**2022 Agenda Science and Engineering Division of the National Federation of the Blind**

**July 7, 2022**

New Orleans Marriott, New Orleans, Louisiana

The Science and Engineering Division annual meeting will be held on Thursday, July 07, 2022, from 6:30 PM to 10:00 PM, in room Studio 3.

To either become a registered member of the Science and Engineering division, or to renew your membership, go to "<http://www.nfb.org/divisiondues>". The dues are $5 a year per person. Please do not make any STEM scholarship donations on this page for the NFB is not yet equipped to separate dues payments from donations on this web page.

6:30 - Registration

7:00 - Call to Order - John Miller President

7:01 - Building from the Ground Up - Jamie Principato-Crane

7:15 - Election for Board Position two

7:20 - Engineering tips and division goals - John Miller President

7:30 - the use of the Graphiti Tactile Graphic Display for the study of STEM subjects – Venkatesh Chari

7:45 - Youth Engineers- The NFB EQ Experience! – Natalie Shaheen and NFB Engineering quotient

 program students

8:05 - Multiline braille displays costing a buck-a-cell, using microliter combustion in rubber – Ronald

 Heisser

8:20 - Interactive digital graphics for science and math content - Dave Schleppenbach

8:35 - Lower Dots - Aaron Cannon

8:50 - The Pearson Nemeth Code Curriculum for Students of All Ages - Tina Herzberg, Susan Osterhaus, and Sara Larkin

9:05 - Learning to be a Blind Scientist – Annalise Diadato

9:20 - NFB Science and Engineering STEM Mentoring Program - Nathanael Wales and Natasha

 Ishaq

9:35 - Business Meeting:

 Treasurer's Report

 Secretary's Report

 Scholarship Pledges

 Elections

10:00 - Adjourn

For any questions, please contact John Miller at johnmillerphd@hotmail.com.

# A summary of the presentations follows.

## Title – Building from The Ground Up

**Speaker:** Jamie Principato-Crane

I am an inventor and founder of Blue Crane LLC. I was formerly an engineering program manager at Google and a project manager with NASA Space Grant programs. I am still active in the Physics and Astrophysics communities and facilitate Diversity, Equity, and Inclusion programs for the American Physical Society.

**Presentation:**

A short discussion of what engineering looks like when you decide to leave industry employment and strike out on your own as an inventor, startup founder, and first-time mom.

## 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 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.

## Title - Youth Engineers- The NFB EQ Experience!

**Speaker:** Natalie Shaheen and NFB Engineering Quotient program students

Dr. Natalie Shaheen is the SABER project director and an assistant professor of low vision and blindness at Illinois State University.

**Presentation:**

Learn all about how NFB is empowering future scientists and engineers through the NFB Engineering Quotient program. Find out more about how youth from across the country were challenged to become engineers, learn new skills, and gain confidence through working with positive blind role models. Hear from program participants about what they have learned and how their experience will shape their educational and career goals.

## Title - Multiline Braille Displays Costing a Buck-a-cell, Using Microliter Combustion in Rubber

**Speaker:** Ronald Heisser

Ronald Heisser is a 5th year PhD candidate at Cornell University in Ithaca, New York, studying Theoretical and Applied Mechanics in the Organic Robotics Laboratory under Robert Shepherd. He grew up in San Antonio, Texas, and went to MIT in Cambridge, Massachusetts for his undergraduate studies. He worked briefly as a mechanical engineer and product designer before graduate school. He enjoys playing soccer, Halo, and spending time with his friends.

**Presentation:**

In this talk I will discuss ongoing soft robotics research to develop a new high-density array mechanical actuation system. We have produced an initial prototype whereby fuel/oxygen mixtures are spark ignited inside microliter-volume, silicone rubber combustion chambers, producing rapid actuation pulses through rubber membranes. The high energy and power density of the fuel produces a pulse powerful enough to lift small pins and provide haptic feeling. The array is a thin, touch, conformable silicone sheet. The exceedingly simple manufacturing method allows for an arbitrarily large number of dots to be made at diminishing cell cost. Our current work suggests an initial pathway to obtain latching behavior with rubber membranes. Though our concept is unconventional, we believe that it deserves serious consideration for future multi-line and graphical tactile displays.

## Title - Interactive Digital Graphics for Science and Math Content

**Speaker:** Dave Schleppenbach

Dave Schleppenbach is an Accessibility Industry expert with over 25 years' experience working with and developing assistive technology. Dave began his career while at Purdue University, founding the VISIONS Lab which developed both cutting-edge STEM teaching tools for visually impaired college students

and innovative media production processes.

In 2000, Dave founded GH, LLC to provide services for the print disabled – including visually impaired, learning disabled, and mobility impaired users.

As CEO, he led GH for almost two decades, driving software development, hardware design, large-scale Braille, and tactile graphics production, and strong

advocacy ties to disabilities organizations as well as industry and government entities.

In 2013, Dave founded Tactile Engineering, LLC to develop a full-page, graphical braille tablet computer for blind users.  As CEO, he continues to be involved

in software development, hardware design, the creation of a high-tech automated assembly factory to produce the product, and securing multiple rounds of

financing for the company.

**Presentation:**

One of the greatest barriers to STEM education and professional activity for blind individuals is the inefficiency of delivering graphical information, particularly for moving processes, e.g., a graph changing as an equation’s variables are altered, chromosomal positioning during mitosis, or current flow

in an electrical circuit. Tactile Engineering has developed a mass-producible refreshable dot array that allows a user to track, via touch, a moving and changing graphic. Accompanied by a live demonstration of the technology, we will present different ways that this new device can fundamentally change how

complex graphical information can be conveyed and exchanged. We will also discuss the development of adaptive control schemes and new finger-and-palm techniques to effectively make use of the additional informational load.

## Title - Lower Dots

**Speaker:** Aaron Cannon

Aaron Cannon started writing software professionally in 1996 and has specialized in the field of accessibility since 2008. In college, he studied chiropractic medicine, accounting, and actuarial science, before finally settling on computer science. He is married with five children, and currently works for Ancestry as a Principal Accessibility Lead. In 2021, he was awarded the Holman Prize by the Lighthouse for the Blind in San Francisco, which is currently the primary funding source for Lower Dots.

**Presentation:**

Lower Dots is a project that aims to make blind accessible math tutorials available to anyone at no cost. In short, we hope to become for the blind what Khan Academy is for the sighted. Our goal is to eliminate the barriers to the STEM fields created by inadequate and inaccessible math instruction. In this talk, you will hear all the technological details of how we are tackling this problem, our future plans, and how you can get involved.

## Title - The Pearson Nemeth Code Curriculum for Students of All Ages

**Speaker:** Tina Herzberg, Susan Osterhaus, and Sara Larkin

Dr. Tina Herzberg is Professor and Coordinator of the Visual Impairment Education Program at the University of South Carolina Upstate. She is a co-author of the “Pearson Nemeth Curriculum” and the principal investigator of Project INSPIRE: Increasing the STEM Potential of Individuals Who Read Braille. Prior to USC Upstate, she served as a general education math and English teacher, itinerant teacher of students with visual impairment, and specialist/team leader for a Texas regional service center.

Susan A Osterhaus taught secondary math for 29 years at the Texas School for the Blind and Visually Impaired before becoming the statewide math consultant in their Outreach Program in 2007. She is a long-time member of the BANA Nemeth and Tactile Graphics Committees. She is a co-author of “Nemeth at a Glance,” a co-author of the “Pearson Nemeth Curriculum,” and a consultant for Project INSPIRE: Increasing the STEM Potential of Individuals Who Read Braille.

Sara Larkin taught high school math for 18 years before becoming the statewide math consultant for the Iowa Educational Services for the Blind and Visually Impaired in 2007. She supports educators across Iowa and provides trainings on Nemeth Code, math technology, tactile graphics, abacus, and math teaching strategies for the blind. She is a co-author of the “Pearson Nemeth Curriculum” and a consultant for Project INSPIRE: Increasing the STEM Potential of Individuals Who Read Braille.

**Presentation:**

We are updating our Pearson Nemeth Curriculum Pre-K – Grade 2, Focused Lessons, and Nemeth Symbol Library to make it even more user-friendly and accessible. Pearson is recruiting for a fall 2022 Nemeth Curriculum field study. The purpose of the study is to explore the effectiveness and usability of the Pearson Nemeth Code Curriculum for students of all ages.

Pearson is seeking a diverse group of teachers of students with visual impairments who use Nemeth Code within UEB Contexts. We are also seeking a variety of students that are learning or using Nemeth Code within UEB Contexts.

## Title - Learning to Be a Blind Scientist

**Speaker:** Annalise Diadato

A graduate from The University of Scranton, I graduated in 2015 with my Bachelor of Science in Forensic Chemistry. I am a recent graduate of the Colorado Center for The Blind. I am currently a counsellor at the Colorado Center for The Blind teaching high school students the blindness skills I have recently acquired.

**Presentation:**

Wolfram syndrome is a rare genetic disorder that starts out with diabetes insipidus, diabetes millitus, and optic atrophy that progresses to legal blindness. This is the story of my journey with Wolfram syndrome, how I have always been inspired by science, got my degree in forensic chemistry , and was then worried this would change as my vision decreased. Learning to accept my blindness that I no longer had to hide my vision impairment, and how I learned to embrace myself as a blind scientist, will be shared.

## Title - NFB Science and Engineering STEM Mentoring Program

**Speaker:** Nathanael Wales and Natasha Ishaq

Nathanael Wales has been blind from birth. He is a civil engineer working as a project manager for the U.S. Army Corps of Engineers on flood risk management and navigation improvement projects in New York City, Long Island, and northern New Jersey out of the Corps’ New York District office. He has also had 15 years experience as a project planner for the Corps and began his civil engineering career with 5 years experience planning dam and reservoir projects for the State of California, Department of Water Resources. Nathanael attended his first NFB National Convention in 1996 shortly after graduating from high school just as he was beginning his college engineering program. He has found the mentoring and networking within the Science and Engineering Division invaluable and enjoys the opportunity to give back what has been so generously shared with him over the years. He was an NFB National Scholarship winner in 1997 (which year he won what was then named the “computer science” scholarship) and was a second-time scholarship winner, a tenBroek Fellow, in 2000.

Natasha Ishaq is a rising senior at The College of New Jersey with a major in Anthropology and a minor in Political Science. Natasha has been conducting original research in paleoanthropology since the spring of her sophomore year and is hoping to publish her work within the next year or two. Her research revolves around hominid evolution and stone tool production, with a specific focus on the biomechanics of tool knapping in early and modern human ancestors. This summer, she will be part of an

excavation team to gain further hands-on experience in the field of

archaeology. In 2019, Natasha received a NFB State Scholarship for

achievement in STEM and subsequently attended her first state convention.

Natasha joined the New Jersey Association of Blind Students and served on the board from 2019-2020. She joined the mentorship program in January 2022 and benefited from the insight she has gained as a result.

**Presentation:**

In 2020 the NFB Science and Engineering Division launched a mentoring program connecting blind students studying in or interested in STEM with blind professionals working in or studying at a higher level (graduate programs), in STEM. Because it was during the height of the COVID-19 pandemic, the program leveraged the many virtual networking and conferencing platforms that gained wide popularity and use such as Zoom and WhatsApp. Mentees meet regularly with their mentors, and the program holds formal and informal networking sessions at least monthly. This talk will briefly summarize the program and let division meeting attendees know how they can get involved as either a mentee or mentor.