

Brain Waves

Department of Mechanical Engineering
JEPPIAAR INSTITUTE OF TECHNOLOGY

Chennai
www.jeppiaarinstitute.org



Department of
Mechanical Engineering



Release of PRIME 2015



Inside this issue:

ASME Activities in JIT	1
Article's corner	4
Charlie : The first robot with a flexible spline and sensitive feet	6
A Digital Notebook that Accelerates Scientific Research	7
LBR iiwa - Enabling a New Generation of Human-Robot Collaboration	8
Fastest Camera in the	9
World's largest nuclear power plant	10
Editorial Board	12

ASME chapter in Jeppiaar Institute of Technology conducted first of its kind National conference (PRIME) with a great response and participation of students from all over the country. National Conference on Promising Research & Innovations in Mechanical Engineering [PRIME - 2015] aims to bring researchers, academicians, practicing engineers and industrialists on to a common platform which provides a national opportunity for researchers to exchange of ideas in recent advances on various aspects of theories, analysis, experimentation in Mechanical Engineering. The conference was inaugurated by Mr. Duraivelu PremAnand .

PRIME 2015 :



National Conference on Promising Research & Innovations in Mechanical Engineering [PRIME – 2015] aims to bring researchers, academicians, practicing engineers and industrialists on to a common platform which provides a national opportunity for researchers to exchange of ideas in recent advances on various aspects of theories, analysis, experimentation in Mechanical Engineering.

The inauguration of PRIME 2015 was done by **Mr. Duraivelu PremAnand** who gave an insightful inaugural speech on the "*Recent Trends in Automobile*". He is a general manager in Gates Unitta India Company. Gates Unitta India Company is a world's leading manufacturer in CVT's for various off terrain vehicles. The speech was both enthusiastic and bought a enlightenment to the students present there. There were over 40 collages participating in PRIME 2015. The valedictory was done by our Managing Director.



AGRONA 15:

AGRONA 15 was a national level technical symposium held by Mechanical department of our college. It had various events ranging from paper presentations to water rocketry. AGRONA 15 had a good response of students from various institutions. The best achievers were given prizes depending on their winning category.



Article's Corner

Article Name : Upcoming Mechanical Engineering Events

Article by : Niranjan Kumar R (Pre Final Year)

Start Date	Fest Name	Fest Type	College Name	City	State
24th-Apr-2015	National Conference on Innovations in Material	National Conference	MATS School of Engineering and Technology	Raipur	Chhattisgarh
24th-Apr-2015	Progetti 2015	Technical Festival	Baddi University of Emerging Sciences and Technology	Baddi	Himachal Pradesh
24th-Apr-2015	TECH SPANDAN'15	Technical Festival	GB Pant Engineering College Pauri	Pauri	Uttarakhand
26th-Apr-2015	ROBOCORE 2015	Robotics Fest	Siddaganga Institute of Technology	Tumkur	Karnataka
27th-Apr-2015	GTU TECHFEST 15	Technical Festival	LD College of Engineering	Ahmedabad	Gujarat
28th-Apr-2015	Indian Case Challenge 15	Technical Fest	IIT Delhi	New Delhi	Delhi
30th-Apr-2015	PRAYAAN 2K15	Technical & Cultural Festival	Marine Engineering and Research Institute	Mumbai	Maharashtra
30th-Apr-2015	IBeTo 2015	Technical Idea Competition	Model Engineering College	Kochi	Kerala
1st-May-2015	DEXTRA 2K15	Technical Festival	Jaypee University of Engineering and Technology	Guna	Madhya Pradesh

Upcoming EVENTS

Start Date	Fest Name	Fest Type	College Name	City	State
3rd-May-2015	International Conference on Research Advancements in Engineering and Technology ICRAET 2015	International Conference	International Institute of Scientific Research and Technology	Chennai	Tamil Nadu
9th-May-2015	cogNIEscience 2015	Paper Presentation	The National Institute of Engineering	Mysore	Karnataka
14th-May-2015	National Conference on Innovative & Emerging Trends in Engineering	National Conference	Panimalar Institute of Technology	Chennai	Tamil Nadu
15th-May-2015	International Academic Conference on Engineering and Technology 2015	International Conference	IACET	Hyderabad	Andhra Pradesh
23rd-May-2015	International Conference on Innovative Research & Technology ICIRT-2015	International Conference	Sri Venkateswara College of Arts and Science Dharmapuri	Dharmapuri	Tamil Nadu
29th-May-2015	International Conference on Adaptive Technologies for Sustainable Growth ICATS 2015	International Conference	Paavai Engineering College	Namakkal	Tamil Nadu
30th-May-2015	International Conference on Technological Research in Engineering 2015	International Conference	ICTRE	Mumbai	Maharashtra

CHARLIE : THE FIRST ROBOT WITH A FLEXIBLE SPINE AND SENSITIVE FEET



Climbing down steep crater walls in search of frozen water on the moon, for example, requires a robot to be both autonomous and flexible. In the future, these skills will become increasingly important for mobile robots. To meet these demands, scientists at the German Research Center for Artificial Intelligence (DFKI) Robotics Innovation Center and the University of Bremen have developed an ape-like robot named "Charlie" - with an actuated spinal column and sensor feet - for better traction and stability in uneven environments like lunar terrain.

Charlie is a hominid robotic system, equipped with multi-point contact feet and an active, artificial spine. The robot's front and rear are connected via a flexible spinal structure that offers movement in six spatial directions. Likewise, the robot's foot and ankle structures support the system's movement in terms of traction and stability. Altogether, the robot has more than 330 sensors. They are as self-contained as possible, allowing Charlie to respond to external disturbances with only minor delay.

For the time being, the robot's quadrupedal posture is a more stable standing position, better equipped to tackle explorations of rough, uneven environments like moon craters. Up until now, the robot has been able to walk in many different test environments with a range of walking speeds on various surfaces and in varying inclinations ranging from -20 to 20 degrees. The robot is able to shift its center of mass in real-time based on the slope it is walking on. Since the robot can also stand up on two legs like a human, advanced applications in a bipedal posture may also be possible, such as for using the front extremities for manipulation tasks.

Charlie was designed over the course of the DFKI project "iStruct - Intelligent Structures for Mobile Robots." iStruct received 3.3 million euros in funding from the Space Agency of the German Aerospace Center (DLR) and the German Federal Ministry for Economic Affairs and Energy (BMWi).

A DIGITAL NOTEBOOK THAT ACCELERATES SCIENTIFIC RESEARCH

The Berlin-based start-up labfolder has created a novel interface for accelerating scientific data processing, namely an intelligent digital lab notebook that enables scientists to effortlessly document, archive, and share their research findings in a digital format.

Currently, up to 96% of all scientists still use paper notebooks to record their primary research data a time-consuming process that also makes it difficult to reuse and communicate research findings with other scientists. In contrast, labfolder's Web 2.0 alternative is intuitive and easy-to-use; it helps eliminate the nuisance of searching through vast data sets stored on paper in various locations. To simplify scientific documentation and archival procedures, this cloud-based online platform is equipped with smart research tools, such as protocol templates, image annotation features, and sketch pad capabilities. In addition, group sharing functions help foster knowledge exchange, enabling scientists to more easily collaborate with fellow colleagues and researchers worldwide.

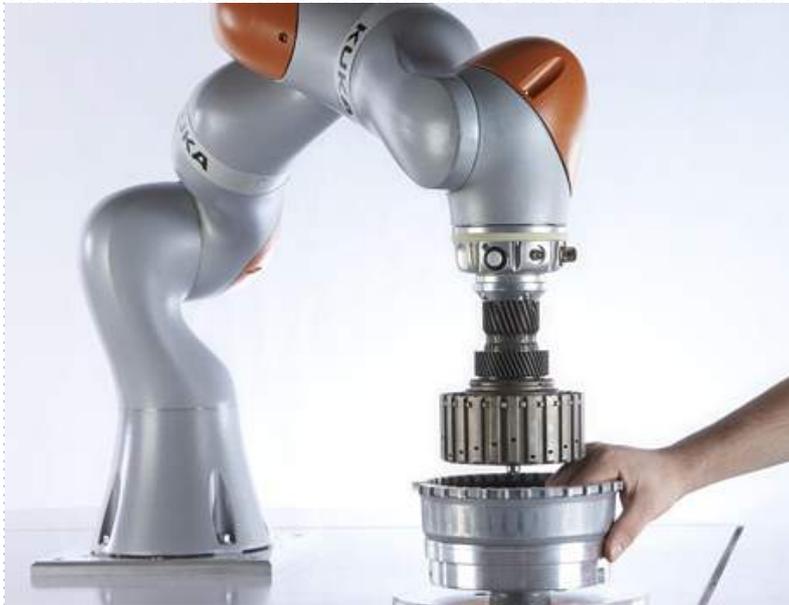
Free mobile apps for Android and iOS interfaces further support labfolder's vision of providing users unlimited access to their scientific data; Smartphones, tablets, and iPads can be used as digital lab notebooks to instantly record handwritten notes, sketches, and photographic results from experiments on-the-go - be it in the lab, at a conference, or out in the field.

For individual academic scientists and small research groups, labfolder's basic software is free. For larger research teams, the "Extended Team" edition, which offers functions tailored for managing such groups, is available for a monthly fee.



labfolder GmbH was founded by two scientists and a software architect who individually struggled with time-consuming research procedures in their labs. To emphasize labfolder's commitment to increasing the efficiency of lab research in general, the company welcomes customer feedback to further improve its digital lab notebook.

LBR iiwa - Enabling a New Generation of Human-Robot Collaboration

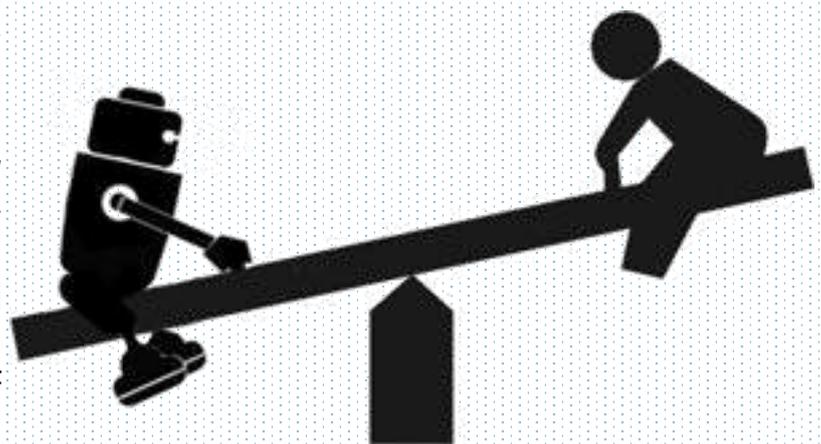


KUKA, Europe's leading supplier of industrial robots and automated production systems, is welcoming the newest member of its robot family: the LBR iiwa. "LBR" stands for "Leichtbauroboter" (German for lightweight robot) and "iiwa" for "intelligent industrial work assistant." This precise, flexible robot with seven axes, modeled after the human arm, opens up new possibilities in automation as well as new fields of application for service and medical robotics. The robot can work safely with a human operator without the need for a safety fence, acting as the operator's "third hand." Furthermore, the user can manually guide the robot with his or

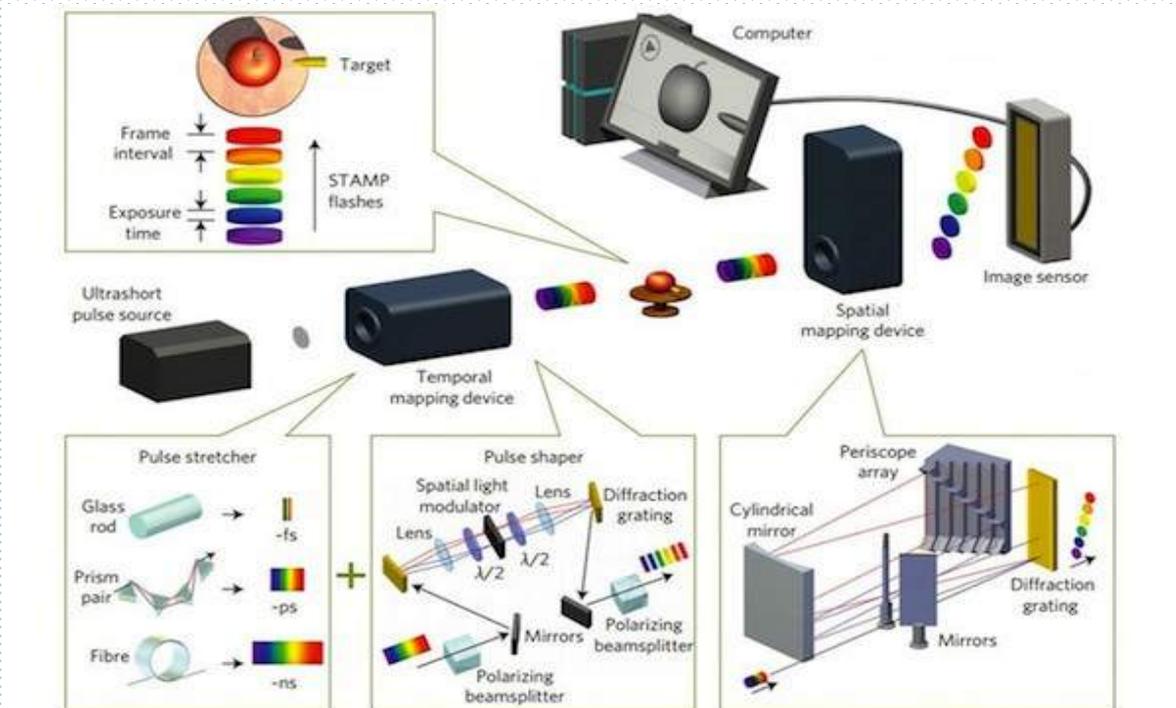
her hand to program it right there on the spot.

The robot is equipped with mechanical systems and drive technology designed for industrial operation. This makes it possible to automate delicate and complex automation tasks in a manner in which the use of robots was previously inconceivable. The LBR iiwa is also the first robot to have safe torque sensors in every axis. Hence, its high-performance collision detection capabilities and integrated joint torque sensors make the LBR iiwa ideal for delicate joining processes and the use of simple tools. Furthermore, its lightweight nature, multiple axes, and streamlined design make it perfectly suited to confined installation situations and enables very easy integration into pre-existing production systems.

In 2014, the LBR iiwa received the Red Dot Award "Best of the Best" for excellence in design and business. In 2014, only 60 out of 4,815 product entries from more than 1,800 manufacturers from 53 countries won the Red Dot "Best of the Best".



World's Fastest Camera Takes 4.4 TRILLION Frames Per Second



Researchers in Japan have developed a motion picture camera that can take 4.4 trillion frames per second making it the fastest camera in the world. They call their technique “sequentially timed all-optical mapping photography” (or STAMP), and the resolution is an impressive 450 x 450 pixels. The current gold standard for high-speed, real-time recording utilizes a method known as the pump-probe process, where light is pumped at the subject and then probed for absorption. But to construct an image, it requires repetitive measurements.

Developed by a large team led by University of Tokyo researchers, STAMP uses single-shot bursts to acquire images. Its optical shutter lets it capture images consecutively in less than one-trillionth of a second. Without the need for repetitive probing, STAMP offers results that up to 1,000 times faster than existing high-speed cameras. The team managed to photograph the conduction of heat, which is transmitted at a speed equivalent to one-sixth the velocity of light.

“It is a promising invention because these cameras can be utilized in various fields,” says study author Keisuke Goda from the University of Tokyo. In auto and semiconductor factories, the camera could help develop a better understanding of laser processing. In this schematic of STAMP from their paper, an ultrashort laser pulse is split by the temporal mapping device into a series of discrete “daughter” pulses in different spectral bands. The image-encoded daughter pulses are separated by the spatial mapping device and directed towards different areas of the image sensor. The data recorded by the image sensor are digitally processed on the computer to reconstruct a movie.



WORLD'S LARGEST NUCLEAR POWER PLANT

Kashiwazaki-Kariwa is the world's largest rated nuclear power station. With seven reactors generating 8,212MW, the station, owned and operated by the Tokyo Electric Power Company (TEPCO), can provide electricity to 16 million households. The 4.2km² site is located in the Niigata Prefecture city of Kashiwazaki and the town of Kariwa, approximately 135 miles north-west of Tokyo, on the coast of the Sea of Japan.



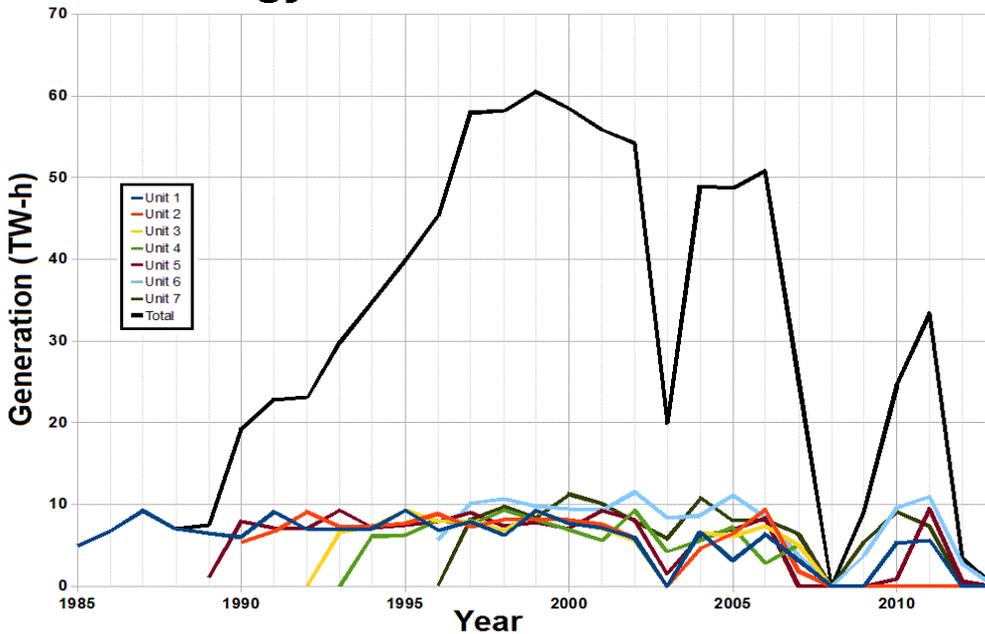
Kashiwazaki-Kariwa is also the world's fourth largest electric-generating station behind three hydroelectric plants: Itaipu on the Brazil-Paraguay border, Three Gorges Dam in China and Guri Dam in Venezuela. Like all power plants in Japan, Kashiwazaki-Kariwa was built to strict earthquake-resistance standards. However, the 2007 earthquake caused the plant to leak radioactive substances into the air and water. The plant, which has been operating since 1985, was closed until safety checks following the earthquake were completed. The plant was reopened in May 2009.



Reactors continue to use low-enriched uranium as the nuclear fuel; however, there have been plans drafted by Tepco to use MOX fuel in some of the reactors by the permission of the Japanese Atomic Energy Commission (JAEC). A public referendum in the Kariwa village in 2001 voted 53% against use of the new fuel. After the 2002 Tepco data fabrication scandals, the president at the time, Nobuya Minami, announced that plans to use the MOX fuel at the KK plant would be suspended indefinitely. News of the earthquake, combined with the fact that replacement power sources (such as oil and gas) are at record highs, caused TEPCO's stock to plummet 7.5%, the largest drop in seven years, which amounted to around 4.4 billion USD lost in stock capitalization. This made

the event even more costly to the company than the 2002 data falsification scandal. Additionally, Tepco warned that the plant closure could cause a power shortage during the summer months. Trade minister Akira Amari requested that business users cut electricity use and in August TEPCO was forced to reduce electricity supplies for industrial uses, the first time it had to resort to such measures in 17 years. Reports of the leak caused thousands of cancellations at resorts and hotels along the Sea of Japan coast, even as far as Murakami, Niigata and Sado Island. Inn owners have said that rumors have been more damaging than direct effects of the earthquake.

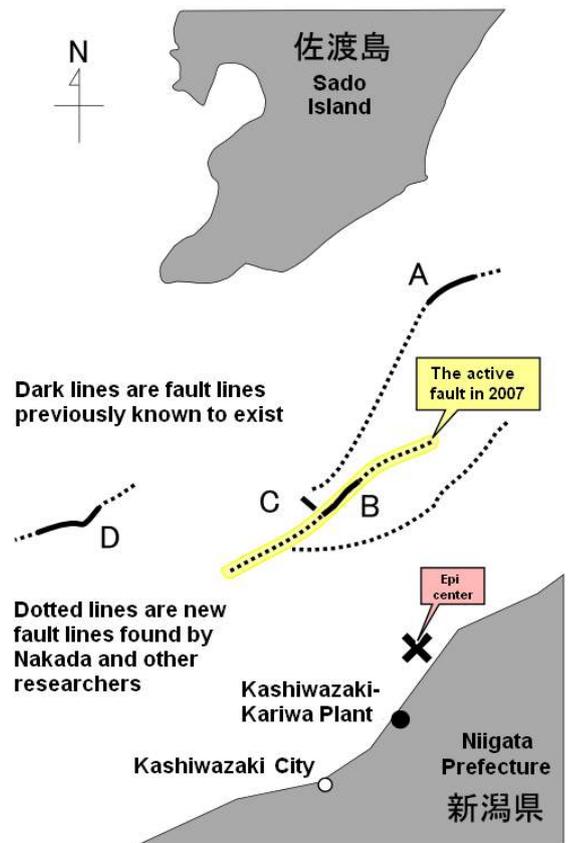
Energy Production of the KK NPP



The shutdown forced TEPCO to run natural gas plants in place of this plant, not only increasing Japan's demand for the fuel and increasing the price internationally, but also increasing carbon dioxide output such that Japan will have difficulty meeting the Kyoto Protocol.

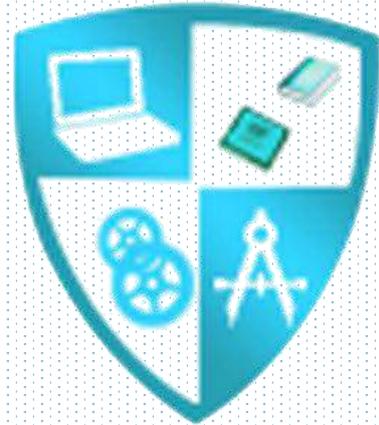
After 16 months of comprehensive component-based assessment and upgrades on all seven reactors, this phase of post-earthquake response was almost complete, with reactor 7 fully upgraded to cope with the seismic environment. On 8 November 2008, fuel loading in reactor unit 7 started, preparatory to a period of system safety tests on that reactor. On 19 February 2009 TEPCO applied to the local governance to restart unit 7 after having obtained approval from the national government and regulators. Local government agreement for restart was granted in May and electrical grid power was supplied from Unit 7 at 20% power on 19 May. The reactor was raised to 100% power on 5 June 2009 as part of a series of restart tests. Unit 6 restarted on 26 August 2009 and reconnected to the grid on 31 August.

Unit 1 restarted on 31 May 2010 after loading with fuel (along with Unit 5) earlier in the year, and was generating grid power by 6 June 2010. Unit 5 recommenced grid generation on 26 November 2010, in the same week that fuel loading for unit 3 started.



What's in our next issue?

1. ASME Activities
2. Artificial Intelligence
3. Life beyond Earth
4. 3-D Printing for everyone



Jeppiaar Nagar, Kunnam, Sriperumbudhur tk,

Chennai-631 604

Ph. No: 044-27159000

www.jeppiaarinstitute.org

Editorial Board

1. Chief Mentor : **Dr.N.MARIE WILSON** B.Tech., M.B.A., Ph.D.
Managing Director,
Jeppiaar Institute of Technology.
2. Coordinator : **Dr.T.VENKATAMUNI**, HOD Mechanical dept.
3. Chief Editor : **SATYANARAYEN R** (Final Year)
NIRANJAN KUMAR R (Pre-Final Year)
4. Co-Editors : **ARUN V** (Second Year)

NEWSLETTER PUBLICATION SCHEDULE : JULY, OCTOBER, JANUARY, APRIL.

Mail your articles and Feedback to asme@jeppiaarinstitute.org

BRAIN WAVES, MECHANICAL DEPARTMENT, JIT, CHENNAI

