



# THE AMERICAN SOCIETY OF

**Central Oklahoma Section Newsletter**  
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The Section is located at: Oklahoma Engineering Center, 201 Northeast 27<sup>th</sup> Street, Oklahoma City, OK 73105

The Central Oklahoma Section Newsletter is nominally published nine times per year to convey monthly meeting dates, meeting topics, section activities, and/or other ASME information to its membership.

**\*\*\*\*\* JOINT MEETING WITH THE OKLAHOMA AIAA & SWE SECTIONS \*\*\*\*\***

**PROGRAM: MANUFACTURING IN OKLAHOMA**

**SPEAKER: Dr. Shivakumar Raman**, Professor, University of Oklahoma School of Industrial and Systems Engineering



**DATE: Thursday, January 22, 2015**

**LOCATION: OSU-OKC Campus, Student Center (SC), Third Floor Conference Room South, 900 N. Portland Ave., OKC**

Dr. Shivakumar Raman will discuss manufacturing in Oklahoma. His extensive manufacturing experience is of value throughout Oklahoma. His presentation will highlight present and future visions for manufacturing processes.

We welcome the Oklahoma Section of the Society of Women Engineers (SWE) and the Oklahoma Section of the American Institute of Aeronautics and Astronautics (AIAA) who will be joining us!

**Please join us for this meeting on January 22nd! PDH certificates will be available for attendees.**

**Time:** 5:30 - 6:00PM: Meet & Register at OSU-OKC meeting site.  
 6:00 – 6:45PM: Introductions and Catered Meal                      6:45PM: Program by Dr. Raman

**Cost:** \$10 for ASME Sr. members and Guests, \$5 for ASME Student Members. Please place your reservation with Albert Janco (Ph: 405-848-1991 (leave message); e-mail: JANCOA@asme.org) by Tuesday, January 20th at **NOON**. PLEASE furnish the name of each person attending and their affiliation (ASME, SWE, AIAA, etc). If a student, please indicate school/university. If a P.E. please indicate if a PDH certificate is desired.

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**ADDITIONAL JANUARY MEETING INFORMATION**

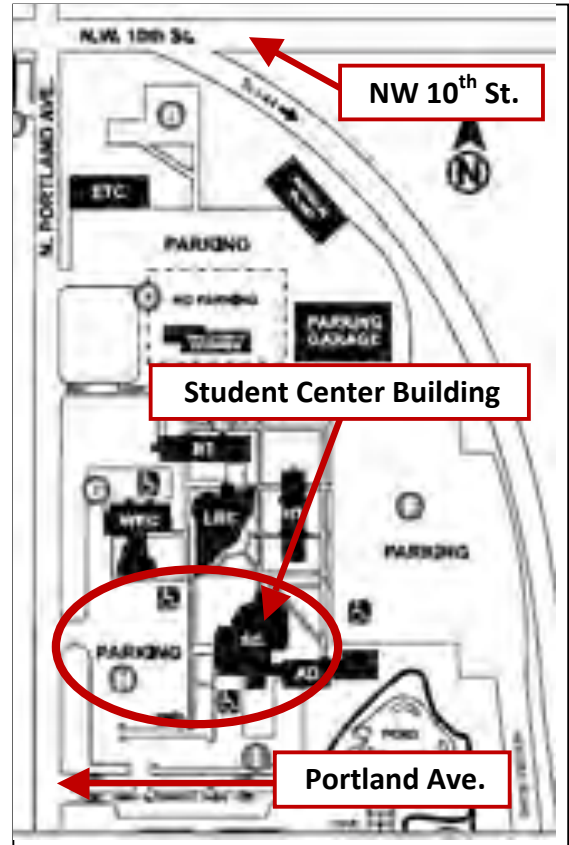


Dr. Shivakumar Raman is a tenured full Industrial Engineering professor at the University of Oklahoma where he holds the *David Ross Boyd* and *John A. Myers* Chair positions. He has also held the *S.R. Noble Foundation* Presidential Professorship.

Dr. Raman teaches courses in the areas of materials, manufacturing processes and metrology. He is an Elected Fellow of three major engineering societies: SME, ASME and IIE. He is the current Scientific Committee Chair (Chief Editor) for the North American Manufacturing Research Institution of SME (NAMRI/SME) and also serves on its Board of Directors (2008-2010).

He has served as an associate editor for the Journal of Manufacturing Systems and Journal of Manufacturing Processes (both of SME), and ASME Transactions: Journal of Manufacturing Science and Engineering; and as an editorial board member for IIE Transactions (Journal of Design and Manufacturing), and International Journal of Precision Engineering and Manufacturing (KSPE). In addition, Dr. Raman has organized or Chaired many technical conferences and sessions associated with manufacturing and manufacturing engineering.

Dr. Raman received his Ph.D. in Industrial Engineering from Pennsylvania State University, his M.S. in Mechanical Engineering from the University of Texas at Arlington, and his B.S. in Mechanical Engineering from Shivaji University. His research interests include form and geometry verification of parts in manufacturing, shape engineering, adaptive methods for sensing and metrology in manufacturing, tribology in machining and scalability, surface metrology, modeling of machining processes for systemic functions and integration, bio-manufacturing, and osseo-metrology.



Above is a map to the OSU-OKC Student Center (SC). The SC is located in the main (mid) area of the OSU/OKC campus that is west of the Fairgrounds on N. Portland Avenue and north of W. Reno Avenue. This map is accessible at: <http://www.osuokc.edu/map/> or <http://www.osuokc.edu/map/pdf/campusmap.pdf>

**OKLAHOMA FUTURE CITY COMPETITION  
SATURDAY, JANUARY 24<sup>th</sup>**

The Oklahoma Future City competition will be held Saturday, January 24<sup>th</sup> at Oklahoma Christian University. VOLUNTEERS ARE NEEDED to help judge the entries and critique participant presentations.

These student teams do a remarkable job in planning, building, and explaining their Future Cities. All are welcome to stop by and see!

For more information contact Todd Heimer at [todd@okfuturecity.org](mailto:todd@okfuturecity.org).



## **CENTRAL OKLAHOMA MATHCOUNTS COMPETITION SATURDAY, JANUARY 31<sup>th</sup>**

Oklahoma regional MATHCOUNTS competitions are here! Five regional competitions that will be held with boundaries shown here.

The central Oklahoma Future City competition will be held Saturday, January 31<sup>th</sup> at Oklahoma City Community College in southwest OKC.

VOLUNTEERS ARE NEEDED to help proctor and grade.

Contact Kris Sanders for all regional MATHCOUNTS dates ([kris@ospe.org](mailto:kris@ospe.org)).



### **HELP NEEDED TO CRITIQUE OU-AME STUDENT PROJECT PROCEDURES**

Dr. Diana Bairaktarova is an ASME member and Assistant Professor of Engineering Practice in the OU Aerospace and Mechanical Engineering department. She is in the process of evaluating results from a study and needs our help!

The focus of her study is on different ways engineering students learn:

- One of the activities for the study is asking first-year engineering students to write an assembly procedure for building a solar boat. \
- Part of the study assessment is to have professional engineers evaluate the students written procedures.

Dr. Bairaktarova needs 10 engineers to evaluate the students' procedures. Each engineer will have 30 procedures. The assembly procedure is less than a page and will not take a person more than an hour to evaluate 30 procedures. She has an example of an assembly procedure with 1 - 5 grading scale and only three evaluating criteria.

She has collected relevant data and is ready to communicate all details with engineers prior that are willing to help. Her plan is to begin the analysis in February with completion by mid-February.

Please contact Dr. Bairaktarova if you would like to help! See her web page at:

<http://www.ou.edu/content/coe/people/bairaktarova.html> or e-mail [diana.bairaktarova-1@ou.edu](mailto:diana.bairaktarova-1@ou.edu)

## **NEWS ITEMS OF INTEREST**

### ***Boeing and UW Launch Lab so Professors, Engineers can Improve Automation***

(courtesy [Seattle Times](#), January 15, 2015)

([Dominic Gates](#), Aerospace Reporter) On Monday, Gov. Jay Inslee will officially open a new Boeing Advanced Research Center at the University of Washington, where company engineers will research automation of airplane assembly alongside UW professors and grad students.

Boeing and the University of Washington are taking their collaboration to greater heights with a new campus research center where doctoral engineering students, UW professors and Boeing engineers will work side by side on projects focused on automating aircraft assembly processes.

The jet maker is investing \$800,000 per year initially to fund the first four research projects at the new Boeing Advanced Research Center, company spokesman Peter Conte said.

Jointly led by Boeing-employed engineers working as affiliate instructors and UW engineering professors, the 4,300-square-foot facility at the Department of Mechanical Engineering has been planned for more than a year.

Gov. Jay Inslee will officially open the new facility Monday in a ceremony attended by UW President Michael Young and Boeing Commercial Airplanes chief Ray Conner. The center is already up and running, with an existing lab gutted, refurbished with new equipment and stocked with airplane parts.

Todd Zarfos, the Boeing vice president who heads the Washington state engineering-design center and is also responsible for the company's relationship with UW, said that the new center will streamline the research. "By having both parties working together on a daily basis, we hope to see acceleration in technology development," Zarfos said.

One initial project is designed to make it easier for mechanics to build the insides of airplane wings by using small, remotely controlled robots to crawl inside the cramped wing interior and place nuts on bolts, seal seams and inspect the space for debris. Other projects include automating the riveting of fuselages and predicting the final shape of certain aircraft structures.

Zarfos said the research will be geared to look ahead beyond immediate applications, to find technology that can be implemented on Boeing's next new airplane or next new production system.

He said the UW and Boeing have negotiated a standard agreement to protect intellectual property. Graduate students working on the research will still be able to further their academic careers by publishing papers, but only with material that is not specific to Boeing applications.

Anything developed that's specific to Boeing will be closely held. And anything the university researchers develop that may be novel can be separately licensed. Until now, Boeing has given money to specific departments or specific professors to do research on something the company needs. The university researchers then pursue the work, with quarterly reviews by Boeing.

What's new is the day-to-day, side-by-side working together envisioned at the Boeing Advanced Research Center.

That could potentially increase a long-standing concern among some academics about private companies funding and directing work for their own interest at publicly financed universities.

Jack Lee, professor of mathematics and chair of the UW faculty-senate committee on planning and budget, said strengthening ties between the university and industry has been pushed by Young in response to the state slashing financial support in recent years.

"It's an alternative way to bring research funding to the university, which we need," Lee said. He added that the university nonetheless needs to be careful to ensure that research priorities and direction are not entirely dictated by corporate sponsors.

He said engineering researchers must pursue what looks promising and useful, and if some of that is useful to Boeing, that's fine. But he cautioned that "the university is here for more than doing research that private corporations need."

He said he welcomes the Boeing investment and collaboration, but also that "We need to keep our eyes open to ensure we don't become a partially owned subsidiary of Boeing."

"We can see that growing to eight (Boeing engineers) in the short term," said Zarfos, "Hopefully it will generate other opportunities, and (in the future) we'll be looking at potentially expanding it."

If the project works as well as expected, he said, "we'll be looking at doing similar things at other universities."

**EDITOR'S NOTE:** Boeing has moved many programs from Seattle and California to central Oklahoma. Perhaps our area universities can also work with Boeing engineers on research efforts.

## **Engineering Meets Art**

(via <https://www.asme.org/engineering-topics/articles/design/engineering-meets-art>)

Engineers are applying the principles of a 17th-century Japanese art form to develop innovative products and structures that are meeting a variety of challenging design situations in a host of industries.

The old art form, origami, creates unique patterns and shapes from paper folding. Today origami is inspiring engineers to design active materials and smart structures that bend, stretch, and curve, overcoming traditional design constraints to render products and systems with remarkable performance characteristics and features.



A reconfigurable C-arm of an X-ray machine with the shroud that expands and contracts like origami.

The amazingly compact automobile airbag is an example of origami-inspired engineering, which is also making commercial inroads in the energy, apparel, and healthcare industries. Reflecting the emerging interest in the field, the National Science Foundation recently provided funding to eight U.S. universities to advance origami engineering into the realm of reconfigurable smart structures and self-assembling systems.

“Origami engineering can meet the demand across multiple industries for products and systems with very complex applications,” says Mary Frecker, a professor of mechanical engineering and biomedical engineering at The Pennsylvania State University, University Park, one of the schools to receive an NSF research grant. “Origami enables products with the ability to fold and then unfold on demand – at any time.”

To create products to do that, engineers are incorporating active materials like magneto-active elastomers and polymer films into the origami-inspired structure. Then an external stimulus such as a magnetic or electric field is exerted on the material, inducing the structure to crease, fold, bend, and exhibit other characteristics.

While the material is almost magical in its ability to morph into different shapes and patterns, the challenge for engineers is create a system that is structurally sound and can be fabricated for practical use.

“Traditional origami art uses paper; however, most engineering applications require materials with finite thickness to provide the necessary strength and stiffness to achieve a desired functionality,” says Frecker, a fellow of ASME. “Our analysis of experimental designs shows that different activation processes determine different folds, curves, and deformation in the material structure.”



Prof. Mary Frecker and graduate student Adrienne Crivaro discuss the design of an origami structure.

As researchers continue to work to create new structures that can stand up to practical use, some companies have placed origami-inspired designs into the commercial marketplace, realizing the benefits of products and systems with unique folding capabilities. GE Healthcare recently collaborated with Brigham Young University on a cover for the extension arm of an X-ray machine used in the operating rooms of hospitals. “GE needed a design for the shroud that maintained the sterile field during all movements and positions of the extension arm,” says Larry L. Howell, a professor in the Department of Mechanical Engineering at BYU, Provo, UT. “After several concepts were evaluated and tested, an origami-based design was selected.”

The design of the shroud was complex. In order to accommodate the needed motion and geometry of the X-ray machine arm, the BYU team developed an adjustable shroud based on a crease pattern named *Miura-ori*. The shroud expands and contracts like a musical accordion to shield the sterile field in the operating room from the nonsterile extension arm. The shroud is made of Tyvek, a type of synthetic paper produced by DuPont.

Beyond the medical field, origami-inspired products include telescopes, protective covers for automobiles, athletic shoes, kayaks, solar arrays, appliance drawers, and temporary shelters.

“These and other products present evidence that foldable solutions are viable in engineering design,” says Howell, an ASME fellow. “Origami art will continue to inspire products that need to be portable and deployable.”

Twenty-eight technical papers on origami engineering were presented in a dedicated symposium at the 2014 ASME Design Engineering Technical Conferences, reflecting surging interest in the field. According to Frecker, at Penn State, the evolving interest is in self-folding structures as well as deployable large-scale systems for space exploration. Another area of increasing focus is applications that combine electrical, magnetic, and thermal means to activate materials to enable origami-based design.

Says Frecker: “Origami engineering provides numerous opportunities to revolutionize the way we design, manufacture, assemble, and package products and devices.”

### **Chair's Corner**

**VERY IMPORTANT QUESTION to ALL ASME Central Oklahoma Section members:** Do you wish to continue receiving future notices of our monthly Newsletter? Or, if unable to attend a monthly meeting [that you really wanted to attend] - did you know that you can download the meeting presentation slides for later viewing? Due to pending changes at the reorganized ONE-ASME, we are being discouraged in sending out mass e-mailings to our membership. Instead **they are asking all ASME members to join a group page on the ASME.ORG webpage.**

If you navigate to the ASME.ORG webpage you will have several choices of Group Pages to join. Two groups in particular interest are recommended, the Central Oklahoma Section and the Group Pathways & Support (GPS) networks. The quickest way to navigate to either Group page is to type in either Central Oklahoma Section or GPS in the ASME homepage search box and click on the magnifying glass icon. Since **we will be loading our Newsletters and other announcements on the Central Oklahoma Section Group page,** it is recommended that you join this group (save as a favorite?) in order to access all future notices.

You can supply as much (or little) personal information as you wish. If you are really curious of the MAJOR changes that ONE-ASME is making to our society - join the GPS Group page for all the pending changes and NETWORKING opportunities available to ALL of our fellow ASME members. Happy networking!

Please make plans to join us on January 22nd for the Joint ASME/AIAA & SWE meeting – see details above for details. All ASME-Central Oklahoma Section members, students, and guests are welcome to join us.

Tom Betzen, Chair, ASME Central Oklahoma Section

### **Future ASME-Central Oklahoma Section Events**

<b>Date</b>	<b>Location</b>	<b>Program Topic and Speaker</b>
Thursday Jan. 22, 2015	OSU-OKC Campus 900 N. Portland, OKC	Joint Program with the Oklahoma AIAA Section
Saturday Jan. 24, 2015	Okla. Christian Univ. (OC) Edmond OK	Oklahoma Future Cities Competition – VOLUNTEERS NEEDED For information contact Todd Heimer (todd@okfuturecity.org)
Saturday Jan. 31, 2015	Okla. City Community College (OSCC), OKC	Oklahoma Central Region MATHCOUNTS Competition VOLUNTEERS NEEDED For information contact Kris Sanders (kris@ospe.org)
Thursday Febr. 26, 2015	Okla. Christian Univ. Gaylord Student Center Edmond OK	Joint Engineering Societies Banquet Speaker: Mr. C. Michael Ming, General Manager, New GE Oil & Gas Research Center in OKC
Thursday March 26, 2015	TBD	Ethics Meeting
Thursday April 23, 2015	TBD	Honors and Awards Meeting

**Please visit our Section website:**

[https://community.asme.org/central\\_oklahoma\\_section/default.aspx](https://community.asme.org/central_oklahoma_section/default.aspx)

**IT'S BEEN REVAMPED.** Check event updates and other useful information!