OPEN Optics and Photonics Education News

Newsletter of the Optics and Photonics College Network June 2018

International Day of Light is Worldwide Success

On 16 May 2018 the first International Day of Light celebrated the vital role of light and related technologies in science, culture and art, education and sustainable development. More than 600 events were held in 87 countries reaching hundreds of thousands of people, and a spectacular afternoon and evening celebration was also held at UNESCO headquarters in Paris, France.

From the Executive Director

The leading picture, above, is a reminder of the recent celebration of the International Day of Light (IDL). Several colleges used this event to create interest for students to enroll in photonics technology. The IDL article by LASER-TEC and the WE STEM Day at Indian Hills Community College are good examples. SPIE is holding an IDL photo contest through September 16; for information and to view photos from the 2017 photo contest, click **here**.

Gordon Snyder's article describes a very unusual application of photonics emerging in Montana where researchers have developed a special LIDAR to identify and track invasive fish (Lakers) in Yellowstone Lake.

A new photonics program emerging at Spokane Community College is also described in this newsletter.

The final article of this issue describes two OP-TEC guides to help high schools organize, develop and teach the Fundamentals of Light & Lasers course for dual credit.This summer, please consider planning/assisting one or more of your local high schools to add a photonics course in their STEM academies.

Have you registered and made your travel plans to attend the July HI-TEC Conference in Miami? Please contact **Christine Dossey** for more information.

In This Issue

Upcoming Events

06/24/18 - 06/27/18
American Society for Engineering Education (ASEE) Annual Conference
Salt Lake City, UT

06/26/18
9:30 am - 2:30 pm
Seminar: Converging Networks in Enterprise Buildings
Indian River State College
Fort Pierce, FL

07/23/18 - 07/26/18
HI-TEC Conference
Miami, FL

07/30/18 - 07/31/18
MPEC Fundamentals of Photonics Workshop
Indian Hills Community College
Ottumwa, IA

08/06/18 - 08/10/18
MPEC Laser Material Processing
Indian Hills Community College
Ottumwa, IA

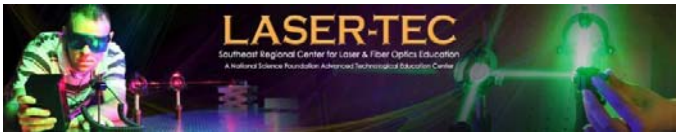
View Events Webpage

Dan Hull

LASER-TEC Celebrates International Day of Light

LASER-TEC joined the global community in celebration of the International Day of Light on May 16, 2018. Over 130 students from Glendale Elementary School visited the Photonics Lab at Indian River State College in Florida. Through interactive hands-on activities students learned about the impact of light technologies on our everyday life. They investigated how these technologies make a huge difference in the way we communicate, shop, diagnose and treat diseases, sustain the environment, and explore the universe frontiers. The students also learned about the school preparation necessary to enter this exciting and ever-growing field. The activities included propagation of light in fiber optic cables, selective absorption and reflection, light diffraction, and light polarization as it travels though optically active materials.

If you would like to learn more about LASER-TEC and its student and public outreach, please contact Dr. Chrys Panayiotou at **cpanayio@irsc.edu** or 772-462-7621.



WE STEM Day at Indian Hills

Nineteen local high school girls visited Indian Hills Community College to attend the 4th annual WE STEM Day (Women Exploring Science, Technology, Engineering, & Math Day). Students had the opportunity to do lots of hands-on activities in multiple Advanced Technology Center laboratories including multiple technology and science learning opportunities in Lasers & Optics, Bioscience, Computer Software, Automotive, Machining, and Robotics.

In the laser lab, the girls observed demonstrations of laser welding and a variety of laser/optics laboratory activities. The girls also performed hands-on activities with robotic "Hummingbird Kits" and learned about servo motors, LEDs, and sound sensors in the Robotics lab. In the Automotive lab, the girls built some solar powered cars and learned about switches, current flow, and series/parallel circuits. In the Machining lab, the girls used Computer Numerical Controlled machines to manufacture fidget spinners. The girls used a program called "SCRATCH" with some help from college students in the Computer Software Development lab. The Bioscience activity involved a yeast fermentation process and a staining process whereby the girls were able to view yeast cell viability under microscopes.

Enterprise Networks Seminar

Converging Networks in Enterprise Buildings

LASER-TEC will be hosting a free seminar to explore a different way to deliver services in your environment that make is easy for you to manage today's needs while being prepared for a dynamically evolving future. The latest technologies in fiber optics, DAS, and Small Cells will be covered by subject matter experts from Corning Optical Communications and Notora RF Engineering.

Who Should Attend:

- Managers of IT departments, buildings & school facilities
- Hospitals, hotel & resort administrations
- Civic, convention center & stadium managers
- Managers of mining facilities
- Civil engineers & architects

Register HERE
Register early as seating is limited.

Holography Webinar

Holography for Display: From AR to HUD to 3D

WE STEM participants with Jaclyn Welcher (5th from the right)

The highlight of the day was an inspirational keynote presentation from Jaclyn Welcher, Senior Field Analyst with Johnson & Johnson Vision Care, Inc. Jaclyn shared her career and educational pathway with the WE STEM attendees. Jaclyn's success story is one of turning challenges into opportunities and demonstrates that hard work and determination pay off in the long run.

This WE STEM Day activity was sponsored by IHCC and the Midwest Photonics Education Center (a National Science Foundation Regional Center).

For more information, please contact Greg Kepner at greg.kepner@indianhills.edu or Frank Reed at frank.reed@indianhills.edu.

Using LIDAR to Control Invasive Non-Native Fish Populations by Gordon Snyder

Growing up in New England, I spent a lot of time trout fishing with my Dad, two brothers and friends. In the spring and summer, it was typically small stream and rivers for brook and brown trout. Other times, it was trolling lakes with streamers for rainbow trout and in the winter, it was fishing through the ice for whatever we could catch! We did not fish a lot for lake trout (aka "Lakers") but I do remember fishing Lake Willoughby in Vermont them through the ice and later fishing Quabbin Reservoir in Massachusetts for them with my wife, her Dad and brother. Lakers were always considered trophy fish by my family...big, strong and they tasted pretty good!

A recent **Photonics.com** article titled **LIDAR Helps Yellowstone Manage a Threatened Ecosystem** took me by surprise. It turns out our revered Lakers are considered a non-native invasive fish out west, where they are wreaking havoc on native, cutthroat trout populations.

Yellowstone Lake in Bozeman, Montana is dealing with a serious problem, spending approximately $2 million per year to try and keep the Laker population in check. The Lakers eat lots of native cutthroat trout that are a key food source for bears, birds, and other animals. These predators cannot target lake trout because, unlike the cutthroat, Lakers spend most of the year out of range in deeper, colder water.

In 2004, an airplane-mounted LIDAR was first tested at Yellowstone Lake, in an attempt to locate the places where Lakers were spawning. Once spawning locations were identified, biologists used different methods to reduce populations.

Montana State University engineers and technicians built a custom LIDAR system for less than $100,000, mounted on a small airplane that can be operated for approximately $500 per day. Here's how it works:

Holography is now being used in a variety of display technologies, from augmented reality to head-up and 3D display. This webinar will discuss the technology of holographic optical elements and their use in display systems where the size and weight of optics must be constrained. If you miss the webinar it will be archived at www.photonics.com/Webinars.

Register HERE

HI-TEC Conference Plans

The national and regional photonics centers will host the next annual in-person OPCN network meetings and photonics industry site visits at the HI-TEC Conference, July 23-26, 2018 in Miami, FL.

The HI-TEC Conference provides a wonderful opportunity for educators to learn, network, give presentations, share best practices, and disseminate project resources with other STEM educators.

OPCN meetings and events are being planned for the HI-TEC Preconference on Monday and Tuesday, July 23-24. The general conference keynotes, presentation sessions, and exhibits will take place on Wednesday and Thursday, July 25-26. Be sure to visit the photonics booths #18-19.

As in previous years, OP-TEC will be offering conference registration codes for OPCN representatives to attend. OPCN Coordinators and Members will receive priority for these free registrations. Actively reporting OPCN coordinators may also request reimbursement for airfares following OP-TEC guidelines.

Interested educators should contact Christine Dossey at

The device works by transmitting a short pulse of laser light from the airplane through the air and into the water. The LIDAR receiver measures backscattered light, allowing researchers to pick out fish from the surrounding water. To optimize the setup for use on the lake, researchers used a green beam laser, which penetrates water better than other types of lasers used for LIDAR applications on the ground. The beam is angled backward so that the light's reflection on the water is deflected away and not saturate the receiver.

Montana State is further refining the system to use a technique called pushbroom scanning, in which the laser beam is scanned in a line to cover a wider swath. This would allow scanning the full lake area more quickly than the single fixed-angle laser used in the current setup. Researchers also have plans to adapt the system for other types of freshwater ecosystems.

"Yellowstone Lake Laker"Image Credit: Wade Fredenberg/USFWS

Photonics Momentum at Spokane Community College

Spokane Community College (SCC) recently added photonics lecture and lab classes to its Electronics Engineering Technician AAS degree curriculum. These classes are based on OP-TEC's Course 1, Fundamentals of Light and Lasers. The first student cohort began their program of study in fall 2017. These students will complete five quarters of electronics classes, a quarter of photonics and microprocessor classes, and finish with a capstone project in Spring 2019.

SCC recently received an NSF ATE subgrant from the Southeast Regional Center for Laser and Fiber Optics Education (LASER-TEC) which allowed the college to purchase three photonics laboratory equipment kits from the Midwest Photonics Education Center (MPEC). The MPEC kits, along with five optical tables donated to SCC by Lake Washington Institute of Technology, and a generous variety optical components and equipment donated by Irvine Valley College, will help SCC create a stimulating hands-on experience for students.

To add to the excitement, SCC entered the Minus K Technology annual Educational Giveaway and was selected, along with five other universities and colleges (including Irvine Valley College), to receive a negative-stiffness vibration isolator. With building renovations underway over the next few years, SCC will have plenty of opportunity to demonstrate the effects of vibration on optical experiments.

cdossey@op-tec.org.

We hope that all OPCN members will be able to attend July 23-26 in Miami!

PACT Alumni Spotlight

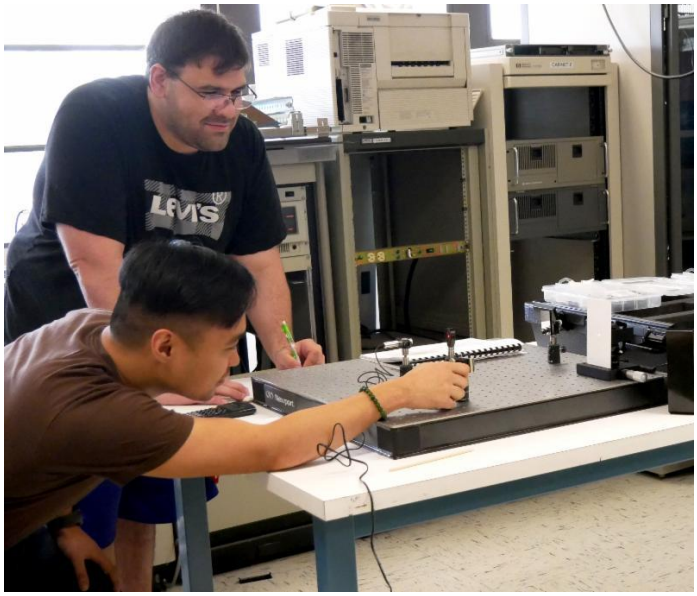
Robert Kraft's interest in photonics started before he graduated from high school. He began researching Indian Hills Community College's Laser and Optics Technology program and careers associated with the photonics industry. After seeing all the opportunities and what the photonics industry could offer someone straight out of a two-year program, Robert knew that photonics was a career he would like to pursue.

When Robert enrolled into the program at IHCC, he knew that science and math would be a part of the program, and he also knew that math had never been the easiest subject for him. "Math and science have always been challenging for me," he says, "but once these subjects were applied to something I thought was interesting, it became easy to me. Math, science, and photonics, it was all intertwined together." Robert worked hard to complete his degree. The more he learned about photonics, he says, the more he understood where he wanted to go in life and what he wanted to do.

After graduating, Robert accepted a job at Lawrence Livermore National Laboratory (LLNL) as an Engineer Technician 4. He is an operator for the Ignition Laser System at the National Ignition Facility. He works on subsystems that help control experiments with the world's most powerful laser.

"I love what I do," Robert says. "I find lasers and optics

Thanks to the assistance and equipment from OP-TEC, LASER-TEC, MPEC, Lake Washington Institute of Technology, Irvine Valley College, and Minus K Technologies, SCC is able to bring photonics into its curriculum and open the doors to many new career opportunities for its graduates.



SCC students setting up a single slit diffraction pattern experiment using a low power diode laser pointer and optical components from their new MPEC photonics equipment kit

Create High School Dual Credit Photonics Courses

Improving Student Enrollment & Retention with STEM Partnerships

Strengthening the "high school pipeline" for new photonics students can not only increase enrollment, it can assure that new students are well-prepared and committed to pursuing careers as photonics technicians. If your nearby high schools are offering, or considering, STEM academies, invite them to consider adding photonics (or lasers and optics) as a career major. If high schools do not offer STEM academies, your college can cooperate with them to offer dual credit photonics courses.

To assist high schools in designing and implementing the Fundamentals of Light and Lasers course, OP-TEC has recently revised and updated the Photonics Program Planning Guide for High Schools. This Guide contains information about career opportunities in photonics as well as guidelines for high schools to plan and implement a dual-credit course that will not only interest and prepare students for postsecondary education/training in photonics, but will also earn postsecondary credit with your institution. The Guide not only contains an appropriate lab design and a list of inexpensive equipment, it also describes teacher requirements for the dual credit course. OP-TEC will provide online teacher preparation.

incredibly interesting, plus working with the world's most powerful laser is pretty exciting."

Robert is certain that the field of photonics will continue to grow. He plans to keep working and learning all he can as a laser technician at LLNL, and he also sees himself pursuing a degree in optical engineering down the line.

Read more about Robert and other successful technicians in **Success Stories in Photonics Careers**.

OPCN Committees

The Committees of the Optics and Photonics College Network are dedicated to sharing expertise, best practices, resources, and advice on issues of importance to photonics technician educators at colleges throughout the United States.

Professional Development Committee
Anca Sala, Chair
anca.sala@baker.edu

Student Recruiting Committee
Chair TBD

Program Assistance Committee
Gary Beasley, Chair
gbeasley@cccc.edu

Equipment Committee
Frank Reed, Chair
frank.reed@indianhills.edu

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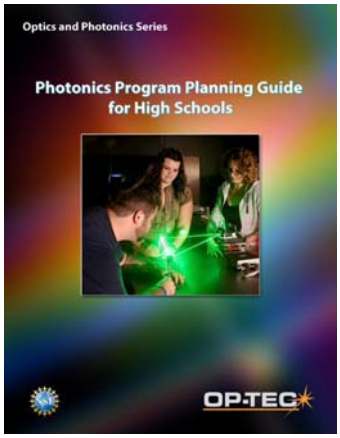

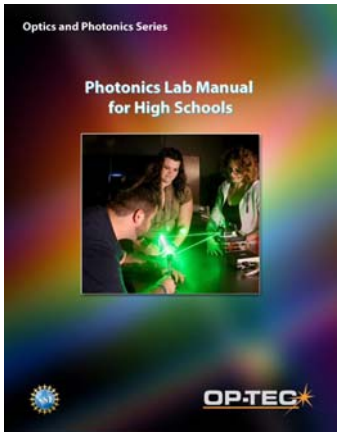

OP-TEC has also updated the Photonics Lab Manual for High Schools for Fundamentals of Light and Lasers, which contains alternate high school lab layouts and procedures that can be performed using less expensive equipment. While this equipment may not be "industry-grade," it nevertheless supports the hands-on learning required for this course, and develops useful "hands-on skills." High school students who successfully complete high school Fundamentals of Light and Lasers using this equipment are fully qualified to advance to the next level of postsecondary photonics courses in their curriculum.

Dual credit courses in photonics have been proven to support student enrollment. As an example, 10-12 high school graduates entering the photonics technician program each year at Indian Hills Community College, have completed articulated courses that count toward their A.A.S. degree.

Access to the Program Planning Guide and the Lab Manual for high schools can be found at **www.optecstore.org**.

Join the Conversation

We hope you enjoyed this edition of the OPEN newsletter. We would really like to hear from you. If there is some subject that you would like us to discuss or look into, please let us know at prmanager@op-tec.org.

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