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NEWSLETTER

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IN THIS ISSUE

INTERNATIONAL COOPERATION

Joint Remote Sensing Training

An advanced land based remote sensing training course, co-sponsored by China National Remote Sensing Center and the European Space Agency under a "Dragon" S&T cooperation program between China and Europe, opened on September 6, 2010 in Lanzhou. The training course was designed to let young remote sensing personnel from research institutes and universities in China's west region get familiarized with the latest remote sensing techniques developed by Chinese and European researchers. Trainees were taught with both theories and actual operations, including radar, optical, thermal, and infrared remote sensing techniques, and to use a range of advanced computer programs, including BEAM, NEST, and POLSARPRO, in handling remote sensing data.

China Strives for More Space Technologies

It is reported at a meeting held to celebrate the 30th anniversary of the establishment of the Special Committee for Spacecraft Measuring and Control, part of Chinese Society of Aeronautics that China will strive to master six key technologies concerning space based measuring and control, high speed data transmission, and high precision measurement in the next 20 years.

1) China will build up its space based measuring and control capability, in an effort to reduce the cost of land based navigation, shifting its focus from land based navigation to high altitude and deep space missions. Chinese scientists will work on space based internet technology on an experimental basis, getting prepared for establishing an integrated information network linking the earth and space, and for manned deep space probe activities, allowing astronauts to work in orbit for an extended time;
2) China will enhance its efforts to develop high speed data transmission technologies, in an attempt to improve its earth-space communication capability. Chinese scientists will also work on applicable relay technologies for moon and space probe activities, rendering a rational, economic, and efficient solution for high speed transmission between the earth and space.
3) China will expect breakthroughs in high precision measurement techniques, realizing precision orbiting and positioning, and meeting the high precision needs for lower and middle orbit satellite positioning at a millimeter level, geosynchronous satellite positioning at a 10-meter level, and precision landing/docking/celestial body surface navigation in deep space probe activities.
4) China will improve its space debris monitoring technologies, and associated prewarning capability. In the next 5 to 10 years, the space objects and debris that can be cataloged will exceed 20,000 in number, a noticeable threat to China's space assets. In this context, Chinese scientists have to enhance their efforts to identify and catalog the properties of space debris.
5) China will develop efficient management techniques, enhancing the efficiency of its control system. China has to build a capable management system for large scale resources planning and management, multiple targets control, quick space response, and failure handling, in an effort to deal with the booming number of in-orbit spacecraft and multiple-satellite measurement and control.
6) China will develop and apply integrated information technologies, raising the overall capability of its control system. Chinese scientists will establish a new and flexible measuring and control information system, featured with an open structure, information sharing, and resources realignment, meeting the increasing measuring and control needs in the future.

New Moon Probe Has More Innovations

Not long ago, WU Weiren, chief designer of the moon probe project, said that Chang'e II satellite will strive for technology innovations and breakthroughs in the following 6 aspects:

1) Chinese scientists will develop new launch technologies to send the new moon probe satellite directly to the earth-moon transfer orbit. China sent its first moon probe satellite, Chang'e I satellite, to a transitional orbit near the earth, before gearing it up to the orbit heading for the moon. The new moon probe satellite will directly hit the orbit heading for the moon at a perigee altitude of 200km, and an apogee altitude of 380,000 km. This will shorten the time to reach the moon. It took 14 days for Chang'e I satellite to enter the working orbit, while it will only take 7 days for the new satellite to accomplish the same mission. This calls for an enhanced thrust of launch vehicle, and improved orbiting and control precision.
2) China will test its X-band deep space measuring techniques using Chang'e II satellite, validating the feasibility of establishing a deep space measuring regime of its own. The control of Chang'e II satellite will for the first time test China's own X-band deep space measuring system. Comparing with the S-band measuring system employed in Chang'e I satellite, X-band will provide a higher radio signal transmission frequency, desirable for long distance control and communication.
3) Chinese scientists will test a 100km lunar capture technique. Chang'e I satellite had a lunar capture 200km from the lunar surface. The new satellite will apply the brake at a point 100km from the lunar surface, which requires a faster speed at a lower orbit with an enhanced brake capability. Meanwhile, the unevenly distributed gravity over the moon surface would build up perturbation impacts on orbit, making brake a tough task.
4) Additionally, Chinese scientists will test orbital mobility and fast measuring techniques within the scope of 100kmx15km through Chang'e II satellite. The test will turn the 100km circular orbit into an oval orbit with apolune at 100km, and perilune at 15km.
5) A brand new camera will be tested for an enhanced data transmission capability. The new satellite will be equipped with a drop camera. Scientists will test its moon imaging capability, get prepared for Chang'e III satellite's soft landing. The new camera is designed with an enhanced data transmission speed up to 6M per second, from 3M per second applied to Chang'e I. A 12M-per-second transmission capability will also be tested.
6) High resolution imaging capability will be tested. The CCD camera aboard Chang'e I satellite had a resolution of 120m. The new satellite will image the possible landing areas for Chang'e III satellite at perilune of both 100km circular orbit and 100kmx15km oval orbit with a greatly enhanced resolution from 10m to 1.5m.

New Anti-Cancer Drug

The Chinese Academy of Medical Sciences Tumor Hospital announced on September 17, 2010 that its researchers have finished the phase III clinical trials of Icotinib Hydrochloride, a novel proprietary anti-cancer drug targeting at small molecules. Clinical trials show that the new drug is effective on non-small-cell lung cancers in advanced stage.

Clinical trials also show that the new drug has produced a therapeutic effect that is no inferior to the control. It registered 137 days for no-disease progress, or 34.3% longer than the 102-day record kept by the Gefitinib group, and 154 days for disease progress, noticeably longer than the control's 109 days. The new drug has also produced a noticeably improved safety record at 60.5% for adverse reaction, compared with 70.4% by the control, with a rash occurrence at 40.0% and 49.2%, and diarrhea at 18.5% and 27.6%, respectively.

The study was financed by MOST Innovation Fund, National 863 Program, Major New Drug Innovation Earmark Project, and a major earmark project initiated by Zhejiang Province for the 11th five-year period.

Alzheimer's B-Amyloid Level Reducing Gene Found

A study team, led by Profs. ZHANG Yunwu and XU Huaxi at Xiamen University Institute for Biomedical Research, has recently identified a mouse gene, Rps23 retroposed gene 1 (Rps23rg1), that regulates β-amyloid (Aβ) level and tau phosphorylation, two major pathological hallmarks of Alzheimer's disease (AD). Researchers found that both Rps23rg1 and Rps23rg2 are reversely transcribed relative to the parental Rps23 gene, expressed in various tissues and encode proteins that interact with adenylate cyclases. Similar to the RPS23RG1 protein, RPS23RG2 can upregulate protein kinase A activity to reduce the activity of glycogen synthase kinase-3, Aβ level and tau phosphorylation. The finding was recently published in the journal of *Human Molecular Genetics*, where Chinese scientists also discussed the Rps23r1 gene family and its functional structures.

World's First 2GHz ARM SoC

Chinese startup Nufront announced on September 15, 2010 the release of its first computer system, a single chip NuSmart 2816 built on ARM-architecture. The Chinese made chip is produced under a 40nm manufacturing process, with a dual-core CPU ARM-Cortex A9 processor, running up to 2 GHz. The new chip enjoys four major highlights, including high performance, low power consumption, high integration, and low cost, and a capability that is no inferior to the mainstream chips, claiming a better graphics capability compared with its counterparts. The new chip has a power consumption that is only 1/10 or 1/5 of the traditional chips. NuSmart 2816 is the world's first chip to integrate a 2GHz dual-core ARM Cortex-A9 processor, a multi-core 2D/3D graphics processor, 64-bit DDR2/3-1066 memory controller, 1080p multi-format video engine, SATA2 controller, USB2, Ethernet, together with general I/O controllers. The highly integ

rated chip would make electronic products smaller, lighter, thinner, and more affordable. It is not only aiming at the burgeoning netbook, flat personal computer, and intelligent TV markets, but also at the traditional Win—tel alliance, and desktop and laptop markets.

Low-dose, Simple, and Fast X-Ray Imaging

In collaboration with an imaging team at National Synchrotron Radiation Lab in Hefei, WU Ziyu and coworkers at the University of Science and Technology of China, landed a major breakthrough in X-ray phase-contrast imaging, making it a faster, more sensitive, and safer X-ray phase-contrast imaging CT technology.

Phase sensitive X-ray imaging methods can provide substantially increased contrast over conventional absorption-based imaging. The use of gratings as optical elements in hard X-ray phase imaging overcomes some of the problems that have impaired the wider use of phase contrast in X-ray radiography and tomography. Chinese researchers present an innovative, highly sensitive X-ray tomographic phase-contrast imaging approach based on grating interferometry, which extracts the phase-contrast signal without the need of phase stepping. To validate the feasibility of the solution, Chinese researchers tested the novel technique on rats' joints and brains, in collaboration with X-ray specialists in Japan and Switzerland, and obtained affirmative results. The new approach enjoys numerous merits, including simple and fast operation, and a greatly reduced dose by at least 50%. Working with the existing CT techniques, it is able to realize low-dose, simple, and fast grating-based X-ray phase-contrast imaging. The finding was published in the recent issue of *PNAS*.

NEWS BRIEFS

Real-time Observing System for South China Sea

Not long ago, Chinese scientists put an optical marine observing system into operation at a site in the northern part of the South China Sea, a follow-up system to the buoy based observing network built by them last year near the Yongxin Island, part of the Xisha Isles. The development indicates that China has established a real-time marine observing system in the heart of the South China Sea.

According to a briefing, the South China Sea Institute, part of the Chinese Academy of Sciences, put an optical marine observing system into operation at a site in the northern part of the South China Sea, during its 7th open expedition to the area. The observing system, made up of sea surface and underwater units, is designed to collect regular meteorological elements, including sunshine, radiation, wind speed, wind direction, temperature, relative humidity, air pressure, and spectral irradiance at different underwater levels.

The system, applied with optical fiber spectrum, buoys, automation components, and distant communication technologies, is able to realize real-time sea surface and underwater observation in a non-stop manner, collecting time series data for diverse marine studies concerning marine life, optics, and physical processes, and validating the results of water color remote sensing products. It works with a range of sediment capturers deployed by other open expeditions, monitoring the impact of western boundary current in the northern part of the South China Sea and geographic environment of ambient islands on marine ecology. It will eventually become a marine environment time series station for the northern part of the South China Sea.

Subsurface Buoys for Hydrothermal and Cold Spring Vents

LUAN Xiwu and coworkers at CAS Institute of Oceanology recently rolled out a novel subsurface buoy able to observe hydrothermal and cold spring vents in deep sea. The subsurface buoy can descend to the target hydrothermal or cold spring vents under a preset program or upon instructions, collecting temperature, salinity, and pressure data from the mouth of hydrothermal and cold spring vents, before sending them back the control center.

According to a marine experiment made by the researchers over a marine area in Sanya, the subsurface buoy was made to descend to a depth of 1300m, allowing researchers to test its major functions, including balancing, descending depth, positioning, data transmission, and ascending. Test results show that the new subsurface buoy system is of a fine communication capability, enjoying high positioning precision, reliable measurement, strong applicability, and fine environment adaptability.

In the tests, the subsurface buoy was able to keep a balanced attitude in the seawater at 2-knot, without spinning. While descending, the buoy worked smoothly in measuring, real-time data and voice transmission, tracking, and positioning.

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