

> FACULTY AWARDS AND HONORS

● Professor Wenjie Wan Receives STCSM Grant



Prof. Wenjie Wan has been awarded by the Science and Technology Commission of Shanghai Municipality (STCSM), under the 2015 Science and Technology Innovation Act Program in international cooperation. The project title is ***SERS Gas Sensor Based on Nanoimprint Technology for Atmospheric Surveillance***. Relying on the funded joint project of the University of Michigan-Shanghai Jiao Tong University Collaborative Research, Prof. Wan's project plans to develop further research joining forces at home and abroad. Shanghai Jiao Tong University has 24 competitors this year, among which 8 are selected to be funded.

About Science and Technology Innovation Act Program in International Cooperation

Making best use of international resources, it is intended to promote Shanghai local international science and technology and innovation, and finally build Shanghai a global innovation city. Priority is given to scientific and technological cooperation with international academic organization and cross-nation cooperation led by the applicant. Long-term steady collaboration should be maintained. The applicant in China should have published SCI papers in the recent 3 years with the foreign collaborator, as 1st author or corresponding author.

● Professor David Hung Signs Contract with ASAHI KASEI PLASTICS (SHANGHAI) CO., LTD

In this new research project sponsored by *Asahi Kasei Plastics*, the effect of innovative timing chain guide plates with lightweight material characteristics on the power output, frictional loss, and fuel economy of a domestic downsized high performance spark-ignition engine will be investigated. The timing chain guide is a key engine component for precise timing control of engine operation. The goal of this research project is to help *Asahi Kasei Plastics* identify key attributes of the specific lightweight materials and design criteria for the development of the next generation timing chain guide plates.

Asahi Kasei Plastics (Shanghai) Co., LTD

New generations of high efficient and clean engines require precise and robust control of engine operations. Asahi Kasei Plastics Co. LTD is a global manufacturer of high performance plastic compounds for automobile manufacturers and automotive tier suppliers around the globe. Asahi Kasei Plastics specializes in developing innovative lightweight materials to help engines achieve high efficiency and low emission.



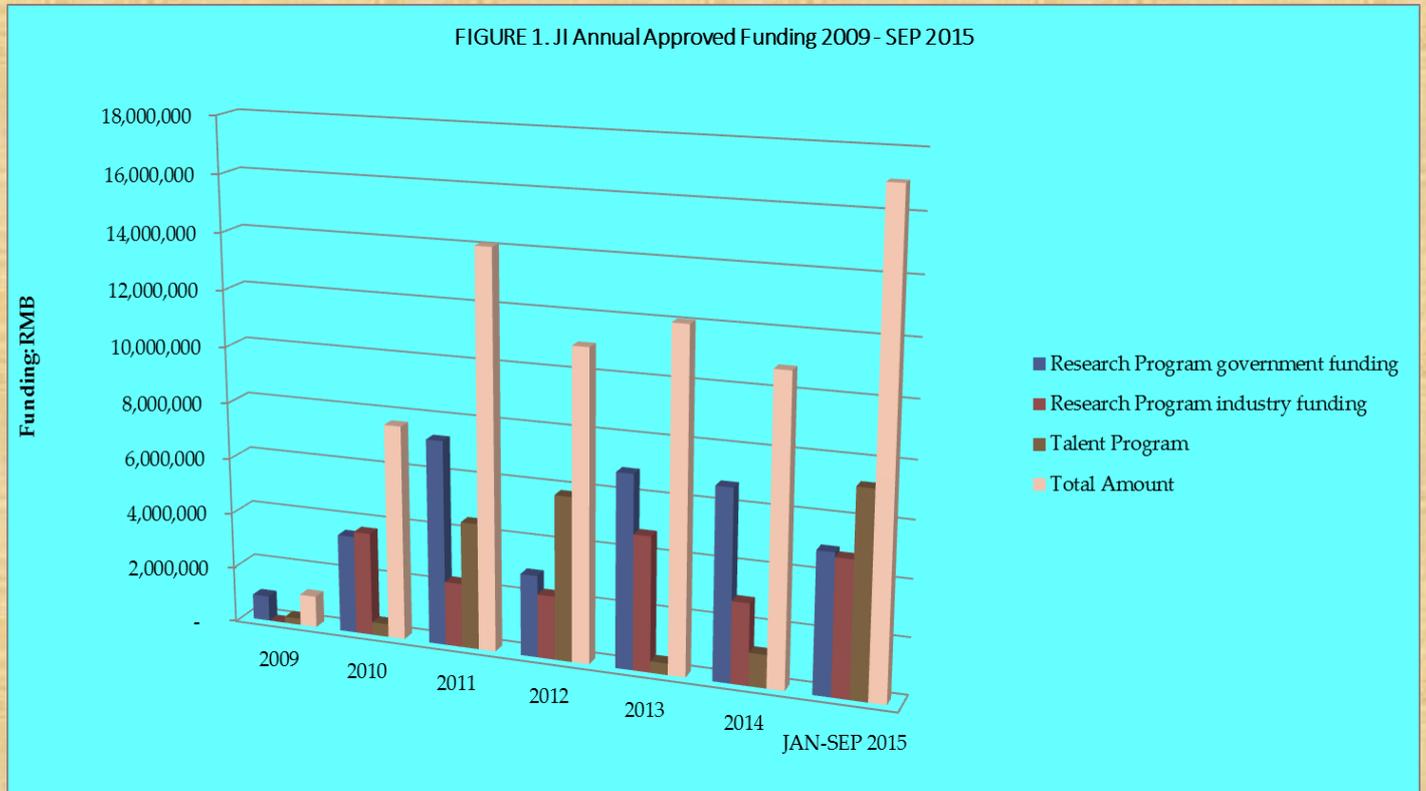
Figure 1. Samples of the Lightweight Timing Chain Guide Plates

● Professor Jigang Wu Signs Contract with HITACHI (CHINA) RESEARCH & DEVELOPMENT CORPORATION SHANGHAI BRANCH



Prof. Wu has been sponsored by HITACHI (China) with a short-term project, in which Prof. Wu provides design service for the company. The project is about the design of a lens suitable to be used in a compact imaging system. The design provides characterization of the imaging quality by considering optical aberrations, field-of-view, illumination level, optical materials, as well as assembling and packaging issues. The design will be helpful for the company in developing one of their future products.

● **JI Funding/Project Summary**



As shown in Figure 1, funds from talent program saw a dramatic boost of over ¥ 7,000,000 in 2015. This is largely due to the talent awards obtained by 3 Young Thousand Scholars.

➤ **SPOTLIGHT**

● **Selected Research Papers:**

Development of the SJTU Unfoldable Robotic System (SURS) for Single Port Laparoscopy

Kai Xu, Jiangran Zhao and Minxiao Fu

IEEE-ASME TRANSACTIONS ON MECHATRONICS VOL. 20, NO. 5, Pages (2133-2145), OCT 2015; DOI: 10.1109/TMECH.2014.2364625

Date of Publication: Nov. 11, 2014; Date of Current Version: Aug. 31, 2015; Issue Date: Oct. 2015

Abstract: Single-port laparoscopy (SPL) has attracted continuous attention in the past decade due to the potential of generating better surgical outcomes than the traditional multiport laparoscopy. In order to ease the challenging surgical manipulation tasks using manual tools in SPL, several robotic systems were constructed to provide surgeons an intuitive way to operate. With possible improvements identified, the SJTU unfoldable robotic system (SURS) for SPL is developed for improved system specifications. The SURS can be deployed into



abdomen through a phi 12-mm port in its folded configuration and can then be unfolded for dual-arm surgical interventions with onboard 3-D visual guidance. A few key design concepts which lead to the specification improvements are elaborated. The design descriptions, kinematics modeling, actuation compensations, and experimental characterizations are detailed to demonstrate the potentials of the SURS.



Kai Xu, assistant professor, UM-SJTU Joint Institute, IEEE Member.



Jiangran Zhao (S'12) received the B.S. degree from the University of Michigan - Shanghai Jiao Tong University Joint Institute, Shanghai Jiao Tong University, Shanghai, China in 2011. He is currently pursuing his Ph.D. degree in the same institute. His research interests mainly include surgical robots and continuum mechanisms.



Minxiao Fu received the B.S. degree from the School of Mechanical and Power Engineering, East China University of Science and Technology, Shanghai, China, in 2012. He is currently pursuing his M.S. degree in the University of Michigan - Shanghai Jiao Tong University Joint Institute, Shanghai Jiao Tong University, Shanghai, China.

The authors are with the **RII Lab (Lab of Robotics Innovation and Intervention)**, UM-SJTU Joint Institute, Shanghai Jiao Tong University, Shanghai, 200240, China

About IEEE/ASME Transactions on Mechatronics

The journal encompasses all practical aspects of the theory and methods of mechatronics, the synergetic integration of mechanical engineering with electronic and intelligent computer control in the design and manufacture of industrial products and processes. Impact Factor: 3.427

➤ NEWS AND EVENTS

● JI Welcome New Faculty!



Dr. Qianli Chen joined faculty as assistant research scientist and lecturer. Inspired by her master thesis work on dye-sensitized solar cells in the laboratory of Prof. M. Grätzel at EPFL, Qianli became interested in the fundamental physical and chemical processes in energy conversion devices. In her doctoral thesis written at Empa, Swiss Federal Laboratories for Materials Science and Technology, she discovered the effect of epitaxial strain on the proton conductivity, which has opened up a new route for the design of efficient electrochemical devices such as fuel cells. Shortly after joining the Max Planck Institute for Polymer Research in Mainz as a postdoctoral researcher, she was awarded

an Alexander von Humboldt Fellowship to intensify her studies on sensitized solar cell systems. Dr. Chen is the winner of Young Scientist Prize of the Swiss Neutron Scattering Society in 2014 and the recipient of the 2005 Baosteel scholarship. She holds a Dr.sc. from ETH Zurich, an M.Sc. from KTH / Stockholm and a B.Eng. (with honors) from Southeast University / Nanjing.

● Professor George Barbastathis of MIT Appointed JI Adjunct Professor

Professor George Barbastathis of Massachusetts Institute of Technology has been appointed Adjunct Professor by the Joint Institute. An appointment ceremony was held on September 28, officiated by Dean Peisen Huang and attended by Prof. Xinwan Li, Associate Dean for Research, students and faculty members in the optics field, including Wenjie Wan, Jigang Wu, and Sungliang Chen.



Prof. Barbastathis is JI's first adjunct professor. He was awarded a "High-level Foreign Expert Project" while visiting JI from September 2013 to August 2014 and engaged himself in extensive research at JI. Six papers associated with JI have been published in famous international journals such as *Optics Express*, *Optics Communications*, *Journal of Optical Society of America*. His interactive way of teaching was well received by the students. He has mentored a couple of young JI faculty members and had invited world-class scholars to give seminars at JI.

- **Seminars**

A. Graduate Forum on Emerging Technologies in Medical Imaging



After the appointment ceremony of George Barbastathis, the 1st graduate forum on Emerging Technologies in Medical Imaging was held. 5 students from research groups in medical imaging presented projects (see below), followed by questions and answers. Prof. Barbastathis exchanged ideas with JI faculty and students about future research collaboration.

Topics and Presenters

Metal-free Flat Lens Using Negative Refraction by Nonlinear Four-wave Mixing

Student: Jianjun Cao Supervisor: Prof. Wenjie Wan

Ultra-Low Dose CT Image Reconstruction Based on Big Data Priors

Student: Xuehang Zheng Supervisor: Prof. Yong Long

Wide-field-of-view microscopy with compressive sensing

Student: Jie Wang Supervisor: Prof. Jigang Wu

Single-nanowire silicon bipolar phototransistors as a high-gain, low-voltage photodetector

Student: Xingyan Zhao Supervisor: Prof. Yaping Dan

Photoacoustic microscopy by scanning mirror-based synthetic aperture focusing technique

Student: De Cai Supervisor: Prof. Sung-Liang Chen

B. Graduate Forum on Thermal Sciences and Solid Mechanics

Following the 1st graduate forum on medical imaging, the Graduate Forum on Thermal Sciences and Solid Mechanics was held 14:00, Oct. 9 at the Joint Institute. It was chaired by Prof. Yongxing Shen, one of the four faculty members calling for the forum. The other three faculty members are Hua Bao, Roberto Dugnani, and Shane Johnson. Prof. Xinwan Li, the Associate Dean for Research, Prof. Chien-Pin Chen, the Associate Dean for Graduate Program, Prof. Yaping Dan, and 18 postdocs, graduate and undergraduate students attended the forum. One week later, the 2nd session, chaired by Prof. Shane Johnson, was held at Room 401 of the South Law Building.

Session 1: Topics and Presenters

Yihuan Li: Adaptive mesh refinement for the phase-field model of fracture based on the potential energy functional

Peng Zhan: Constitutive multi-scale region specific modeling of the plantar soft tissue

Cheng Shao: Thermal transport at nanoscale: Fundamental and application

Session 2: Topics and Presenters

Mostafa Mollaali: Numerical modeling of supercritical carbon dioxide fracturing: A preliminary study

Han Xie: Prediction of thermal conductivity with numerical methods

Zeeshan Qaiser: Design, optimization and experimental validation of a novel tunable stiffness mechanism (TSM) for adaptable orthotics



(Left: 1st session; right: 2nd session)

As Profs. Xinwan Li and Chien-Pin Chen remarked, multidisciplinary research is JI's hallmark. Prof. Li hoped JI can keep graduate forum series stable as part of the JI academic culture. Prof. Chen pointed out that the forum can serve as a platform for exchange and cooperation between research groups and expected it would further push forward seminar classes in JI in the future.

About the Forum

The purpose of the forum series is to promote the exchange of ideas between different research groups and facilitate further collaboration among JI faculty.

This forum is composed of four sessions, all on Fridays. In each of the four sessions, a graduate student or postdoc from each group presents his/her work in front of these four groups (advisors + postdocs + grad. students + undergrads) and whoever interested, so that the presenters can practice giving seminars and the advisors get to know better colleagues' work. Some presentations are results of collaboration.



● **JI Holding Joint Workshop with KITECH on Electrical Engineering Collaboration**

On October 15th, JI-KITECH (Korea Institute of Industrial Technology) Joint Workshop was held in JI building. The group of KITECH visitors including Prof. Kyung Tae KANG, Heui Seok KANG, Kwanhyun Cho and Prof. Lee, Moon Gu from Ajou University were invited. Professors Peiyun Yi, Xinmin Lai, Shuhuai Lan and Linfa Peng from the School of Mechanical Engineering (ME) and Professor Xiaojun Guo from the School of Electronic Information and Electrical Engineering (EIEE) also joined. The workshop was to share the recent research outcome of both institutes in electrical engineering based on the MOU signed in the early 2015 between SJTU and KITECH.



Prof. Xinwan Li, Associate Dean of JI, firstly welcomed all the visitors and then introduced the framework of JI-KITECH collaboration. Afterwards, professors from both institutes presented their current studies in micro/nano scale manufacturing of advanced printed electronics. A discussion session continued following the presentations for making general guideline for co-publication, international patent and program application for mutual benefits. Both sides agreed on the regular workshop and sharing results data for long-term cooperation relationship. In the afternoon, KITECH visitors toured the laboratories in micro-nano research lab building, center for advanced electronic materials and devices, schools of ME and EIEE. In previous collaboration with the strong support from the KITECH president, a half-year R&D project named “A study on light trapping technology for organic solar cells using nanostructure” has been successfully awarded in August this year. Dr. Cho is a principal investigator and Prof. Tian Yang is a potential collaborator from SJTU. And in April, joint conference between two institutes has been held in Seoul, Ansan. This time the joint workshop provides opportunities to further strengthen the partnership between SJTU and KITECH and more progress in this collaboration relationship is expected.



➤ UPCOMING EVENTS

● Graduate Forum on Thermal Sciences and Solid Mechanics

Session 3: Friday, Nov. 13, 16:00-18:00 Can Wu, Liping Kang, Saeid Zahiri, Weizi Li

Chair: Roberto Dugnani

Session 4: Friday, Nov. 27, 16:00-18:00 Cheng Cheng, Haihua Ou, Chen Yan, Zhen Tong

Chair: Hua Bao

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