



Innovation news

Spanish engineers created a 3D system fitted with the infra red sensor system to promptly and automatically scan a person in three dimensions using special lenses.

It was used to “scan” all the residents of a village in Andalusia. The CloneScan3D developers and project initiators tell RIA Novosti that the scanning process takes 15 seconds, and 90 seconds are needed to process the image.

“To create your own three-dimensional picture is now as easy as to take your picture in a photographer’s studio,” say the developers.

At the Nano Tech 2015 exhibition, which took place in Tokyo at the end of January this year, representatives of National Institute for Materials Science (NIMS) presented samples of the polymer film they created. The film changes its colour based on the applied mechanical stress. This effect is affined to the effect of the iridescent colours on the wings of some species of butterflies or bugs which change their appearance when changing sight angle or light incidence angle. But the film’s colour is not changed completely, all points of the mechanical stress, stretching or twisting areas are vivid on its surface. This can be an advantage for various purposes.

The effect of the film was achieved by scattering a colloidal solution above the film surface. The solution contained nanoparticles having the dimensions comparable to the reflected light’s dimensions. When the solvent dried, the coating became a kind of an elastic optical crystal able to reflect light in a specific wavelength range, which means it obtained its original colour. The surface colours created in this way are called structural colours. Such colours are typical for wings of some species of insects, butterflies, and bugs which are iridescent in the bright sunlight.

Mechanical stress applied to the film causes its deformation, stretching or twisting. Anyway, due to the deformation, the distance between the coating nanoparticles slightly changes causing changes of the colloid optical crystal’s properties, which starts to effectively reflect light with a shorter wavelength.

To create the colloid optical crystal’s coating, the researchers used a rather common organic solvent, which is colourless and fully safe for environment and people. Thanks to these properties, such coatings can be used for any public infrastructure facilities to monitor structural integrity of buildings, bodies of transportation vehicles, trains, and public transport. Moreover, such coating application method can be used when manufacturing toys, load and mechanical stress sensors, optical filters and elements of spectroscopic devices.

KAIST presented a robot prototype which can pilot a real aircraft. The development is rather “rough”, but its potential is evident even now.

Korea continues to surprise the world with robotic engineering. At the last IROS conference in Chicago, the developers from KAIST presented their new creation – the robot able to pilot aircraft. The development was named PIBOT.

What is a distinctive feature of the robot? The point is that PIBOT can detect switches and buttons in a cockpit, and use them with no trouble. Thus, the robot pilots aircraft the same way as a human pilot. It is even able to identify edges of a runway. PIBOT has a video camera for this purpose.

Simulated flight tests were completed successfully. The robot effectively prepares to take off by rotating/turning on all the required switches. When the engine is started, PIBOT starts acceleration on the runway. At this, the robot recognizes its edges and goes along the central line. After a successful

take off, descent and return to the start point are initiated, followed by a safe landing. The PIBOT's ability to manoeuvre and move along the set trajectory should be emphasized.

Baxter, an industrial robot created for a range of routine processes and dangerous production operations, is being examined by psychologists. The University of Canterbury studies opportunities of humanoid robots and human interaction.

Baxter is a leading-edge robot able to learn based on a human example, repeat movements strictly following their sequence, but more than one hundred-fold faster. The robot is presented as a safe one for joint operations with humans. It needs no safety system and its human "colleagues" can be in the immediate vicinity.

Professor Dick Elton, an employee of Psychology Department, called Baxter the first real step in terms of the smart machines revolution following which robots will be able to work jointly with humans. One of the questions which can arise even prior to a smart machine implementation in a factory is the way human respond to such a newcomer. Will they trust their electronic colleague? The psychologists are also interested in the consequences of global robotic automation. Particularly, if the inter-human relations change in case the machines are too much alike us. Also, if we become too much dependent on robots and, consequently, socially disengaged. There is such branch of science as social robotics, and elaboration of Baxter and humans interaction is beneficial for it. Based on its example, understanding of human reaction to the robot's appearance and behaviour, as well as of the human response to the unusual machine is refined.

Baxter has two hands similar to human ones, and a head with animated eyes. It is able not only to perform a number of production operations, but also to report in case of an abnormal situation. But it is unlike other machines mostly because it is a learning machine.

Military turned lightning into weapon

Laser weapon being used by military can blind spy satellites or set enemy's equipment on fire. But what about using something more familiar, but causing the same horror as weapons, for example, lightning?

The US military laboratory tests a laser weapon creating a plasma channel in the air similar to the one that occurs during storm. The weapon can effectively kill targets, such as enemy's tanks or unexploded shells, since these targets conduct electricity better.

The new weapon's concept is based on the phenomenon that when lightning from a thunderstorm leaps from cloud to ground, the electricity follows the path of least resistance, explains George Fischer, Lead Specialist of the U.S. Army Armament Research, Development and Engineering Center.

To create a laboratory unit, the researchers used "ultra short laser pulses of low power". The laser's electromagnetic field collects electrons from air molecules to create plasma.

"During the duration of the laser pulse, it can be putting out more power than a large city needs, but the pulse only lasts for two-trillionths of a second," says Fischer.

It would be wrong to believe that such weapon can be installed onboard a cruiser of the US navy any time soon. The prototype is of laboratory scale and consumes a lot of energy. But we should bear in mind what type of weapon we can see in the future.

Based on the data from livescience.com.





American military tests reconnaissance airship

Golden age of airship took place between World War I and World War II, since then they are mostly displaced by aircraft. However, the US Army does not write them off and prepares the flight of Long Endurance Multi-Intelligence Vehicle or the reconnaissance airship.

The airship is to be fielded next month, and the first flight will take place in New Jersey in the beginning of June. Following the test flight, the airship will be fitted with cameras and other equipment for black operations.

“We’ve developed a clean aerodynamic design with less drag than competing designs, use existing proven hull materials, a type certified engine.”

Should the equipment tests be carried out as planned, LENR will fly across the Atlantic in the “beginning of winter” for demonstration in Afghanistan.

It is of a football pitch size (to compare, the Hindenburg airship – the most famous one – is 243 m), LENR’s payload is 20 t. A larger model can potentially lift hundreds of tons. The upper limit is 6700 m, the maximum time the airship can be in the air is 21 days.

The largest load the aircraft (the An-225 aircraft) has ever lifted also weighted hundreds of tons; but it is very expensive and requires a good runway to take off. At this, the airship’s operation is cheaper and needs no high-quality runway to take off.

Based on the data from northropgrumman.com

NASA developed Mars Helicopter Scout

Jet Propulsion Laboratory (JPL) ensuring researches for National Aeronautics and Space Administration (the USA) developed and tested prototype of a reconnaissance drone to be used on Mars.

One of the main difficulties for the unmanned explorers on Mars is a limited view field of the cameras. Landscape heights can obstruct some terrain areas to which a Mars rover vehicle should be directed causing significant inconveniences. In view of such limitations, the vehicle shall go along an imperfect route.

A reconnaissance device onboard spacecraft going round Mars is also insufficient to ensure the best movement conditions for the rover vehicle. Thus, it would be favourable to provide low-altitude reconnaissance scouts in close vicinity to the main machine.

As per experts’ assessments, use of the drones additionally to the Mars rover vehicles, which provide terrain tracking from the top, will triple the distance the rover vehicles can cover during a Martian day.

Under such exploration scheme, the helicopter type drone will fly ahead of the Mars rover vehicle almost every day to check different terrain spots which can be interested for researchers and assist engineers on Earth to design the best route for the rover vehicle.

Moreover, mini helicopters will allow preliminary identification of landing points, for example, for sampling, which can be applicable not only for the Mars rover vehicle operating with the helicopter, but also for future exploration with rover vehicles of future generation.

An aerodynamic device powered by solar cells can lift about one kilo. The distance between the blade tips is 1.1 m. The exploration equipment and control system elements are placed in a cubical container.

New cloaking device hides objects across range of angles using simple lenses

Recently, scientists have developed several ways – both simple and involving new technologies – to hide objects from view.

The latest development of the University of Rochester addresses some limitations of the previous devices, and its design includes inexpensive available materials.

“There’ve been many high tech approaches to cloaking and the basic idea behind these is to take light and have it pass around something as if it isn’t there, often using high-tech or exotic materials,” says John Howell, professor of physics at the University of Rochester.

Howell and Joseph Choi, a PhD student, decided not to use the specialized components and developed a combination of four standard lenses that hides the object from view even when a viewer moves up to several degrees away from the optimal viewing position.

“This is the first device that we know of that can do three-dimensional, continuously multidirectional cloaking, which works for transmitting rays in the visible spectrum,” says Choi, a PhD student.

Results are published in the Optics Express journal.

