

News

The Irago Conference 2012, November 2012

Toyohashi University of Technology is organizing the Irago Conference 2012, Thursday 15 and Friday 16 November 2012 at the Irago Sea-Park & Spa Hotel, Tahara, Aichi, Japan.

Objective

The world is at a major turning point. Recent changes in global economics and industrial priorities, environmental and energy policies, food production and population movements have produced formidable challenges that must be addressed for sustaining life on earth.

The objective of this conference is to provide an 'interdisciplinary-platform' to enhance mutual understanding between scientists, engineers, policy makers, and experts from a wide spectrum of pure and applied sciences in order to resolve the daunting global issues facing mankind. In particular, the organizers would like to encourage graduate school students to participate and talk directly with internationally renowned academics, industrialists, and opinion leaders for a firsthand view of the major issues facing scientists and engineers of the 21st century.

Plenary and Invited Speakers

Daniel E. Morse

(University of California, Santa Barbara, USA)

"Biologically inspired, nano-structured materials for energy and photonics"

Sakae Tanaka

(AQUABIT Corporation, Japan)

"Future prospect 2012-2025 -How will the World and our business change in future-"

Daniel Hock Chuan Chua

(National University of Singapore, Singapore)

"Applications of multifunctional core-shell carbon nanotubes as bottoms-up material for key technology"

Robert Geller

(University of Tokyo, Japan)

"Limitations of predicting earthquakes and the myth of safety at Fukushima"

Oussama Khatib

(Stanford University, USA)

"Robots and the human"

G. P. Li

(University of California Irvine, USA)

"Heterogeneous Integrated Package Systems"

Jing-Feng Li

(Tsinghua University, China)

"Thermoelectric nanocomposites and microscale modules"

Takashi Ohira

(Toyohashi University of Technology, Japan)

"Electric Vehicles on Electrified Roadways (EVER) -Powering Electric Cars by Exploiting Radio Frequency Displacement Currents via Revolving Tires-"

Yoshimitsu Okada

(National Research Institute for Earth Science and Disaster Prevention, Japan)

"Recent progress of seismic observation networks in Japan"

Uracha Ruktanonchai

(NanoDelivery System Lab, NANOTEC, Thailand)

"Nanotechnology for natural disaster mitigation"

Susumu Sakata

(National Institute of Advanced Industrial Science and Technology, Japan)

"Microbial methanogenesis as the process of methane hydrate formation"

Seiichi Takenoshita

(Fukushima Medical University School of Medicine, Japan)

"Turning a tragedy into a miracle -Fukushima Medical University version for revitalization-

Further information

General information:<http://www.apirc.jp/index.html>

Speakers:<http://www.apirc.jp/invited.html>



[Enlarge Image](#)

Visitors from Council for Scientific and Industrial Research (CSIR) of the South Africa

On 23rd July, Dr. Ntsika Msimang and Dr. Fulufhelo Netwamondo of CSIR visited Toyohashi University of Technology. The CSIR is a national research institute under the Ministry of Science and Technology in South Africa, which is equivalent to The National Institute of Advanced Industrial Science and Technology (AIST) in Japan.

In this visit Mr. Cecil Masoka, Minister Counselor, Science Technology, and Mr. Daisuke Tanaka, Science Technology Liaison Officer, Embassy of South Africa in Tokyo, accompanied two researchers. The visitors first met President Yoshiyuki Sakaki and Vice President Kiyokatsu Jinno.

The government of South Africa aims to create employment and economic development by manufacturing products that add value to their abundant mineral resources. Thus, the visitors were interested in research being conducted by Professor Takashi Ohira on manufacturing batteries from mineral resources and electric automobiles. The research being conducted by Ohira's group includes not only electric automobiles, but also offers a hint for improvements in the electric distribution network in South Africa. The visitors exchanged opinions with Ohira, including initiating a technical transfer program based on collaborative research.

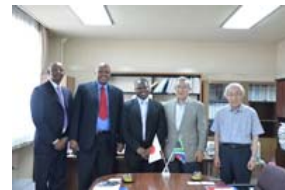
The visitors also met Professor Zhong Zhang at the Machinery Engineering Department (Measuring System) and were introduced to detection technology to monitor abnormal vibration or noise in automobiles. Zhang also described his research on the detection of surface defects on metal mirror reflection parts, sound segregation and orientation technology, and technology to detect the physical and mental condition of car drivers in motion.

Finally, at Professor Shuichi Ichikawa's Laboratory, the visitors were introduced to the application of dedicated communication circuit technology to security systems. Specifically, a hardware control program; diversification of an incorporated processor; and (3) the design and evaluation of a random number generator circuit.

Further information

Council for Scientific and Industrial Research (CSIR) of the South Africa:

<http://www.csir.co.za/>



South African delegation at Toyohashi Tech: From left to right: Mr. Cecil Masoka, Dr. Fulufhelo Netwamondo, Dr. Ntsika Msimang, President Yoshiyuki Sakaki, Vice President Kiyokatsu Jinno



Professor Takashi Ohira Laboratory



Professor Zhong Zhang's Laboratory



Professor Shuichi Ichikawa's Laboratory

Delegation from Jazan University in Saudi Arabia visits Toyohashi Tech

Toyohashi University of Technology was honored to host a delegation of nine students and teaching staff from Jazan University's College of Computer Sciences and Information Systems in Saudi Arabia on 12 July 2012.

The group's visit was part of a three-week fact finding mission to Japanese universities and industrial corporations. Toyohashi Tech was chosen because of the universities internationally recognized excellence in research in computer sciences and information systems.

Following an overview of Toyohashi Tech by vice president Kiyokatsu Jinno, the delegation held technical discussion with Jun Miura , head of the Department of Computer Science and Engineering, as well as Hideo Sekino and Toshihiro Fujito of the same department. Afterwards, the delegation toured three of the department's laboratories for a first-hand look the areas of research being carried out by Toyohashi Tech students.

Later, Professor Miura was joined by his colleagues Masaki Aono and Yoshiteru Ishida for engaged in a lively discussion with the delegates about education and the process of earning a degree in Japan.



Staff from Toyohashi Tech poses with the delegation from Jazan University



The visitors tour a laboratory

Japanese delegation visits Kiev to initiate science and technology exchange with Ukraine academic institutes

A delegation of Japanese researchers led by Kanji Fujiki, Deputy Minister of the Ministry of Education, Culture, Sports, Science and Technology, recently visited Kiev, the Ukrainian capital. Arriving on 8th July, the 19-strong party spent 4 days promoting the exchange of science and technology between Japan and Ukraine, as well as interaction between the two countries' young researchers. The delegation visited the Kyiv Polytechnic Institute and the National Academy of Sciences of Ukraine, where they discussed future international research cooperation and interaction among young researchers with the Ukrainian counterparts.

Toyohashi University of Technology (Toyohashi Tech) was represented by Noriyuki Kurita, associate professor at the department of computer science and engineering, who was involved in debate with local researchers regarding exchanges in the fields of life science and computational science. Some of the main outcomes of the meetings include a plan for Toyohashi Tech, Kyiv Polytechnic Institute, and the National Academy of Sciences of Ukraine, to pursue joint research on the effects of radiation on the human body—an area of keen social interest in Japan since the reactor meltdown at the Fukushima Daiichi Nuclear Power Plant.

Ukraine is a uniquely ideal partner for this research because, not only did the country experience a reactor meltdown at the Chernobyl nuclear power station, but also because the progress made in science and technology since the collapse of the Soviet Union means that Ukraine has the potential to become one of Japan's strategic science and technology exchange partners. Indeed, the visit by the Japanese delegation to Ukraine came about when, during an exchange of information on responses to nuclear power plant accidents, the president of the National Academy of Sciences of Ukraine asked Japan (through Toichi Sakata, the Japanese ambassador to the Ukraine) to establish a forum for debate between Japanese and Ukrainian experts on Ukraine's strengths in science and technology.

The delegation's mission was to find ways to help promote substantial exchanges in the fields of science and technology. Hopes are high that their visit to Ukraine will initiate stronger interaction between the two countries in the life sciences and a broad variety of other fields, such as material science, cosmic science, radiology, and high energy physics.



A church in Kiev that is a United Nations World Heritage site



A building on the Kyiv Polytechnic Institute



Prof. V. I. Danilov (right)
Prof. D. M. Govorun (second from right)
Dr. Kurita (third from right)
at National Academy of Sciences of Ukraine

Inaugural Student Lunch Time Colloquium

On 13th July, the first time Lunch Time Colloquium for international students was held in the Hibari Lounge, Toyohashi University of Technology.

Mr Chandra Prakash and Ms Gauri Patwardhan, Internship students at EIIRIS (Electronics-Inspired Interdisciplinary Research Institute) from Indian Institute of Technology Delhi, presented a summary about their research, impressions of Japan, and student life at IIT Delhi. More than 40 people participated in the event including Japanese and international students, as well as researchers from EIIRIS.

This Colloquium offered an opportunity for feedback from short term international students. Chandra Prakash and Ms Gauri Patwardhan were also the first internship students accepted as part of the EIIRIS scholarship.



Chandra Prakash and Ms Gauri Patwardhan talking to the audience during the Colloquium.



The flyer posted around the campus for the Colloquium.

Features

Learning how to socialize with robots

Robot communications with humans is little better than that of speaking vending machines saying, "thank you," after a purchase, argues Professor Michio Okada. "You just don't feel any real communication is going on, because there is no social coupling taking place." To understand this phenomenon better and to improve robot-to-human communications, Okada has established the Interaction and Communications Design Laboratory (ICD-lab) in Toyohashi Tech.

ICD-lab is a multidisciplinary laboratory that employs electronics, mechanical design, software, sensors and so on, together with Okada's own research in computer engineering and cognitive science, to build novel "social robots and devices," often of a minimalistic design for specific research purposes. To the unsuspecting visitor it might appear that the idea is merely to develop entertaining robots that engage smoothly with humans.

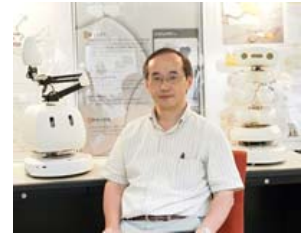
"But the underlying aim is to uncover the basic mechanisms of our every day communications by studying how we interact with these social robots and devices," Okada points out.

One such research effort involves a "sociable trash box." This is a motorized trash box fitted with electronics and a servomotor that enables it to detect trash, then locate humans and gesture to them it wants them to put the nearby trash into its trash box.

"The main purpose of these robots is to investigate the social clues and behaviors that build a social rapport and induce the assistance of children in collecting the trash," says Okada. Findings so far include the importance of movement, especially having the robots move towards the trash to elicit assistance. Also noted is how several robots moving together, compared with just a single robot, attracts more children and causes them to establish different distances and interaction times with the robots, compared to that of a single robot.

Other ICD-lab projects include a "sociable PC" that acts as a companion through its verbal and non-verbal actions such as cute motions based on the behavioral feedback of the user, and a "sociable dining table" that employs proto-communication, i.e. the user knocking on the table, to cause robot devices on the table to move in certain directions.

Not only can this kind of research lead to better human-robot interfaces and interaction, but it is helping Okada understand the communication problems of autistic children. "Children with autism generally avoid people," he says. "But they are interested in mechanical toys. Our social robots can become intermediaries between us and these children."



Professor Michio Okada



Examples of socializing-robots conceived by Michio Okada.

Research highlights

Facial color is processed in the left hemisphere of the brain.

The face is the most important three dimensional object for humans to facilitate social interaction by conveying information and emotion. Cognitive neuroscience research during the past 20 years has showed brain activity directly resulting from face processing—known as the N170 component of event-related potential (ERP).

Previous research showed that the N170 is modulated by structural or configural information of a face such as shape or layout of facial parts). However, is its still not clear how facial color affects the face-selective brain activity N170 although many behavioral studies have shown facial color to play an important role in the perception of age, gender, health status, and attractiveness.

Here Shigeki Nakauchi and colleagues at Toyohashi University of Technology report that N170 was sensitively modulated by facial color information.

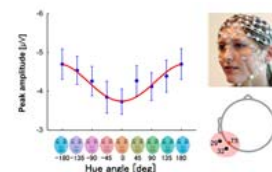
ERPs were recorded while subjects viewed face images (ten Asian faces) at eight different hue angles, which were generated by rotating the original facial color distribution around the white point.

The N170 component was found to be selectively modulated by differences in facial color and the modulation was only observed in the left posterior temporal site, even though face selectivity by N170 has been said to be dominant in the right hemisphere so far.

The results imply that facial color is processed differently from configural information of the face. Furthermore, the study showed the possibility that facial color information, which not only indicates a typical or an atypical face, may provide cues to the recognition of health conditions during the initial stage of face detection.

Reference:

- Authors: Kae Nakajima, Tetsuto Minami and Shigeki Nakauchi.
- Title of original paper: The face-selective N170 component is modulated by facial color.
- Journal, volume, pages and year: *Neuropsychologia* (2012).
- Digital Object Identifier (DOI): 10.1016/j.neuropsychologia.2012.06.022
- Affiliations: Department of Computer Science and Engineering, Toyohashi University of Technology.



Modulation of the left hemisphere of the brain by facial color



Shigeki Nakauchi

Research highlights

Optical frequency signal propagation and detection via surface plasmon polaritons

Surface plasmon polaritons (SPPs) are waves that propagate along the surface of a conductor and collective oscillation of electrons coupled with optical fields on the nanometer scale, beyond the diffraction limit of propagating light waves.

Many researchers have tried to transmit optical signals through SPPs for application to photonic integrated circuits. However, optical frequency signal transmission has not been examined as yet.

Now, Mitsuo Fukuda and his group have developed a transmission technique and a SPP detector and demonstrated the feasibility of optical frequency signal transmission via SPPs.

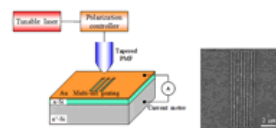
The SPP detector was a Au/silicon Schottky-junction diode, and free electrons excited by SPPs within the Au-metal cross over the junction, thereby generating a photocurrent. Here the detectable wavelength range of light is determined by the height of Schottky barrier. The waveguide of SPPs was fabricated using a thin Au-film deposited onto a silica substrate, and optical heterodyne detection technique was employed to detect optical frequency signal from SPPs.

The Schottky-junction diode detects SPPs corresponding to light even in the 1550-nm-wavelength band, in contrast to conventional silicon photodetectors which use interband electron transition, and cannot detect light of wavelengths of more than 1000 nm. The SPPs converted from 1550-nm-wavelength coherent light carry the optical frequency signal along the surface of Au-film without any coherence degradation.

This device and technique could find applications to nano-scale photonic integrated circuits for processing large amounts of information at high speeds.

Reference:

- Authors: Takuma Aihara and Mitsuo Fukuda.
- Title of original paper: Transmission properties of surface-plasmon-polariton coherence.
- Journal, volume, pages and year: *Applied Physics Letters* **100**, 213115 (2012).
- Digital Object Identifier (DOI): 10.1063/1.4723715
- Affiliations: Department of Electrical & Electronic information Engineering.
- Department website: www.photon.ee.tut.ac.jp



SPP detector developed.



Mitsuo Fukuda

Research highlights

Sociable Trash Box: Proxemics in Dynamic Interactions

Humans regulate their interactions according to different contexts, the degree of the relationship, cultural factors, gender, age, and so on. These factors can be utilized as an interpersonal boundary-control mechanism which is totally dependent on encouraging or discouraging another person's interactions. Humans are expected to dynamically optimize the above mechanism according to the interpersonal distances and personal spaces (proxemics).

Michio Okada and colleagues at Toyohashi University of Technology were interested in determining what kind of distances (spheres), effective social cue, and behaviors that an sociable trash box (STB) requires with children in order to convey its intention to acquire child assistance in collecting trash from the environment as a child-dependent robot.

We conducted the experiment in a Developmental Center for Children at Toyohashi City, and evaluated the validity and effectiveness of the approach through different interactive scenarios. The experiments on naturally interacting with the STBs were conducted with the participation of 108 children aged 4 and 11 years old).

The results of the proxemics showed that when the STBs moved individually in the environment and moved in a swarm (three STBs), the children established different spaces (according to distance and interactive time) to interact with the STB.

These extracted spaces can be utilized in the STB decision process (moving with distances, staying time, etc) to convey its intention to collect trash with assistance from children. This will be the basis of our future plans to extend our study in order to develop a decision hierarchy inside of the STBs

References

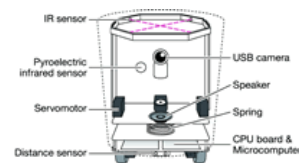
Authors: Yuto Yamaji, Taisuke Miyake, Yuta Yoshiike, P. Ravindra De Silva and Michio Okada

Title of original paper: STB: Child-dependent Sociable Trash Box Robot

Journal: International journal of social robotics, **3**, 4, Pages 359–370, 2011

Digital Object Identifier (DOI): 10.1007/s12369-011-0114-y

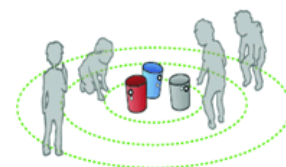
Affiliations: Department of Computer Science and Engineering, Toyohashi University of Technology



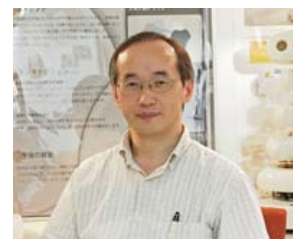
Designing concept for STB



Children interacting with the sociable trash-box



Interactive distances between children and STB



Michio Okada

Research highlights

Aluminum nitride coatings by atmospheric reactive plasma spray

Aluminum nitride (AlN) has a high thermal conductivity, low thermal expansion (similar to silicon) and exhibits high resistance to halogen plasma. These remarkable properties of AlN are exploited in heat sinks and semiconductor manufacturing equipment, such as chemical vapor deposition reaction vessels and electrical components.

For such applications fabrication of thick AlN coating by thermal spray into the chosen material surface considered to be suitable solution. However, it is impossible to fabricate AlN coating directly by conventional thermal spraying due to the AlN thermal decomposition without melting.

Here, Mohammed Shahien and colleagues at Toyohashi University of Technology, Japan report on the realization of cubic AlN coatings on steel substrates by atmospheric reactive plasma spraying of fine Al_2O_3 feedstock powder in N_2/H_2 plasma.

The formation process was clarified thus, during spray the particles melted, spheroidized and nitrided in the plasma to form the cubic aluminum oxynitride then cubic-AlN. Furthermore, using smaller particle size enhanced the surface (reaction) area and improved the nitriding conversion.

It was possible to fabricate thick and uniform coatings with high AlN content by spraying fine $\text{Al}_2\text{O}_3/\text{AlN}$ mixture and the thickness increased from about 150 μm to about 200 μm with increasing the N_2 gas flow rate from 100 to 160 l/min.

These results are important for the manufacture of high performance equipment for the materials manufacturing including semiconductors.

Reference

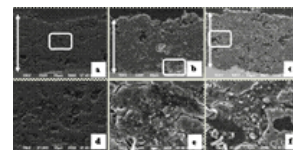
Authors: M. Shahien, M. Yamada, T. Yasui, M. Fukumoto

Title of paper: Aluminum Nitride Coating Fabricated by Reactive Plasma Spraying of Al_2O_3

Journal: Proceedings of Thermal Spray 2012: Proceedings from the International Thermal Spray Conference and Exposition, May 21–24, 2012, Houston, Texas, USA. Pages: 873-879.

Affiliation: Interface & Surface Fabrication Laboratory, Department of Mechanical Engineering

Website: http://isf.me.tut.ac.jp/english/E_index.html



SEM cross section images of the AlN coatings fabricated with using N_2 plasma gas flow rate of: (a) 100, (b) 120, (c) 160 l/min and (d-f) are higher magnifications of the squared parts in (a-c).



Mohammed Shahien

Club Activities

Playing rugby has many rewards

Rugby football may not be as popular as baseball or soccer in Japan, but for members of Toyohashi Tech's Rugby Club, enthusiasm for the sport is no less strong. Three times a week, many of the 25 members gather to practice passing and kicking, carry out excises such as sprinting, running and push-ups, and to play field touch rugby.

"Like most of the members, I like physical sports," says Yuta Fujimoto, captain of the team and now in his fourth year studying mechanical engineering. "I started playing the game in technical college, so I've been playing for about seven years. You'll find this is the case with many of the other members."

The club plays competitively against other universities in the C Division of the Tokai regional league. It also arranges friendly matches with local universities, and its members hold practice games between themselves in the annual summer camp get-together. Although members buy their own rugby boots, the university supplies the uniforms, so out-of-pocket expenses are low.

Third-year student and club member Pasan Dunuwila from Thailand studying environmental life sciences, points out that Japan was the first country to take up Rugby Union in Asia, while in Thailand the sport is particularly popular among the police and military. Dunuwila began playing in technical college before coming to Toyohashi Tech. "What I really like about the club," he says, "is the team spirit."

Manager of the club Aki Nemoto, a third-year electronic engineering student, is the only female member. "I take care of things like providing the players with water during games, taping them up before playing and also keeping our home page updated. I enjoy the responsibility and it's fun."

Other members' random reasons for joining the club include, developing a strong body, broadening the mind through playing competitively, enjoying the game's physicality and the increased endurance that comes from all the training and playing the sport.

"We like the game so much," says Fujimoto, that most of us want to continue playing if the companies we join after graduating have rugby teams. But our immediate goal is to win promotion to the B Division this year."



Members of the Toyohashi Tech Rugby Club

No. 8, Sep 2012

Excursions

Toyohashi Gion Matsuri: Traditional Japanese Fireworks Festival

Gion Matsuri originated as a purification ritual to appease the gods thought to cause disasters such as fire, floods, and earthquakes. Since then, it has been celebrated annually.

On the eventful day, it was drizzling prior to the “Hanabi” (fireworks) display. It was a welcomed change in the weather as the rain gave us some relief from the unbearable summer heat.

I also attended the Toyohashi Gion Matsuri in 2009. However, this time I still felt the same excitement as before for Gion as I made my way to the venue. The anticipation of watching my first fireworks display this summer and the buzz from the Yukata donning crowd really did set the mood for the festival.

The firework extravaganza took place along a stretch of the Toyokawa River. The atmosphere was amazing and wherever I looked, excited crowds of Japanese and foreigners were mingled together as they looked forward to the fireworks display.

The fireworks started at about 6 pm and lasted for more than 2 hours. The spectacular fireworks display, exhilarating music, and the cool breeze that evening made a perfect event. The crowd was in awe throughout the continuous fireworks display.

I would like to express my sincere gratitude to Toyohashi Municipal Council for their generosity in providing international students from Toyohashi University of Technology the opportunity to attend this eventful festival every year. The warm hospitality and kindness of the staff throughout the festival was very much appreciated.

All the international students, some with members of their family and other who attended with friends, had an unforgettable and exhilarating evening. This day, which marks a long standing tradition accompanied by the spectacular fireworks display, will be vividly etched in our memories for ever. What a lovely way to celebrate summer. I expect that everyone is looking forward to next year's Toyohashi Gion Matsuri.



Tan Wai Kian, Doctoral Course Student
from Malaysia