

ISLAND

2016

**7th Annual Independence Science
Learning a New Direction
Conference on Disability**

**Kurz Purdue Technology Center
Friday, September 16, 2016**

1281 Win Hentschel Blvd.
West Lafayette, IN 47906
Conference Rooms A-B

Sponsored by:
GH LLC
Independence Science, LLC



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**Independence
SCIENCE**
...empowering a new vision.®

Conference Mission

The IsLAND conference on Disability serves to inform and connect educators and future educators to the latest assistive technology, while exploring alternative teaching methods and simple access solutions for learning. Multi-sensory and hands-on approaches are emphasized during this conference in order to generate elevated student interest in classroom material and, thus, improve concept development. Symposium topics also include factors that contribute to Science, Technology, Engineering, and Mathematics (STEM) underrepresentation and strategies for increasing representation among students with disabilities.

8:30 a.m.	Breakfast	
9:05 a.m.	Cary Supalo:	Welcoming and Introductions
9:15 a.m.	Bharat Bhargava:	<i>Emerging Technologies to Assist the Blind.</i>
9:55 a.m.	Greg Williams:	<i>The SciVoice Talking LabQuest 2.</i>
10:35 a.m.	Morning Tea and Coffee	
10: 50 a.m.	Roseanne Hoffmann:	<i>APH Offers Accessible Manipulatives for Understanding Cell and Molecular Biology.</i>
11:30 a.m.	Ting Zhang:	<i>Perceiving Histological Images using Multimodality Sensory Feedback by Persons who are Blind or Visually Impaired.</i>
12:10 p.m.	Lunch	
1:15 p.m.	Todd Pagano:	<i>Making Education and Careers in Chemistry Accessible and Successful for Deaf/Hard-of-Hearing Students.</i>
1:55 p.m.	Chris Rogers:	<i>Including Students with Disabilities in State Science Assessments</i>
2:35 p.m.	Afternoon Tea and Coffee	
2:50 p.m.	George Takahashi:	<i>Accessible device for Visually Impaired Navigation within a Virtual Environment</i>
3:30 p.m.	Byung-Cheol Min:	<i>Assistive Robotics Technology for Campus Navigation by the Blind.</i>
4:10 p.m.	Dave Shleppenbach & Wunji Lai	<i>Current and Future Trends in Access Technology Developments for Students with Disabilities.</i>
4:50 p.m.	Cary Supalo	Discussion and Concluding Remarks

The ISLAND 2016 organizers would like to thank all presenters and participants for making this year's conference a successful event. Your passion for the full inclusion of all in the STEM (Science, Technology, Engineering and Mathematics) professions advances equitable spaces that foster the authentic integration and participation of the disabled within the Fourth Industrial Revolution, and helps humanity achieve the vision of the Sustainable Development Goals of a more dignified future for all. We invite all presenters to contribute a blog to the Huffington Post. We also want to thank the Purdue Research Park for hosting this year's conference and the Purdue Research Park support staff for the smooth operations and logistics. We look forward to seeing everyone again at the 8th Annual ISLAND Conference on Friday September 15, 2017.

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Presenter: **Bharat Bhargava**
Title/Affiliation: Professor, Computer Science, Purdue University
E-mail: bbshail@purdue.edu

Abstract Title: Emerging Technologies to Assist the Blind.

I will present some ideas of using sensors, cloud, and mobile technologies to assist a blind person in crossing signal lights, learning about their surroundings, and eventually playing basketball and participating in other team activities. I will propose a role of publically installed cameras and video for the safety and security of blind persons.

www.cs.purdue.edu/homes/bb

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Presenter: Greg Williams
Title/Affiliation: Independence Science.
E-mail: gwilliams@independencescience.com

Abstract Title: The SciVoice Talking LabQuest 2

In 2012 Independence Science released the Talking LabQuest, which incorporated text-to-speech with the Vernier LabQuest making it the first accessible commercially available data-collection device for STEM. In combination with the large number of Vernier sensors, the Talking LabQuest has enabled students who are blind or visually impaired to be more independent in lab courses. Since then Vernier has introduced the LabQuest 2 with improved hardware and software capabilities and additional sensors, and Independence Science has just released the Talking LabQuest 2 giving BVI students access to these improvements. This talk will demonstrate the accessibility features of the Talking LabQuest 2 as well as some of its new capabilities.

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Presenter: Rosanne Hoffmann

Title/Affiliation: STEM Project Leader, American Printing House for the Blind, Louisville, KY 40206

Abstract Title: APH Offers Accessible Manipulatives for Understanding Cell and Molecular Biology.

APH strives to provide educational materials that are accessible to students with visual impairments as well as with typical vision. Products are designed from the ground up using the concepts of universal design. For example, the DNA Twist and the DNA-RNA Kit use tactile and braille features to introduce the structure and function of DNA to middle and high school students and have been available since 2013. The Protein Synthesis Kit is a new product that extends the concepts introduced by the DNA-RNA Kit and demonstrates the ultimate function of DNA: the formation of a connected chain of amino acids which is the primary structure of all proteins. APH is also field testing the Build-A-Cell prototype, which will allow students to construct a plant, animal, or bacterial cell from their component parts. This presentation will show how these products make complex STEM concepts accessible to all students.

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Presenter: Ting Zhang

Title/Affiliation: Graduate Student, Purdue University

Abstract Title: Perceiving histological images using multimodality sensory feedback by persons who are blind or visually impaired.

No suitable assistive technology is currently available for students and scientists that are blind or visually impaired (BVI) from advancing in careers in science, technology, engineering, and mathematics (STEM) fields. It is a challenge for them to interpret real-time visual scientific data during lab experimentation, such as performing light microscopy, spectrometry, and observing chemical reactions. To address this problem, a real-time multimodal image perception system is developed to allow individuals who are BVI perceive blood smear images by employing a combination of auditory, haptic, and vibrotactile feedbacks. These sensory feedbacks are used to convey visual information through alternative perceptual channels. Two sets of image features of interest: primary and peripheral features are applied to characterize images. Causal relation links between these two groups were established by developing a Bayesian network. Then, two methods were conceived for optimized matching between primary features and sensory modalities. Experimental results confirmed this real-time approach of higher accuracy in recognizing and analyzing objects within images compared to conventional tactile images.

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Presenter: **Todd Pagano**

Title/Affiliation: Associate Dean for Teaching & Scholarship
Excellence, Professor of Chemistry, Rochester Institute of Technology/
National Technical Institute for the Deaf

Abstract Title: **Making Education and Careers in Chemistry
Accessible and Successful for Deaf/Hard-of-Hearing Students.**

A goal of the Laboratory Science Technology (LST) program at Rochester Institute of Technology (Rochester, NY) is to produce graduates with strong foundations in applied science, hands-on laboratory applications, and “soft skills” necessary for competitive employment as laboratory scientists. At first glance, the LST program appears to be a typical, high-standard science program similar to any other, but in fact, it is a one-of-kind Chemical Technology program specifically for Deaf and Hard-of-Hearing students. The program resides within the National Technical Institute for the Deaf and has achieved success through outreach, building industrial partnerships, curricular advancements, and student involvement in undergraduate research. Historically, Deaf and Hard-of-Hearing students have lagged behind hearing peers in persistence rates to obtaining post-secondary degrees- leading to a lower employment rate (and lower earnings when employed) in science fields. The LST program has worked to narrow these gaps and has an 80% persistence rate to graduation and places 98% of its graduates in careers. New employers of graduates have discovered that hiring Deaf and Hard-of-Hearing scientists with strong skill-sets in the analytical sciences is not only altruistic, but makes great

“business sense” when their competence in the laboratory helps to improve organizational quality/productivity. Strategies and practices for making science curricula accessible and for increasing student success will be discussed with the goal of renewing interest in broadening participation of Deaf and Hard-of-Hearing individuals in the field.

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Presenter: Chris Rogers

Title/Affiliation: National Center on Educational Outcomes

Abstract Title: Including Students with Disabilities in State Science Assessments

As part of its mission, the National Center on Educational Outcomes (NCEO) evaluates national and state practices in ensuring access to state assessments for students with disabilities, ELs, and ELs with disabilities. In this session, we highlight the new policy context for state science assessments and discuss our analysis of the test content domains, assessment approaches, and response formats of states' 2014-2015 state science assessments. We address how these aspects relate to the inclusion of students with disabilities in science assessments. We also review states' accommodations policies for science assessments. Part of our analysis focused on the similarities and differences between states' general assessments and their alternate assessments based on alternate achievement standards (AA-AAS), the test that is administered to students with significant cognitive disabilities. The implications of our findings will be highlighted in the presentation, followed by a facilitated discussion of concerns and audience questions. Title:

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Presenter: George Takahashi

Title/Affiliation: Graduate Student, Purdue University

Abstract Title: Accessible device for visually impaired navigation within a virtual environment.

Navigation in virtual environments commonly leverage the usage of devices that abstract physical locomotion, usually in the form of a joystick or button press. In contrast, physical locomotion requires space for movement and can often pose troubles for individuals adjusting to a visual impairment. Outdoor navigation through the use of mobile technologies provides a coarse idea of direction, distance and even points of interest, yet indoor navigation can become inaccurate or non-functioning. Through the use of a mobile device and a depth sensor, indoor navigation and obstacle avoidance can be enhanced. By using a Google Tango, we were able to generate an environment sonification of 3D space, as well as mimic it's functionality within a Virtual Reality application by leveraging the omnidirectional walking platform Virtuix Omni. With the latest leap in consumer Virtual Reality equipment and driving interest of locomotion in virtual spaces, we explored the technology from the perspective of a visually impaired individual and duplicated an accessible navigation device within a virtual space. When the level of visual impairment stretches to further limited visibility, tunnel vision or even complete blindness, the effectiveness of conveying the virtual environment relies on the other senses and has an impact on the sense of presence. As the popularity of virtual environments (VE) surge and the capabilities of VR technologies

expand, it is important to consider the potential for rehabilitation, training, or even just accessibility within this medium.

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Presenter: Byung-Cheol Min

Title/Affiliation: Assistant Professor, Department of Computer and Information technology, Purdue University

Abstract Title: **Assistive Robotics Technology for Campus Navigation by the Blind.**

Navigating around a university campus can be challenging for blind or visually impaired persons. Although the current practice is to provide mobility training to gain familiarity with building, classroom and office locations around campus by orientation and mobility instructors, family or friends, this training is time consuming and expensive for all the parties. In addition, even after the training, many blind or visually impaired people often face difficulties in navigation due to dynamic changes on a campus and are in need of additional assistance. As such, we propose a navigation aid system that empowers blind and visually impaired people to navigate independently and efficiently, particularly in indoor environments. The system is mainly composed of a computer software and a mobile wearable device. We will show initial results of the system and present our future works that will involve a development of the mobile robot guidance system.

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Presenter: Dave Schlenppenbach and Wunji Lau

Title/Affiliation: GH LLC (See Write Hear)

Abstract Title: Current and future trends in access technology developments for students with disabilities.

This presentation will discuss work being done at GH LLC to promote the full inclusion of students who are print disabled into K-12 and higher education classrooms. The use of braille, tactile graphic, and electronic presentations of science, technology, engineering, and mathematics (STEM) content for students who are blind or visually impaired will be presented. Additionally, other technological innovations to make STEM content more accessible to students with other disabilities will be discussed.