showed that the vaccine, which consists of two shots that given individually had failed to protect against HIV, is modestly effective, reducing infection 31% among those receiving the regimen vs. those getting a placebo. Scientists are still trying to figure out how the vaccine decreases infection risk, since the shots did not affect the level of virus in the blood of volunteers. And some experts question whether the small effect is indeed significant. The vaccine is not approved for use yet, but it's the first to make any headway against HIV, and that's a start. There is also invention for people with "locked in" syndrome, which paralyzes the body, except for the eyes, but leaves the mind alert. In April, University of Wisconsin doctoral student Adam Wilson — working with adviser Justin Williams, above — tweeted 23 characters just by thinking. He focused his attention on one flashing letter after another on a computer screen while wearing a cap outfitted with electrodes that monitored changes in his brain activity to figure out which character he wanted. His efforts spelled out "USING EEG TO SEND TWEET," among other messages. For now, though, it's slow going: with the speediest brain tweeters reportedly managing just eight characters a minute, it's a good thing they're limited to 140. MIT researchers are developing a microchip that could help blind people regain partial eyesight. Though it won't completely restore normal vision, it will enable a blind person to recognize faces and navigate a room without assistance. The chip, which is encased in titanium to prevent water damage, will be implanted onto a patient's eyeball. The patient will then wear a pair of eyeglasses equipped with a tiny camera that transmits images directly to the chip, which in turn sends them to the brain. With any luck, human trials are only a few years away. Tens of thousands of amputees in the developing world wear an inexpensive prosthetic called the Jaipur Foot. But poor patients who lose a knee joint have few options: a titanium replacement can cost $10,000, and crude models don't work very well. Now a team of Stanford engineering students has designed a knee that's not only dirt cheap — just $20 — but also mimics the natural joint's movements. Developed with the Jaipur Foot group, the JaipurKnee is made of self-lubricating, oil-filled nylon and is both flexible and stable, even on irregular terrain. The device is being tested in India; more than 300 people have been fitted so far.

Now about the cosmic technologies. It's no secret that space is cold. But in some places, it's so frigid that light can't radiate in the visible spectrum, which makes celestial bodies invisible. Now the Herschel Space Observatory is exposing them. Launched in May by the European Space Agency, Herschel scans the skies in the infrared spectrum. In order to avoid infrared interference and temperature fluctuations from Earth, it hovers in space at the second

Lagrange point, about 930,000 miles (1.5 million km) away, where the gravity of the Earth and sun balance out. Herschel will operate for at least three years, during which it will watch stars and planets being born, revealing more about how the universe came to be.

NASA's Ares Rockets, the best and smartest thing built in 2009 — a machine that can launch human beings to cosmic destinations we'd never considered before. There are a lot of reasons astronauts haven't moved beyond the harbor lights of low-Earth orbit in nearly 40 years, but one of them is that we haven't had the machines to take us anywhere else. The space shuttle is a flying truck: fine for the lunch-bucket work of hauling cargo a couple of hundred miles into space, but nothing more. In 2004, however, the U.S. committed itself to sending astronauts back to the moon and later to Mars, and for that, you need something new and nifty for them to fly. The answer is the Ares 1, which had its first unmanned flight on Oct. 28 and dazzled even the skeptics. It's huge: about 100 m tall, or the biggest thing the U.S. has launched since the 111 m Saturn V moon rockets of the early 1970s. Its first stage is a souped-up version of one of the shuttle's solid-fuel rockets; its top stage is a similarly muscled-up model of the Saturn's massive J2 engines. The Ares 1 is a worthy descendant of their rockets and others, with lightweight composites, better engines and exponentially improved computers giving it more reliability and power. The Ares 1 will launch an Apollo-like spacecraft with four crew members — perhaps by 2015. Alongside it, NASA is developing the Brobdingnagian Ares V, a 116 m behemoth intended to put such heavy equipment as a lunar lander in Earth orbit, where astronauts can link up with it before blasting away to the moon. Somewhere between the two rockets is the so-called Ares Lite — a heavy-lift hybrid that could carry both humans and cargo and is intended to be a design that engineers can have in their back pockets if the two-booster plan proves unaffordable. The new rockets could take astronauts to some thrilling places. The biggest costs — and risks — associated with visiting other celestial bodies are from landing and taking off again. But suppose you don't land? An independent commission appointed by the White House to make recommendations for NASA's future recently returned its 154-page report and made strong arguments for bypassing the familiar boots-in-the-soil scenario in favor of a flexible path of flybys and orbits. Under the new thinking, astronauts could barnstorm or circle the moon, Mars and Mars' twin moons, deploying probes to do their rock-collecting and experiments for them. They could similarly sample near-Earth objects like asteroids. They could also travel to what is known as the Lagrange points — a scattering of spots between Earth and the moon and Earth and the sun where the gravitational forces on the bodies are precisely balanced and spacecraft simply ... hang where they are. These would serve as ideal spots for deploying probes and conducting cosmic observations. NASA designers say the Ares line will be 10 times as safe as the shuttle and two to three times as safe as competing boosters.

Among the military and special technologies one can mention the Smart Bullet. You fire a bullet, and it explodes where you tell it to. That's the essence of the XM25, a gun that fires explosive rounds able to neutralize enemies camped out behind cover. Using the gun's laser range finder and the bullets — which are equipped with microchips capable of registering distance according to the number of times they've rotated — a soldier can program a round to detonate beyond an obstruction — no impact required. The practical value? Soldiers in urban environments can fire over or past walls sheltering their enemies, and the bullets will explode on the other side. The weapon is currently under development for the U.S. military by Alliant Tech systems, Heckler & Koch and L-3 Brashear.

We mentioned above some rather important developments in different sciences and technologies. Of course, there are much more. But they are the subject of later discussions.