



Optics outreach evolves in Southern California

OptoBoticssm begins to link informal to formal curriculum.

SPIE Optics & Photonics
Optics Education & Outreach III
Wednesday 20 August 2014
Conference 9811 paper 13

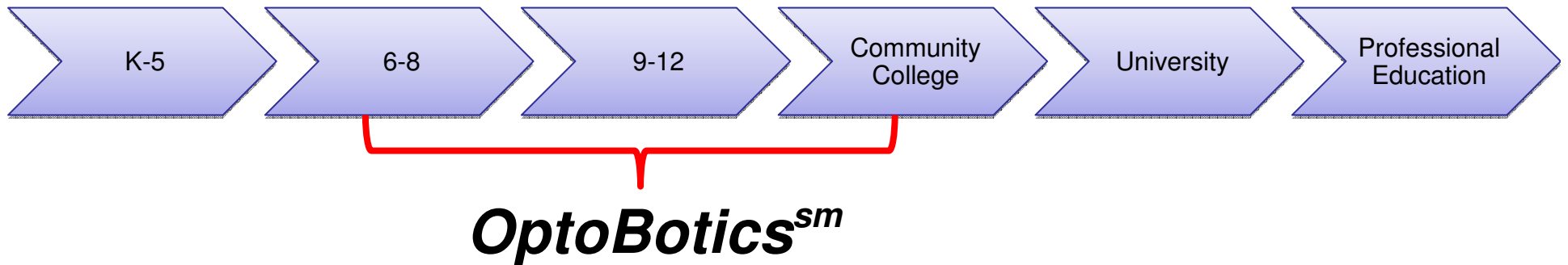
Donn Silberman

2007-2008 President & Fellow; Optical Society of Southern California
Founding Director; Optics Institute of Southern California
Advisory Committee Chair, UC Irvine Optical Engineering
Sr. Applications & Sales Engineer, PI-USA
Sr. Member; SPIE
Sr. Member, OSA



Optics Education Overview

- Optics Education Pipeline
 - K-12, Science & Engineering Fairs, Special Events
 - College and University connections
 - Professional Education
 - Career Pathways



Presentation Overview

- OptoBoticssm article in SPIE Professional 2013
- OptoBotics Trademark
- OptoBotics Summer Camp 2013
- OptoBotics @ Science Fairs & Family Days
- First Full OptoBotics Course Q1 2014
- Photonics Explorer Kits (& partners)
- Summer 2014 programs
- The Future of OptoBotics

Science Education

Many organizations have drawn attention to the alarming number of jobs in the United States that are or will go unfilled because of a shortage of employees with science, technology, engineering, and math (STEM) skills.

Since enhanced science education and outreach efforts are key to attracting young people to careers and college studies in STEM fields, the Optical Institute of Southern California is focusing on students at the secondary-school level, where decisions about college and career are being made.

A white paper from the alliance promoting the U.S.-based National Photonics Initiative (NPI) has also recommended increased investment in science education and job-training programs.

"A well-trained manufacturing workforce is essential to regaining and maintaining U.S. leadership in advanced manufacturing," the NPI white paper says. STEM education should therefore include a photonics curriculum in high school and two-year institutions, with a focus on photonics-related engineering programs.

Read more about the proposed NPI on page 8.

Optics Outreach Evolves

OptoBotics combines optics, photonics, and robotics to engage high-school students.

By Donn Silberman

After 10 years of bringing optics and photonics to students and the general public, the Optical Institute of Southern California (OISC) (USA) is developing a new outreach program especially for high-school students.

Our mission is to work with young people (mostly high school and college students) and to introduce them to the wonderful world of optics and photonics. Our new OptoBotics program shows students how optics and photonics components are integrated into robotic systems in many areas of everyday life, science, and industry.

OptoBotics materials, presentations, workshops, kits, books, activity guides, and events can help students understand everything from the most basic concepts about photonics to the most complex systems such as those aboard Curiosity, the roving vehicle exploring the surface of Mars.

Epiphany in outreach

Our transition from doing traditional optics outreach presentations began in 2007 when the OISC was invited to present at the University of California at Los Angeles Sci | Art NanoLab Summer Institute for high-school juniors. I used the lenses, polarizers, and other interactive tools from my Opticks Suitcase while a friend from the NASA Jet Propulsion Lab at the California Institute of Technology did a presentation on remote sensing using optics and photonics. My friend Mark was a big hit, and the students were buzzing outside the auditorium during the break.

Ever since then, I knew we had to make significant improvements in our outreach efforts to high-school students, as they are the ones who will go to college and beyond using the optics and photonics that piqued their interests from our interactions.

To make our outreach efforts more appealing to high-school students, we began weaving remote sensing concepts into OISC presentations. However, it still did not create that very special instant recognition and 'ah-ha' moment I was seeking.

A couple of years later, I saw a new science, technology, engineering, and math (STEM) outreach business open its doors near my office at Physik Instrumente (PI) in Irvine, CA. It was called Mathobotix. I was intrigued and stopped by one day to see what was going on.

Mathobotix was all about using the LEGO robotics tools to get kids interested in math and science.

Its success in engaging students in the fun side of STEM got me thinking about ways to get optics and photonics into the mix with robotics.

Then one day in January 2012, while participating in the Irvine Valley College Astounding Inventions competition and exhibition, I saw a student in a high-school robotics team try to put his iPhone on his robot. That was the moment it hit me.

He was having trouble figuring out how to give his robot eyes. The word came into my mind: OptoBotics.

I knew then that teaching students in robotics clubs how to implement optical technologies into their robots would capture their imaginations and encourage them to use optics and photonics in their college studies and careers.

Launching OptoBotics

My new friend from Mathobotix asked me to speak at one of his open houses, so I created a new presentation with the OptoBotics concept and delivered it to a packed house in March 2012. While the presentation went OK — my key wireless video demonstration was all static and

there were several other technical difficulties — I knew I still had to have that killer demonstration to capture the students' attention before I could teach them anything.

Shortly after that, while walking through an airport shop, I saw my first commercially available drone. The Parrot AR.Drone is a flying quadcopter with a wireless, high-definition video camera that you control from your Smartphone or tablet. This was the demo that I needed.

I bought one when I returned home and integrated it into the presentation I had created months before. At our next big event, the University of California, Irvine Beall Center for Art + Technology Family day in November, I tried it out.

It was a big hit with the all-ages audience. We streamed live video onto an overhead LCD projector so the audience could see themselves from the flying camera in real time.

We now have several OptoBotics demonstrations under development and will be beta testing them with high-school robotics clubs. We hope to bring OptoBotics materials, presentations, workshops,

kits, books, activity guides, and events to as many groups as we can manage.

More information: oisc.net/optobotics
See photos from more than 75 OISC outreach events at: picasaweb.google.com/OpticsAge.



—SPIE Senior member Donn Silberman is founding director of the Optical Institute of Southern California (oisc.net), a non-profit promoting math, science, and engineering education through the use of optics. A senior applications engineer for Physik Instrumente (PI), he also founded and serves as the chair of the Advisory Committee for the UC Irvine Optical Engineering and Instrument Design certificate programs. Silberman has an MS in technology management from Pepperdine University and a BS in engineering physics from University of Arizona. ■

"Our mission is to work with young people (mostly high school and college students) and to introduce them to the wonderful world of optics and photonics."



The drone is a flying quadcopter.

SPIE supports education outreach

This Optical Institute of Southern California is one of 25 organizations receiving an SPIE Education Outreach grant so far this year. (See page 33 for the full list.)

As part of its mission, SPIE provides support for optics- and photonics-related education outreach projects that promote optics and photonics awareness.

Qualifying not-for-profit organizations such as universities, optics centers, science centers, primary and secondary schools, youth clubs, industry associations, and international optical societies are eligible for project support.

The next deadline for education outreach grant applications is 31 January 2014.

More information: spie.org/outreach

OptoBoticssm

A registered Trademark with USPTO – This is a Brand, not an object.

- **Model robot kits; robots for personal, educational and hobby** use and structural parts therefor
- **Books and magazines** in the field of science, technology, engineering, instrument design and robotics; **printed instructional, educational**, and teaching materials in the field of science, technology, engineering, instrument design and robotics
- **Toy robots; toy robot model kits; toy scale model kit for robots;** remote controllable robotic toys; electronic game machines **for teaching children**
- **Educational services, namely, conducting workshops, classes and seminars in the field of science**, technology, engineering, instrument design and robotics, and distribution of course materials in connection therewith; organizing and conducting competitions in the field of science, technology, engineering, instrument design and robotics; providing educational information in the fields of science, technology, engineering, instrument design and ro...



OptoBoticssm
Robots need eyes too

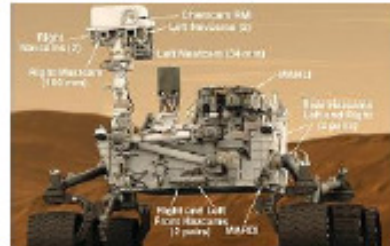


Mathobotix

Linking Robotics to Academic Success and Workplace

Open Projects and Apps

Supporting STEAM Education & Open Learning



OptoBoticssm STEM Summer Camp 2013 for High School Students

The Optics Institute of Southern California (OISC) joins with OpenProjectsAndApps and IVC Community Education to present exciting OptoBoticssm (optics, lasers & robotics) based STEM Open Learning Projects in this one fun filled week of summer camp in a special format for High School Students. Form a virtual company. Make a product or create a service using their OptoBoticssm based STEM knowledge and skills. For example: Add a wireless remotely controlled optical video system to a robotic roving vehicle that lets the owner operator navigate the unit from a different room. Include a small pointing laser to hit a designated target. An extreme version of this is the famous Mars Rover Curiosity. Open Learning projects help team members explore technology of optics and laser systems with some of the open source hardware (Arduino Controllers) and software (Python), Technical Writing, Design and Modeling, Scientific Research Method, Problem Solving Skills, Learning how to Learn, Presentation Skills, etc., while having fun! Teams will share and present their completed projects the last hour of the camp on Friday.

Camp Mentors: OISC Director, Donn Silberman and Mathobotix Staff.

When: July 29 - Aug. 2 | Weekly Camps | Mon thru Fri | 10 AM to 4 PM

Where: Advanced Technology & Education Park – Irvine Valley College Tustin Campus, Room: B101-B, 15445 Lansdowne Rd. Tustin, CA 92782

WHO CAN ATTEND: High School Students and Students graduating to High School.

Pre-requisite: Interest to explore STEM educational and career pathways

FEE: \$349 per week.

Note: Includes project specific material fee.

Enroll Now! http://openprojectsandapps.org/STEM_SummerCamp2013.php

Mail the completed registration form along with the check for \$349.00 payable to "OpenProjectsAndApps"

Mailing Address: OpenProjectsAndApps, 15455 Jeffrey Road, Suite -325, Irvine, CA 92618.

OptoBoticssm is a registered Service Mark of OpticsAge. All rights reserved 2013.

OptoBoticssm is loaned to the OISC for use in its educational programs.

OpenProjectsAndApps.org is a Not-for-Profit organization. It promotes Project and Inquiry based Integrated STEAM Education through Innovative Open Learning Projects using Open Source hardware and software in partnership with local community, businesses, and educational institutions.

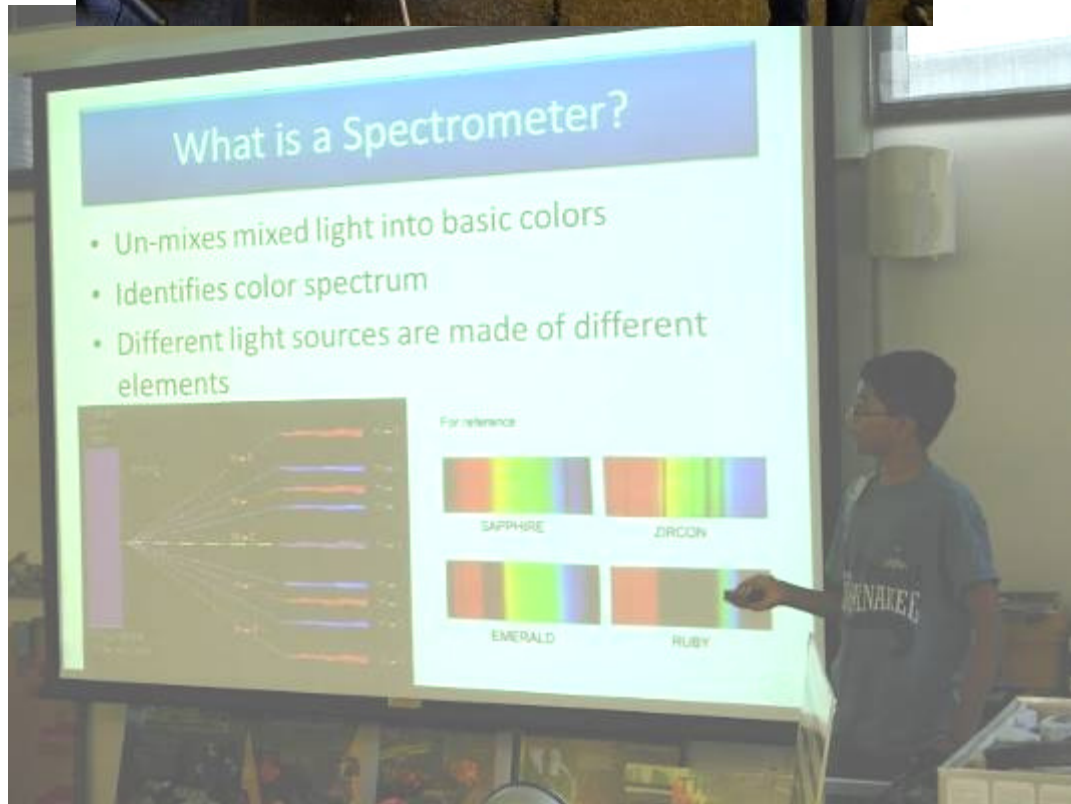
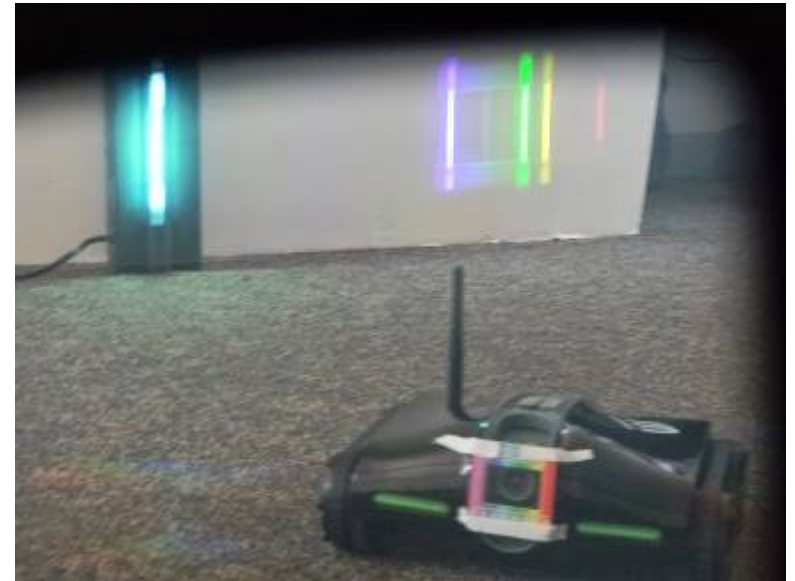
Mathobotixsm offers Science, Technology, Engineering, and Mathematics (STEM) curriculum based after-school educational robotics classes, day camps, workshop to K - 12 students, and corporate team building activities.

**First Formal OptoBotics Program
July – August 2013 @ Mathobotix**



Want a new logo
Based on this concept

OptoBotics for High School students. July 29 - Aug 1



Go through slide show quickly

Orange County MiniMaker Fair Aug. 17 @ UCI Beall Center



Orange County Mini Maker Faire®

Saturday, August 17th, 2013
10AM-5PM

Beall Center for Arts + Technology, UC Irvine



AR Drone 2.0 with HD video WiFi capability

Controlled by SmartPhone

With image transferred to Big Screen LCD

Or overhead projector.

Images of the audience are then caught on the flying HD video camera and the audience sees themselves on the TV or big screen.

Beall Center Family Day

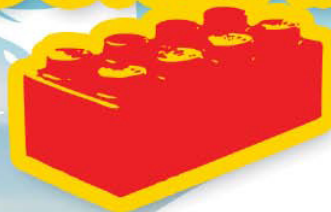
Saturday, November 2, 2013, 11am to 4pm

The OISC, OSSC and UCI OSA/SPIE Students will join together again with hands-on Optricks and OptoBotics demonstrations and presentations.



IRVINE VALLEY COLLEGE & OPENPROJECTSANDAPPS.ORG PRESENT

FIRST®LEGO®League QUALIFYING TOURNAMENT IRVINE



IRVINE VALLEY COLLEGE & OPENPROJECTSANDAPPS.ORG PRESENT
FIRST®LEGO®League Qualifying Tournament
Sunday, November 17, 2013 • 9 am to 5 pm
Irvine Valley College Hart Gymnasium • 5500 Irvine Center Drive, Irvine CA 92618

WHAT

In its 13th season, **FIRST®LEGO®League** is a global kid-friendly robotics program spanning 55 countries and inspiring approximately 200,000 grade level students ages 9-14. This year, 28 Southern California teams will participate in the Qualifying Tournament at IVC.

- Cool robot exhibits and demos from **FIRST®** Robotics Competition teams, UCI, and many more
- Free admission, \$2 parking
- Food available for purchase

2013 CHALLENGE

Can **FIRST®LEGO®League** teams help us master natural disasters? In the 2013 *Nature's Fury Challenge*, over 200,000 children ages 9-14 from over 70 countries will explore the awe-inspiring storms, quakes, waves, and more that we call natural disasters. Teams will generate innovative solutions for what can be done when intense natural events meet the places where people live, work, and play. Brace yourself for *Nature's Fury*!



SPONSORS & ORGANIZERS



Mathobotix



INFO

FLL@openprojectsandapps.org • openprojectsandapps.org • 949-857-1419

SOUTH ORANGE COUNTY COMMUNITY COLLEGE DISTRICT BOARD OF TRUSTEES:
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BRING
THE WHOLE
FAMILY

FREE
ADMISSION

\$2 PARKING



First LEGO League



Cory – Code Orange
Flying Hexacopter with wireless Video camera streaming live



NOW ENROLLING



Mathobotix

OptoBotics™

Giving your Robots Eyes - A Fun Filled Learning Experience about Light, Lasers, Optics & Robots

Grade level:

5th to 8th students

Prerequisite:

Curiosity

Duration:

12 weeks, 2 hours/week (24 hours total)

Session Timeline:

January – March 2014 (exact dates TBD)

Weekly Schedule (enroll in one session only):

- Session 1: Day Monday Time 5:30 – 7:30 pm
- Session 2: Day Friday Time 5:30 – 7:30 pm

Offered in Irvine Lab



Course Description: OptoBotics™

The Optics Institute of Southern California (OISC) joins with Mathobotix to present an exciting new course: OptoBotics™ (optics, lasers & robotics) based STEAM Open Learning Projects in this fun filled 3 month program in a special format for curious students. In this course junior high level students will learn how to apply grade level math and science in simulated real world projects. Each project utilizes a sample set of applications of Science, Technology, Engineering, Art and Math (STEAM) concepts. Project based learning methods are used in a lab environment. Students demonstrate their finished projects to an audience at the monthly open house.

Class Objectives:

- To have fun playing with light, lenses, lasers, optics, video cameras and friendly computerized systems.
- To learn the basics of using light, laser and optics to give your robots eyes (optical sensors)
- To understand the basics of light by using the Photonics Explorer Kits & Optics Benches
- To introduce basic problem solving techniques using light, lasers, optics and robots
- To help build soft skills to work in a team environment

Sample Projects:

Make a product or create a service using their OptoBotics™ based STEAM knowledge and skills. For example:

- Add a wireless remotely controlled optical video system to a robot moving vehicle that lets the owner operator navigate the unit from a different room. Include a small pointing laser to hit a designated target.
- Create a spectroscopic optical / video / robotic system to analyze material composition at a distance

An extreme version of these are on the famous Mars Rover Curiosity.

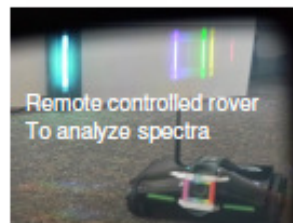
Language & Communication: Students write Project Reports and present their project to audience and explain how their program works and how they solved their problems.

Soft Skills: SCs: Critical thinking, Creative problem-solving, Communication, Collaboration, and cross-cultural relationship building.

Learning Activities: Hands-on Optics & Laser Lab, Short Presentations, Writing, Team Review, and Research

Course Fee: \$480

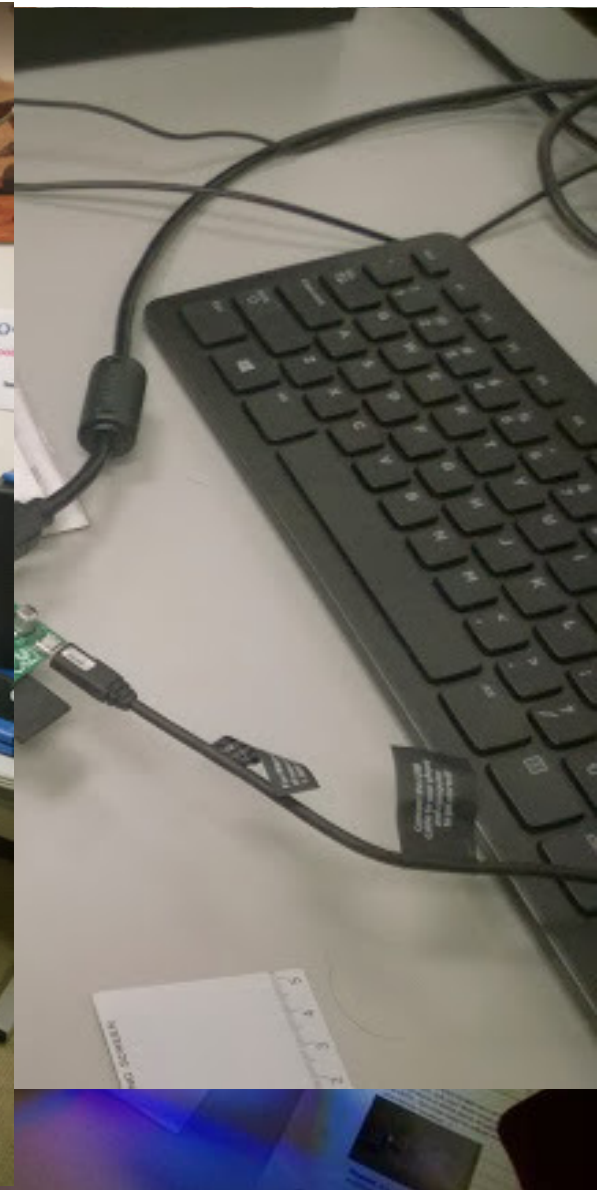
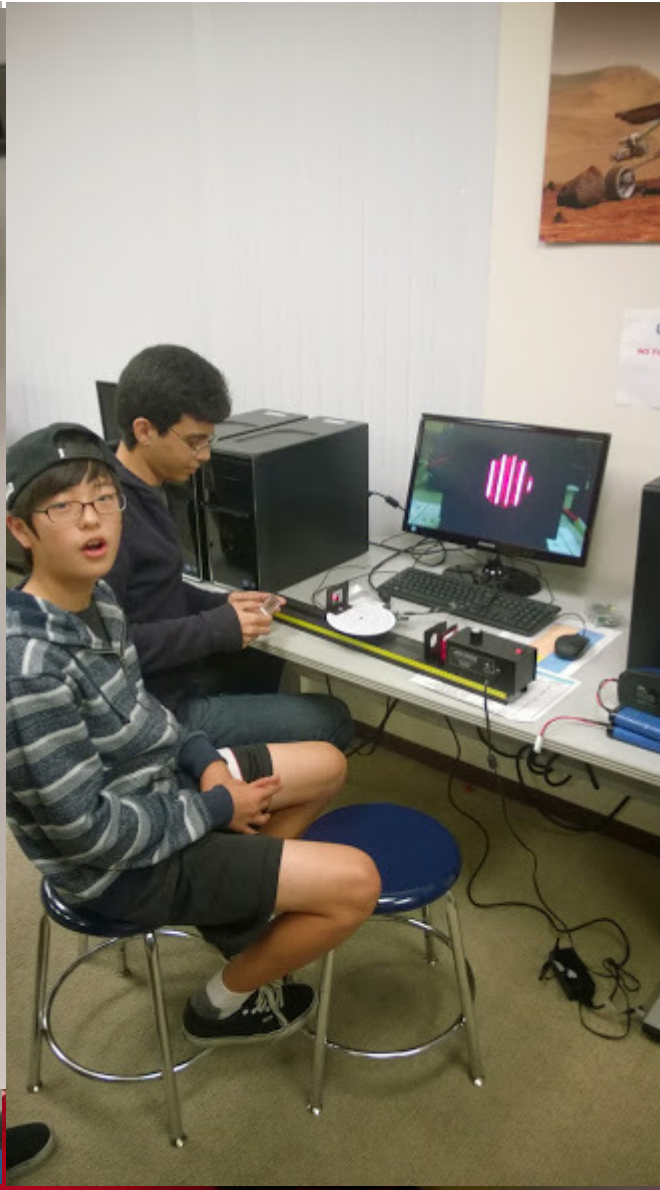
Lab Fee: \$40



First multi-week OptoBotics Program
Jan – March 2014 @ Mathobotix

OptoBotics™

Giving your Robots Eyes - A Fun Filled Learning Experience about Light, Lasers, Optics & Robots





Donn Silberman, M.S.

2007-2008 President & Fellow; Optical Society of Southern California
Founding Director; Optics Institute of Southern California
Advisory Committee Chair, UC Irvine Optical Engineering
Sr. Applications & Sales Engineer, PI-USA
Sr. Member; SPIE
Sr. Member, OSA

Brian Monacelli, Ph.D.

Photonics Instructor, Irvine Valley College
Contributing Editor, Optics & Photonics News, OSA
Technical Director; Optics Institute of Southern California
Optical Scientist, the Optical Sciences Company
Sr. Member; SPIE
Sr. Member, OSA



PHOTONICS EXPLORER WORKSHOP

January 25, 2014



Photonics explorer



OptoBoticssm



Photonics Explorer

- Take the students for a deep dive into the details of the technologies.



We thank our sponsors for 10 Photonics Explorer Kits

1. Diverse Optics, Inc.
2. LightWorks Optical Systems
3. Ohara Corporation
4. Precision Optical
5. Spectrum Scientific, Inc.
6. TH Consulting and Recruiting, LLC
7. Dr. Martin Hagenbuechle
8. Reynard Corporation
9. Robert Chave Applied Physics
10. Optics Institute of Southern California

Introductions

Teachers & Educators signed up for the training

1. **Charlotte Zarembo** – Estancia High School
2. **Ed Hernandez** - Tustin High School
3. **Peter Selby** - Corona del Mar High School
4. **David Towne** – Anaheim High School – (Clay Elliot CTEoc person)
5. **Jake Lee** - Costa Mesa High School
6. **Vital Link** - Joe Rudea & Peter
7. **Mitrut Culciar** – Anaheim Union High School
8. **Paul M. Lewanski** – Beckman High School
9. **Kevin Dewer** – Cypress High School
10. **Angela Liogys** – Pacifica High School

Optics Professional Volunteers

1. **Brian Monacelli**, Irvine Valley College
2. **Nick Lambert**, Precision Optical
3. ***Al Lambert, Sr.** , Precision Optical
4. **Al Lambert, Jr.** , Precision Optical
5. **Paul Dimeck** , Precision Optical
6. ***Julia Majors**, UC Irvine
7. ***Alba Garcia**, UC Irvine
8. **Bo Wang**, Precision Optical
9. ***Cory Hague**, Irvine Valley College
10. ***Dan Schuette**, Physik Instrumente
11. **Two students from IVC Photonics Course**
* unable to attend

Photonics Explorer

➤ Teacher Training Workshop @ Precision Optical in Costa Mesa, CA



Kathy Johnson, Vital Link President, welcomes the teachers and volunteers.

Photonics Explorer

➤ Teacher Training Workshop @ Precision Optical in Costa Mesa, CA



Dr. Brian Monacelli leads the technical review of the kits and associated materials. Nicolaus Lambert, V.P. Engineering, Precision Optical, hosted this workshop.

Photonics Explorer

- Teacher Training Workshop @ Precision Optical in Costa Mesa, CA



Lots of hands-on experimentation occurred during the workshop integrated with the presented materials so the teachers experience the optics assistance from the Optics Professional Volunteers.



Next steps

1. Follow up with teachers & volunteers
2. Collect more funds for more kits (50 kits x \$300 each)
3. Recruit more teachers & volunteers
4. Repeat training in 2 or 3 sections of 10 – 15 teachers





**Edward Ensign Engineering Department
Ensign-Lambert Optics Education Program (ELOEP)**





Photonics

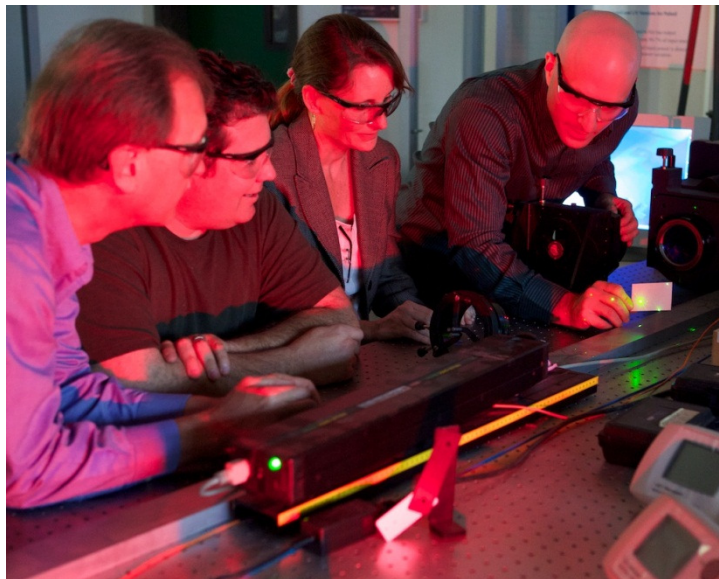
General Information

Brian Monacelli, Ph.D.
Photonics Instructor
949-451-5224 | IVCphotonics@ivc.edu
Advanced Technology Education Park
(ATEP), Tustin

Funding for this program was provided by OP-TEC,
The National Center for Optics and Photonics
Education, based on work supported by the
National Science Foundation under Grant No.
NSF/DUE0603275

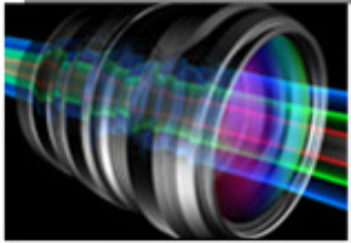
Resources

- [OP-TEC](#)
- [OP-TEC: Lasers, Optics and Photonics Series](#)



PI | **micos**

CA-1200 HeNe Laser



UCIRVINE | EXTENSION

Optical Engineering
Optical Instrument Design
On-Line Courses

Optical Engineering & Optical Instrument Design: Education Planning Session

**Three Summer On-Line Courses open for enrollment
Courses begin July 7, 2014**

Physical Optics, Donn M. Silberman, M.S.

Adv. Lens Design, Jon Herlocker, Ph.D.

Optical Instrument Design, T. Scott Rowe, P.E.

OSSC Members receive a 15% discount for these courses.

NEW! Vital Link's Photo Gallery (click here to view) -->

DONATE ➔

Events

STEM & the Arts Career Showcase
Dates: April 11 through 13, 2014
Times: TBD
Location: DC Fair & Event Center

Kid 2.0
Dates: June 1, 2014
Times: TBD
Location: California State University, Fullerton

[click here for more](#)



Medical Careers in Action

Welcome to Vital Link

Vital Link provides hands-on, career exploration experiences for high school students, helping them carve out their own unique career path. Not sure what you want to study in school or what you want to do for a living? Attend a Vital Link program and sort through your interests, get excited, and literally try on a career for a day. Students are faced with many [challenges](#) ahead of them and we offer the vital next steps so students can jumpstart their career and education plans. Join us and see where you fit in.

Using the Vital Link process where students: Explore, Discover, and Connect to their future, participants can achieve their Dream Career.

New “What is Light?” Exhibit



Vital Link Exhibit Days

March		
3/7	fri	Fontana HS Exhibit Day
3/20	Thurs	Laguna Hills HS Exhibit Day
3/27	thurs	Buena Park JHS Exhibit Day
April		
4/11- 13/2013	fri-sun	STEM and the Arts Career Showcase
		Design Build
		Performance Engineering
		DMA - Career Photo
		OC Maker Challenge
		Robotics
4/23	wed	Talbert Middle School Exhibit Day
4/24	Thur	Los Alisos MS Exhibit Day
May		
5/16	Fri	Alder MS Exhibit Day
5/20	tues	Irvine Int. Exhibit Day
5/22	thur	Utt Middle School Exhibits
5/28	wed	Brea Olinda HS Exhibits



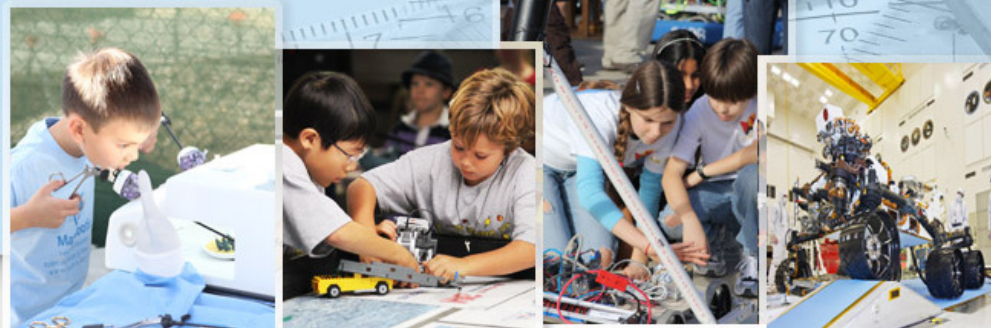
Open Projects and Apps
Our Mission



Home FIRST LEGO LEAGUE Camps Classes Workshops Internships Contact Us

Open Projects and Apps

Supporting STEM Education



STEMPreneur Summer Camps 2014 for High School Students

Explore your future STEM educational and career paths!



OpenProjectsAndApps.org joins Vital Links of Orange County, Mathobotix, and the Optics Institute of Southern California (OISC) to present exciting STEMPreneurship camps this summer of 2014.

STEMPreneur Summer Camps 2014 for High School Students

When: Weekly Camps during July and August 2014 | Mon thru Fri | 10 AM to 4 PM

Where: University High School, Irvine.



Open Projects and Apps
Our Mission



Session #	Dates	Project/Theme
1	July 07 - July 11	OptoBotics
2	July 14 - July 18	Geo-STEM
3	July 21 - July 25	Rescue Robotics
4	July 28 - Aug 01	LilyPad Arduino Wearable Electronic Craft
5	Aug 04 - Aug 08	Home Automation
6	Aug 11 - Aug 15	Arduino Controlled Self-Watering Plant Pot
7	Aug 18 - Aug 22	Theremin Musical Instrument
8	Aug 25 - Aug 29	Laser Intrusion Detection System

WHO CAN ATTEND: Current and entering High School Students

Pre-requisite: Interest to explore STEM educational and career paths

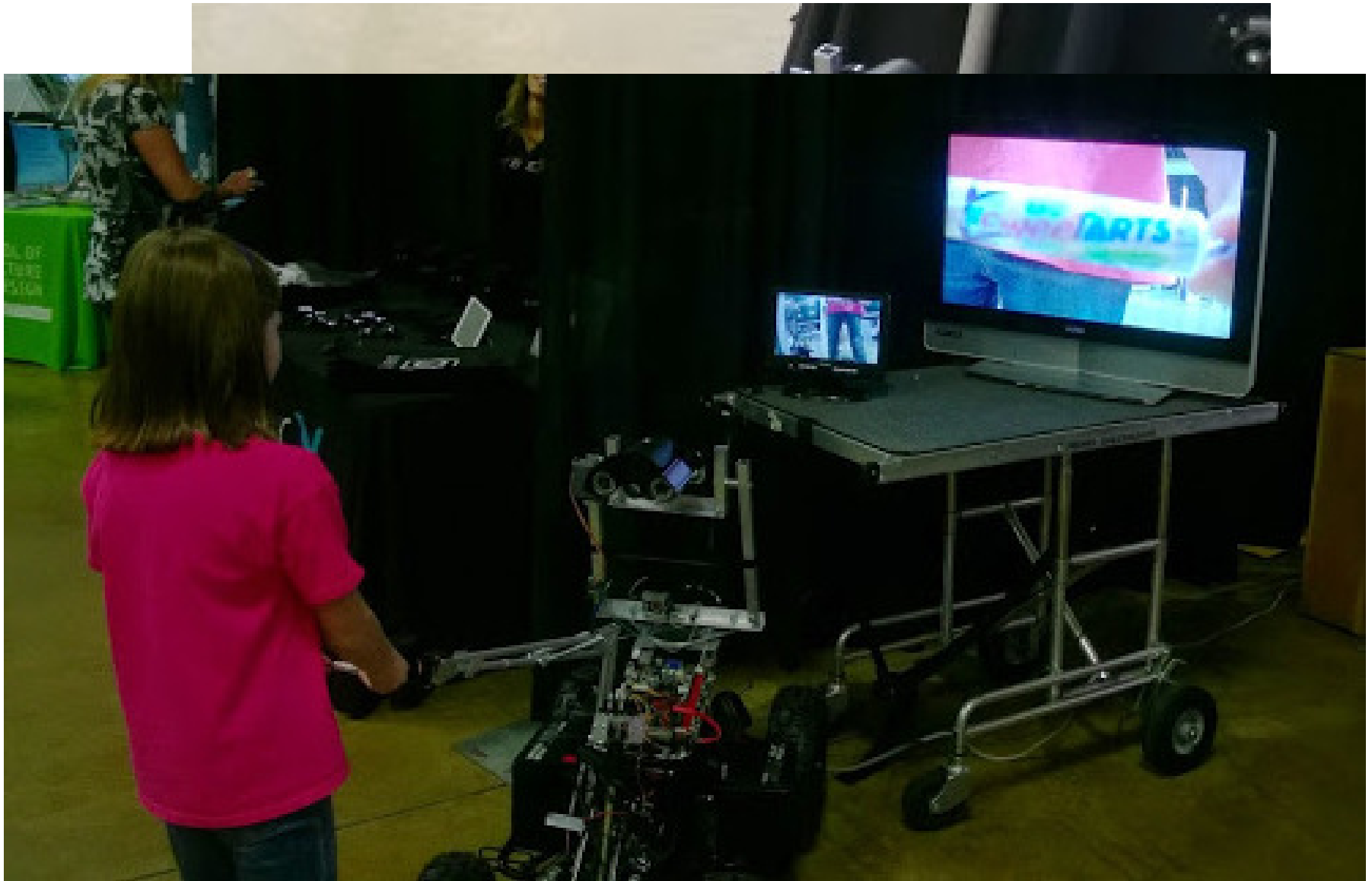
FEE: \$349/per camp.

Note: Includes project specific material fee.

The Optics Institute
of Southern California



The Future of OptoBotics



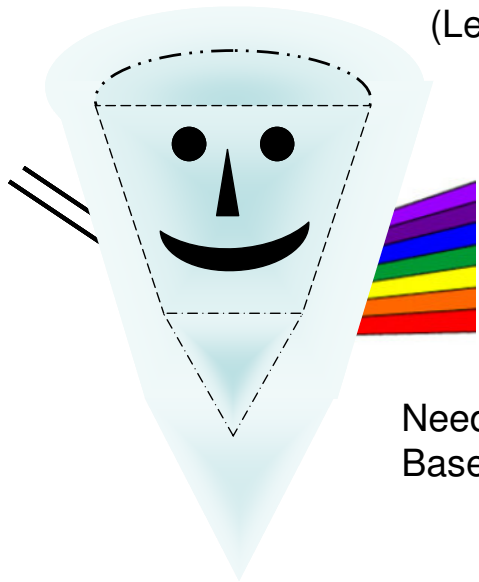
Other OptoBotics® Kits, Merchandise and services

- Optricks / OptoBotics Theme Packets
- Optricks / OptoBotics Suitcases for demonstrations
- Photonics Explorer (OptoBotics) Classroom Kits
- OptoBotics video systems for robots
- OptoBotics spectroscopy systems for robots
- OptoBotics polarization systems for robots
- Curriculum and instructions for all the above
- Magazine articles – How to do add optics to your robots
- OptoBotics games & toys
- OptoBotics competition rules for the robotic educational field
- Dedicated magazine – on-line & print to OptoBotics
- T-shirts, mouse pads, coffee cups, etc
- After-school programs, presentations, exhibits, science fair concepts

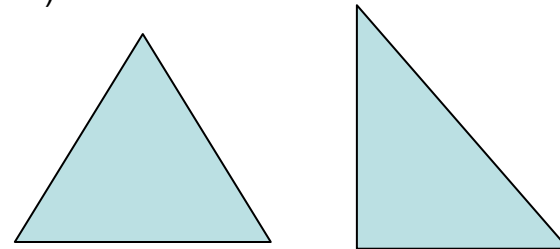
Optricks >> OptoBotics Theme Packets



(Lens included but not shown)



Need new logo
Based on this concept



Add prisms, change logo
Create new web page with educational
Instructions and links to more products
And projects for students, teachers and
hobbyists

Membership & Education

Join or Renew

Member Categories

Benefits & Services

Student Services

Technical Groups

Local Sections

Grants/Recognitions & Special Services

Corporate Membership

▼ Youth Education

Educational Posters

ETOP

Membership Form & Registration

Materials Request Form

Media Library

▼ Optics Suitcase

Optics Suitcase Components

Optics Suitcase Purchase

Optics Suitcase Grant

Optics Suitcase

Developed by the [OSA Rochester Section \(ROSA\)](#) in 1999, the *Optics Suitcase* is an innovative, interactive presentation package designed to introduce middle school students to the dynamic and exciting range of concepts within the study of light.

Each case includes a teaching guide (also available for download at this bottom of the page) and materials for demonstrations and experiments that teach about optics in a fun, hands-on atmosphere. Topics include: polarization, diffraction and selective reflection. The "theme packets," which contain the individual experiments, are designed for students to take home and share with their friends and family as a reinforcement of the classroom lessons. A demonstration requires 40 - 60 minutes on average, and provides materials for up to 50 students. [View a full list of the components.](#)

Request an Optics Suitcase

OSA Student Chapters and Local Sections: You must apply to receive an Optics Suitcase through the [OSA Grants Database](#). Please contact chaptersandsections@osa.org if your Chapter/Section has not received a login.

If you would like to purchase an Optics Suitcase or contribute funds to the program, please use the OSA "Optics Suitcase Purchase" form. *Cost per suitcase is \$350; includes enough materials to serve 50 students.*

To request a free Optics Suitcase, please apply for a grant from the OSA Foundation by completing the "Optics Suitcase Grant Application" form. *Please note: after grant approval, it may take up to six months to receive your Optics Suitcase.*

If you have any questions, or would like to inquire about purchasing the "Theme-Packets," please contact educationoutreach@osa.org.



Students in Ghana, Africa participate in Optics Suitcase activities.

(photo by Lenore Kubie and Daniel Williams)

Through the ROSA/OSA partnership, Optics Suitcases have benefited thousands of students around the world. This program is also supported by the [OSA Foundation](#).



Fun and Hands-On Optics Experiments!

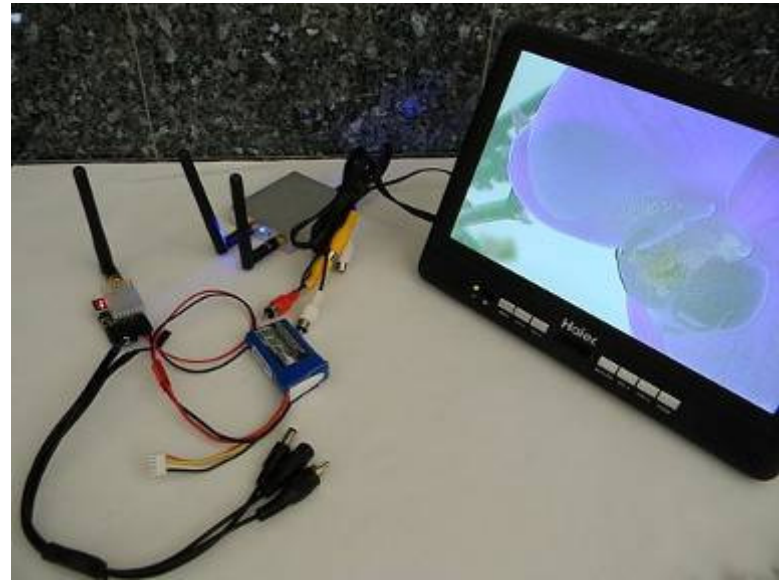
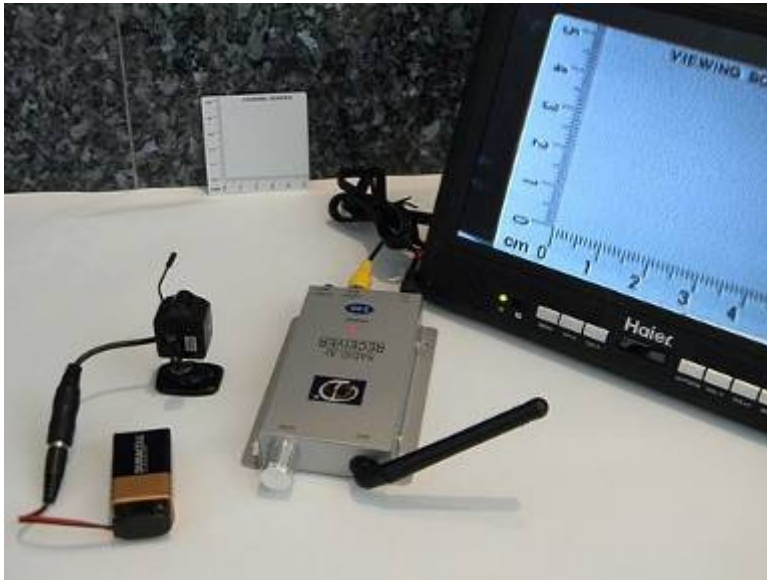
Teach students about a variety of optics related topics such as polarization, diffraction and selective reflection through interactive

Optricks / OptoBotics Suitcases for demonstrations

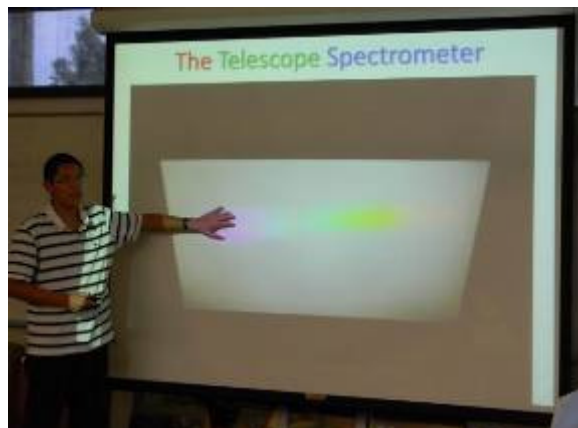
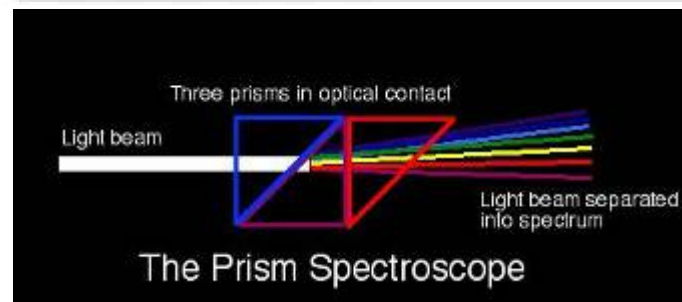
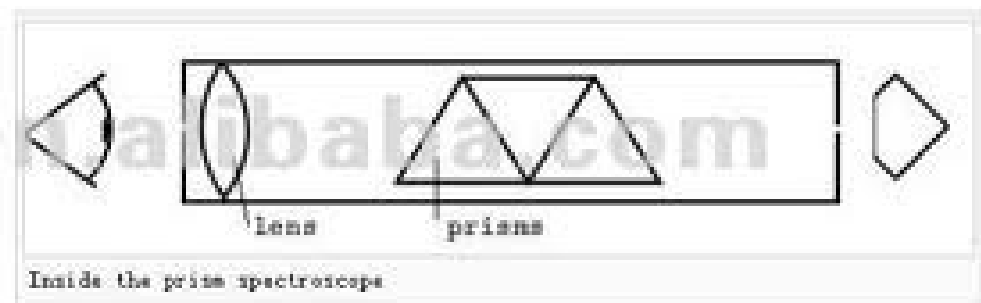
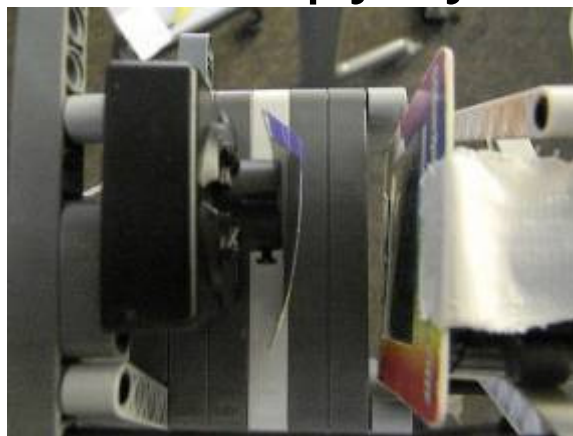
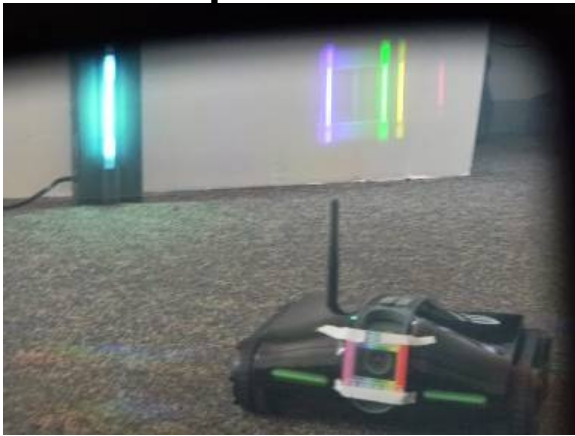


Can make significant changes to create OptoBotics Suitcase that includes new tools like prisms.

OptoBotics video systems for robots



OptoBotics spectroscopy systems for robots

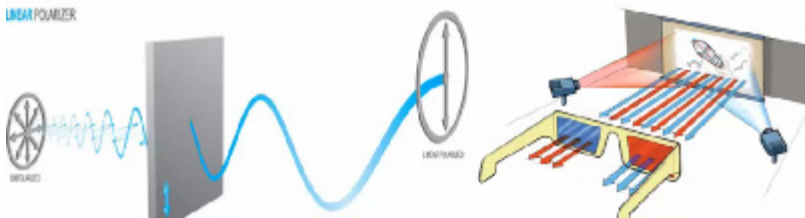


**Replace human eye with CCD camera and appropriate lens
And fixture to mount on robots.**

OptoBotics polarization systems for robots

What is a Polariser?

- Works by blocking out light of a certain polarization
- Polarized light is light that moves in only one direction
- 3-D glasses
- Lakes, windows, etc.

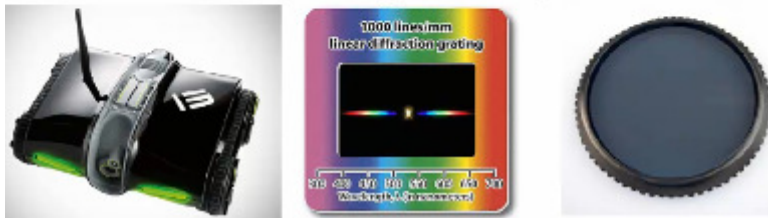


Polarized Tree



Rover 2.0 Spectrum Viewer

- Uses Rover 2.0, linear diffraction grating, and 2 polarisers
- Rover for movement and pictures
- Diffraction grating to split light
- Polariser to lower brightness of picture



Product could be a slowly rotating (motorized) polarizing filter in front of a wireless video camera.

Advanced Amateur Applications

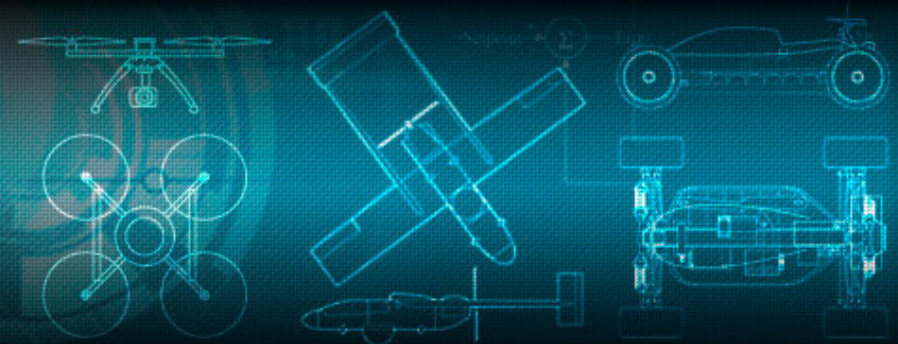
- Intelligence, surveillance, and reconnaissance (ISR)
- Chemical and radiation detection
- Communication repeater node
- Sensor and other payload testing platform
- Area mapping • erosion & environmental monitoring
- Agricultural, farming & commercial fishing management
- Fire & damage assessment
- Border, harbor, & and canal security
- Convoy, road & population protection
- Natural resource & wildlife management
- Pipeline monitoring • power line inspection
- Fire fighting observation and infrared heat detection
- Weather mapping and measurement
- High-altitude, high endurance (HALE) applications
- Releasable, intelligent wing-mounted payload applications
- Search & rescue





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Mark Colwell commented on Bill Bonney's blog post [Announcing APM Planner 2.0 RC1 -- the cross-platform GCS for Mac, Windows and Linux](#)

"For MacOS Maveric version 12 28 2013, Problem with map cache at zoom level 20 & 21, Both Bing and Google hybrid, finishes load but no maps are displayed? also Google hybrid only shows map, no satellite image"

13 minutes ago



Tero Koivunen replied to Chris Wildey's discussion [Ublox 6M GPS w/ compass Connection](#). in the group [Andropilot Users Group](#)

WELCOME TO DIY DRONES!








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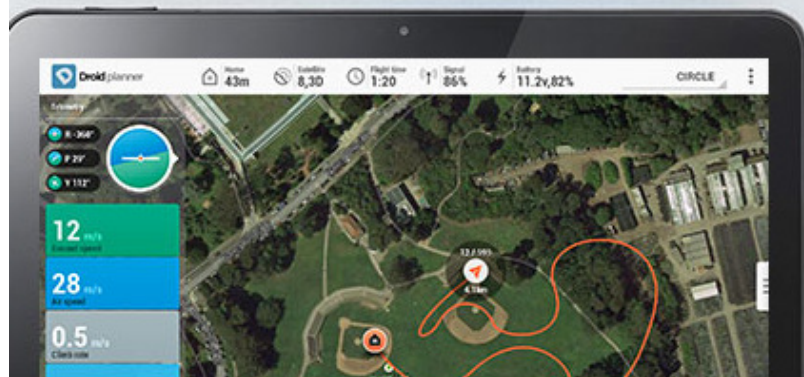
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About



The Optics Institute of Southern California is an Orange County-based nonprofit organization dedicated to the promotion of math, science, and engineering education through the use of optics and related technologies and phenomena. Our educational approach is hands-on, student-centered, and engaging. We seek to foster the curious scientist, the artful mathematician, and the creative engineer in every student, regardless of age.

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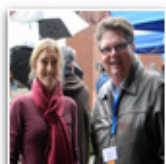
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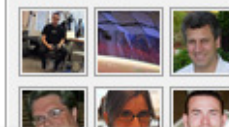
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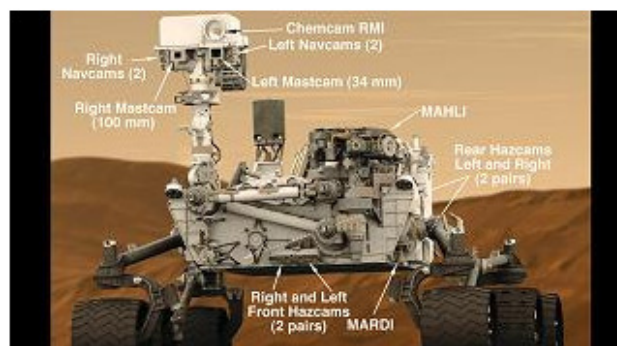
Robots need eyes too



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OptoBotics are our methods of teaching people about optics & photonics and how they are used in everyday life, science, education and industry.

After many years of bringing optics & photonics to students and the general public, it became clear we were missing a key demographic; High School Students. So this website and the associated OptoBotics materials, presentations, workshops, kits, books, activity guides, events are our next stop on our journey to bring the fascinating world of optics & photonics to more people around the globe.

This famous photograph of the Mars Rover Curiosity (Courtesy of NASA/JPL CalTech) is a fine example of integrating optics & photonics into an extreme robotic system.

A recent free Webinar provided by UC Irvine Extension Optical Engineering

OPTOBOTICSsm - Precision Motion for the OpticsAge - A look around the Martian Surface click on [Webinar](#)

This presentation is highly technical and aimed at professional engineers. It is about 1 hour in length and will take about 1 minute to load. Please contact us if you have any questions.

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Questions, Answers, Comments....

