The Science and Engineering Division and National Association of Blind Students Joint STEM Zoom Conference Minutes for February 27, 2022

The National Federation of the Blind's Science and Engineering Division (SED) and the National Federation of the Blind's National Association of Blind Students (NABS) held a joint Zoom conference on Science Technology Engineering and Math (STEM) on Sunday, February 27, 2022, by Zoom.

A recording of this meeting is available at

"[2022-02-27 SED - NABS STEM Seminar Audio Only.m4a](https://drive.google.com/file/d/1Mvtld0nWJB_3yBbiwvS_MEP0E-eS4V7g/view)".

To see past Science and Engineering documents, minutes, and recordings, go to

"<https://tinyurl.com/NFB-Science-Engineering>".

The meeting was called to order by Trisha Kulkarni, president of NABS, at 9 PM Eastern Standard Time (EST).

President Kulkarni welcomed the audience to the annual joint conference between NABS and SED. She invited people to register for the NABS

2022 Midwest Student Seminar (March 18 - 20, 2022).

Registration will remain open until February 28 11:59 PM CST. It will take place in Illinois at the Holiday Inn Chicago O’Hare. This will be one of NABS first in-person events since the beginning of the COVID-19 pandemic "https://www.nabslink.org/".

Trisha then introduced John Miller, president of SED, who will be the moderator for the evening.

SED president, John Miller, thanked the speakers for presenting at this event. He is an electrical engineer. He highly recommended MATLAB

" <https://www.mathworks.com>". He invited people to join the SED. Links for joining NABS and SED can be found under the "Wrap up" heading towards the end of this document.

The SED would have its annual division meeting during the NFB convention. The SED Division meeting will likely occur on Thursday, July 7, 2022. Watch the NFB website for the convention meeting time. He asked that any recommendations for future presentations, or questions for the speakers, be sent through him at "Johnmillerphd@hotmail.com".

# A summary of the presentations follows.

## Title: the use of the Graphiti Tactile Graphic Display for the study of STEM subjects

**Speaker:** Venkatesh Chari

With a background in Electrical Engineering, Venkatesh Chari has worked for over 25 years in the development of technologies involved in mobile and assistive technology products, in roles spanning engineering, management and strategic marketing. At Orbit Research, his work has included the development of the Orbit Reader 20, the world’s first affordable refreshable braille display, and the Graphiti Interactive Tactile Graphic Display.

**Presentation:**

The Graphiti (<https://www.orbitresearch.com/>) represents a breakthrough in non-visual access to dynamic graphical information such as charts, drawings, flowcharts, floorplans, images, and photographs, through an array of moving pins without the need for specialized software. A blind user is now able to view and create graphics in digital form simply by drawing with her finger, store them into a computing device, review and edit them, and exchange such graphics with others. With its ability to interface with computers, phones, and equipment such as microscopes and telescopes, the Graphiti provides instant tactile access to all forms of graphical information. In the classroom, the Graphiti provides the ability to access textbooks with graphical material. It also enables blind students to actively participate in inclusive classrooms and for the first time, visualize the smartboards used in mainstream classrooms. Practical applications of the Graphiti in STEM education and scientific research will also be discussed.

Facts About the Graphiti

The most unique feature of the technology is

the ability to set each pin to different heights, which enables the display of topographical maps and other graphical elements such as shades and color

represented as varying heights of pins that can be readily sensed by the user’s fingers.

Connectable to computers, tablets, smartphones, or the Orion TI-84 Plus Talking Graphing Calculator via a USB port or Bluetooth, its open API allows developers

to create apps on any platform to work with the Graphiti.  Additionally, an HDMI port allows connection to any device with a video display output, making

Graphiti an external tactile display monitor.  This enables any device to connect seamlessly to Graphiti.  The unit also includes a cursor pad for navigation,

and an SD-card slot and USB port to load files for reading and editing in a standalone mode.

Graphiti also features a touch interface to enable the user to “draw” on the display; tracing a shape with a fingertip raises the pins along the path traced.

The touch interface allows traditional forms of touch gesture commands such as swipe to scroll.  In addition, it enables novel uses such as “pushing” or

“nudging” an object on the display to physically move it.  Multiple Graphiti units can be connected to provide complete and immersive interactivity

through touch – what is drawn on one unit appears instantly on the other units in tactile form.

The proprietary technology is fundamentally scalable and enables development of refreshable graphic displays of any size, at a fraction of the cost of

graphic displays in the market today.  The first model has 2,400 pins in an array of 60 x 40 pins and can be used in a portrait or landscape orientation.

Each pin is independently addressable and can also be made to individually “blink” at configurable rates.

It would take three seconds to refresh all 2400 pins.

Each pin has five heights from 0 to 2 MM.

Does not need a screen reader.

Currently being sold.

Current cost is $15,000. Orbit research hopes to bring this price down to $5,000.

## Title: The Challenges That Students and Professionals Will Face in Chemistry, and How to Overcome Them

**Speaker:** Alfred D'Agostino (adagostino@ccbcmd.edu)

Dr. Alfred D’Agostino’s personal and professional activities overlap his interest in promoting accessibility in science lab instruction for blind/ low-vision (BLV) students. Dr. D’Agostino non-visually conducts his teaching and professional activities. In September 2021, he published Accessible Teaching and Learning in the Undergraduate Chemistry Course and Laboratory for Blind and Low-Vision Student in the Journal of Chemical Education (<https://tinyurl.com/DAgostino-non-visual>). Please note that this link points to a version of the article which predates the journal article. For this reason, the article, attached to this link, can be shared.

Dr. D’Agostino has facilitated ‘hands-on’ chemistry experiments for college students and adults at the National Federation of the Blind’s Louisiana Center for the Blind and at the Colorado Center for the blind using ‘speech-enabled’ probe ware. In 2022, Professor D’Agostino will present a Symposium at the Biennial Conference on Chemical Education hosted by the American Chemical Society titled Including the Blind in Chemistry –Making Learning and Instruction Accessible. At conferences where he presents to faculty colleagues, he highlights the access technologies (including tactile graphics) that can assist BLV students in doing independent work in the least restrictive learning environment.

Dr. D’Agostino is Professor Emeritus of Chemistry, has served as a chemistry department chairperson, has taught analytical and physical chemistry at the graduate level at various institutions (he has graduated 2 Ph.D. students), routinely gives conference presentations, is involved in chemical education research, and currently teaches at the undergraduate level. His research has been in surface science and interface analysis. His accomplishments include: a post-doctoral fellowship at Lawrence Berkely Laboratory, Faculty Research Fellow with the Air Force Office of Scientific Research at Wright Laboratory, Faculty Research Fellow at NASA’s John Glenn Research Center and at the Goddard Space Flight Center. Dr. D’Agostino was also Visiting Research Professor of Chemistry at Johns Hopkins University where his work was supported via a National Science Foundation grant.

**Presentation:**

To advance through the undergraduate chemistry curriculum or be successful in taking chemistry classroom, online and laboratory instruction to support other programs, it is necessary to learn via symbolic, visual, and spatial means. This is a difficult, but not insurmountable obstacle for blind and low-vision students and professionals. In this presentation, the following will be discussed: What to expect in the chemistry curriculum; How to anticipate technology needs; Preparing a learning strategy; How to locate resources; and how to be an advocate and realize success.

Points Discussed

* Talked about things common to STEM subjects.
* Described the four -year undergraduate chemistry curriculum.
* Discussed the math and physics courses that were part of the chemistry requirements.
* Talked about the need to use graphics.
* Lots of labs.
* When you decide on a course of study, it is important for you to learn about the field including the curriculum and the job itself.
* Talk to people working in the field, asking them how they succeeded with the curriculum. Ask them how they perform their current jobs. Pay special attention to them if they are blind.
* Often students pick a field of study without knowing much about it.
* Talk to the faculty.

Challenges

* Faculty and peers will have misunderstandings about the abilities of the blind.
* No access to tactile graphics.
* Know how to produce graphics.
* Know how to produce rapid drawings to help your learning and to communicate your ideas. Consider the sensational blackboard to make rapid drawings (<https://sensationalbooks.com/>).
* Often faculty do not know how to make tactile drawings simple enough to communicate an idea without providing too much detail.
* The school's disabled student services may know how to generate graphics.
* The blind can do labs.
* Students will encounter resource issues.
* Look for syllabuses from previous semesters for your courses.
* Identify and acquire accessible copies of your textbooks and other class resources. Do this as early as possible.
* There will be a lag time in obtaining accessible copies of class textbooks and other materials.
* Talk to your professors. Tell them how you learn using nonvisual methods.
* The burden is on blind students to make things work.
* Know Braille, how to use your technology, and how to get other resources.
* Often you will learn more efficiently by using Braille than would be the case if you were listening to books.

## Title: From Entry Level to Senior Leader, perspectives on being blind in Corporate America

**Speaker:** Charles Vanek

Charles Vanek has over 20 years of experience in Software Engineering with the majority of that time being in management. He started at a small company, eWatch, in 2000 as an entry-level data collection & processing manager and has grown to the position of Senior Director of Engineering for Cision’s Distribution platform.

Charles has led ground up custom-built application development to on-boarding SAAS (software as a service) systems such as Salesforce.com. In his career he has found that putting people first leads to the best outcomes for the products produced but has also come to acknowledge & balance the needs of businesses in competitive industries on the global stage.

**Presentation**

He gave insightful perspectives as a blind individual in a corporate setting. From what to expect in interviews through growing your career. As well as "what I wish I had done better". You will find that the most important aspect of any job is managing expectations, including your own.

Points Discussed

* There is your academic career and what comes after that.
* He started at a small company called eWatch.
* Initially, he could read a screen. His vision has gotten worse.
* He tried to hide his blindness.
* You must advocate for yourself.
* He found value in mentoring fellow employees.
* His employees are mostly sighted. In a company of 4,000employees, only one other person was blind.
* When you hire people, honesty and stating your expectations can make a good employee.
* Computer software development is competitive.
* You should honestly set your expectations about what you can do.
* When you are looking for a job, you will first talk to a talent acquisition or HR person. Do not hide your blindness. You might be tempted to do this in a remote (virtual) interview.
* Let your boss know what you need to do your job.
* Things move much faster in a corporate environment compared to an educational setting.
* It is HR's role to find software engineers.
* Software engineers are expensive.
* A $3,000 braille display is not much in industry.
* Let them ask any question they want.
* Part of your self-advocacy is to point out problems in procedures and software.
* When you bring a problem forward, also bring a possible solution.
* Try to be as efficient as is possible.
* You should have an advocate in the company who can help you promote your solutions.
* Know braille. Braille can help you learn more efficiently.
* Braille can help you give presentations.
* Know your technology and shortcuts that will help you do things more efficiently.
* Know how to skim email rapidly.
* Learn JAWS and Voice over.
* He found JAWS to be more efficient than NVDA.
* Design tools are very graphical and are usually inaccessible.
* You must pair-up with a sighted partner to accomplish the inaccessible tasks.
* Designers tend to be artistic, and they want an elegant design. Often they do not include accessibility in their products.
* Pairing up with a designer can help make products accessible.
* He would like to have more blind employees in his organization.
* Diversity Makes an organization stronger.
* John Miller said that he has a sighted college student intern to help him with the inaccessible part of his job.

# Wrap up

John Miller and Trisha Kulkarni thanked the individuals who produced the STEM meeting including Ashley Neybert who handled the Zoom logistics.

If you wish to learn more about NABS, including how to become a member, go to:

"https://www.nabslink.org/".

If you wish to join the SED, go to:

"<http://www.nfb.org/divisiondues>".

Dues for NABS and SED are $5 a year.

Starting in 2022, NFB divisions' financial year will start on January 1 and end on December 31 of the same year.

Individuals may join the NABS and SED e-mail discussion groups at "Nfbnet.org".

# Adjournment

The meeting ended at 10:15 PM EST.

About twenty people attended the meeting.

# Questions and Corrections

If there are any questions concerning the National Association of Blind Students, please contact Trisha Kulkarni (nabs.president@gmail.com).

If there are any questions concerning the Science and Engineering Division, please contact John Miller (Phone: 858-774-9286, Johnmillerphd@hotmail.com).

If there are any corrections for the minutes, please contact Louis Maher (713-444-7838, [ljmaher03@outlook.com](mailto:ljmaher03@outlook.com)).

Minutes submitted by Louis Maher.