The Science and Engineering Division of the National Federation of the Blind Annual Meeting Minutes for July 5, 2024

To either become a registered member of the Science and Engineering division, or to renew your membership, go to "<https://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. Donations to the

A sound recording of this meeting (in mp3 format) can be found at

https://tinyurl.com/NFB-Science-Engineering

In the recordings folder.

The file name is "2024-07-05 SEDNFB Annual Division Meeting.MP3".

A copy of the meeting minutes can be found at the same link in the minutes folder.

The file name is

"2024-07-05 Science and Engineering Division of the NFB Annual Meeting Minutes.docx".

This document uses headings so that readers can rapidly find the sections that interest them.

A meeting of the Science and Engineering Division of the National Federation of the blind (SEDNFB) was held at the Rosen Centre Hotel, in Orlando Florida, on Friday, July 5, 2024.

# The meeting was called to order by President John Miller at 7 p.m. Eastern Daylight Time (EDT).

The science presentations were made, after which President Miller called the business meeting to order at 9:15 P.M.

## Minutes

The membership agreed that the minutes from the SEDNFB 2023 business meeting need not be read since the minutes had been distributed by e-mail. The minutes were approved.

## Treasurer's Report

On June 30, 2024, the SEDNFB general fund treasury balance was $1,701.33.

The treasury report was approved.

## Division Pledges

At the May 20, 2024, SEDNFB board meeting, the board agreed that the Science and Engineering division would donate $75 to each of the following three NFB funds:

The Jacobus tenBroek Memorial Fund which supports the NFB center in Baltimore;

The White Cane Fund: which sends money directly to the general treasury of the Federation; and

The Kenneth Jernigan Fund: which is used to bring a number of attendees to their first national convention.

The membership approved these donations.

## Elections

Since 2024 is an even-numbered year, elections were held. There are four officers and two Board members. Reelected were: John Miller, President; Ashley Neybert, Vice-president; Louis Maher, Secretary; Harry Staley, Treasurer; and Nathanael Wales, Board position one. Gene Kim was elected for the board position two position since Jamie Principato-Crane chose not to run for her board position.

## STEM Scholarship

The Science and Engineering Division and the Computer Science Division are raising funds for an annual $8,000 "Science Technology Engineering and Mathematics" (STEM) scholarship given by the NFB, to a worthy student at the NFB convention.

President Miller said that, for 2024, the NFB STEM scholarship had received $5,000 in donations towards the $8,000 scholarship. The NFB will provide the remaining $3,000.

This scholarship is supported by the Science and Engineering division, and by the Computer Science division.

Notes:

Please consider donating to the NFB towards this scholarship.

To donate:

There are two ways to donate to the NFB STEM Scholarship: one method is online, and the second method is by mail.

If you wish to make an online donation: go to

"<https://www.nfb.org/>" and activate the "Donate" link (or go directly to

"<https://www.nfb.org/donate>". Fill out the required fields. On the "Contribution Note" field please enter "STEM Scholarship". Once your donation has been submitted, you will receive an automatic acknowledgment of your donation. Please forward this donation acknowledgement to John Miller (Johnmillerphd@hotmail.com) so that he can track our progress towards our funding goal.

To donate by mail: Please make a check payable to NFB.

On the memo line write STEM Scholarship.

Mail the check to

NFB accounting/scholarship

200 East Wells St. At Jernigan Place

Baltimore, MD 21230.

Please inform John Miller (Johnmillerphd@hotmail.com) about this donation so that he can track our progress towards our funding goal.

Please make your contributions by March 1, 2025, so that your contributions can count towards the 2025 STEM Scholarship.

**NOTE: Please do not use the NFB division membership form for STEM scholarship donations. It is difficult for the NFB to track scholarship money donated on the division registration form.**

## Presentations

Below is a list of talks that were given during the 2024 SEDNFB meeting. Available speaker introductions and abstracts are given after the Adjournment item.

**Action Item:** If the presenters wish to send us written material supporting their talks, these documents will be publicly shared in our meeting files. Please send any documents to John Miller (johnmillerphd@hotmail.com) and Louis Maher (ljmaher03@outlook.com).

Experiences With The Orbit Research Graphiti Interactive Tablet Display - John Miller

Developments At Orbit Research - Venkatesh Chari

From the Classroom to Research: Effective Non-Visual Methods for Engineering Students - Gene Kim

Eclipse Soundscapes: The Doing of NASA Science in an Accessible Way - MaryKay Severino and Trae Winter

Individuals can learn more about their work, and how to participate in their project, by viewing (<https://eclipsesoundscapes.org/>).

8:15 Making Space Science Accessible with the Cadence Tactile Graphics Tablet - Dave Schleppenbach

Joe Said spoke for Dave Schleppenbach

8:30 Empowering The Blind Community Through Systems Engineering And Model-Based Languages - Sarah Scheithauer

PlantUML is an open-source tool that allows users to create a wide variety of diagrams using a plain text language. It’s designed to support rapid diagramming by interpreting structured text to generate visual representations. PlantUML is also noteworthy for its accessibility features, as it has been used to allow blind people to design and read UML diagrams.

9:00 Modeling Carbon Burial in Ocean Sediments - Jennifer Doran

## Joining the Science and Engineering Division and E-mail List

If you are interested in joining the NFB Science and Engineering division, please fill out the division registration form at "<http://www.nfb.org/divisiondues>". The dues are $5 a year.

Note that the "division registration form" has a field through which you can make donations. Please do not donate to the STEM scholarship through this form. Only use this form to pay dues and make non-STEM-scholarship donations.

If you wish to join the SEDNFB e-mail list, go to "nfbnet.org", open the list of NFB e-mail groups, and search for "NFB Science".

## SEDNFB Mentoring Project

The Science and Engineering division's STEM Mentorship Program Was developed by Newton Nguyen, Gene Kim, and Kennedy Stomberg to pair STEM students with mentors. One of the program's activities is to host a monthly STEM seminar where students and mentors can discuss STEM techniques.

The mentor program registration form is located at:

"<https://docs.google.com/forms/d/e/1FAIpQLSd0p63m3xhR_hX-r3lwEylLtFuipX3_TVOIRRH4fsTcYnUhyA/viewform>".

For questions about the program, write to "systemicaccess@gmail.com".

## Adjournment

The division meeting adjourned at 10PM.

Respectfully submitted,

Louis Maher, Secretary

Science and Engineering Division of the National Federation of the Blind

Phone: 713-444-7838

E-mail ljmaher03@outlook.com

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

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# Biographies and Presentation Summaries

What follows is a copy of the material that appeared in the meeting agenda.

## Title: Experiences With The Orbit Research Graphiti Interactive Tablet Display

Author: John Miller

## Title: Developments At Orbit Research

Author: 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.

Abstract: Over the past year, Orbit Research has launched several new products. These include the Orbit Speak Notetaker that combines braille input and speech output in a compact, affordable device. The Magna Handheld Electronic Magnifiers provide portable magnification solutions. The Orbit Reader Q20 and Q40 deliver high-quality braille displays with QWERTY keyboards. The Orbit Slate models offer multiline braille displays for enhanced reading and writing experiences. The Graphiti Plus provides a combination of true braille and the unique multi-level graphic array of pins that users can touch and feel while it refreshes in real-time. We will pass the devices around for people to try.

## Title: From the Classroom to Research: Effective Non-Visual Methods for Engineering Students

Author: Gene Kim

Gene is a senior at Stanford University studying Computer Science, focusing on Human-Computer Interaction and Accessibility. He has served as the Secretary for the National Association of Blind Students, co-founded the NFB Science and Engineering mentorship program, is a Kenneth Jernigan Leadership in Service Program participant, and has held other roles in the NFB. He has published 10 papers (with collectively over 100 citations and a best paper nominee) in accessible data visualizations, STEM education technology for blind youth, and digital design tools. He enjoys cooking, hiking, listening to music, and following the NFL.

Abstract: Gene will briefly highlight two of his ongoing research projects. 1) using safe electrical muscle stimulation (EMS) in accessibility contexts, and 2) analyzing data with an exploratory data visualizer. He will conclude with non-visual strategies for navigating STEM courses, particularly electrical/mechanical engineering classes based on his experiences building a self-driving robotic car and a sensor-based musical instrument from scratch.

## Title: Eclipse Soundscapes: The Doing of NASA Science in an Accessible Way

Authors: MaryKay Severino and Trae Winter

Dr. Henry “Trae” Winter is the Chief Scientist and Co-Founder of the ARISA Lab and a co-lead on the Eclipse Soundscapes Project. Dr. Winter has worked on eight NASA missions observing the Sun. His primary research focus is improving computer simulations to explore how energy is released in the Sun’s atmosphere, known as the “corona,” and how this happens in other stars. Dr. Winter has designed video wall exhibits for the Cooper-Hewitt National Design Museum, the National Air and Space Museum, North Carolina State University’s Hunt Library, and the Harvard Art Museum's Lightbox Gallery.

MaryKay Severino is the Education Director and Co-Founder of the ARISA Lab and a co-lead on the Eclipse Soundscapes Project. After earning a business degree from Villanova University, she worked in South Carolina and California as a Program Manager and Marketing Consultant. Realizing she was ready for a change, she went on to earn her master's degree in education and worked in public school systems and universities in Taiwan, South Korea, and in the United States. Living abroad, immersed in other cultures, and navigating daily life with language and literacy barriers, gave MaryKay a strong understanding of the challenges faced by anyone who communicates differently. For this reason, the Eclipse Soundscapes project was a natural fit. She is excited to use her skills to promote, plan, and execute a project which will bring the amazement and wonder of an eclipse to even more kinds of people.

Abstract: The Eclipse Soundscapes Project is a NASA-funded participatory science project that engages the general public in doing eclipse-related science alongside scientists. The project focused on ensuring that as many people as possible would be welcomed to participate by considering accessibility and inclusion at every stage of the project by focusing on the fact that solar eclipses are multisensory events. This talk will explain the project, what we hope to learn from it, how people participated before and during the eclipses, and how people can continue to participate in doing real and impactful science with NASA.

## Title: Making Space Science Accessible with the Cadence Tactile Graphics Tablet

Author: Dave Schleppenbach

Dave has been a powerful voice in the AT industry and advocacy for over twenty years. His company, GH, LLC, produced millions of pages of STEM braille and tactile graphics, and he was actively involved in the development of accessibility specifications like ANSI/NISO, NIMAS, and MathML. Currently, he is co-founder and CEO of Tactile Engineering, an Indiana-based company that manufactures the Cadence tablet, with the goal of making STEM and graphical content available to all blind students and professionals.

Abstract: We'll discuss our space science education projects and results, including high-altitude balloon launches executed by Indiana School for the Blind students, accessible space camps, live tactile telescopy, and upcoming rocket launches with blind student participants.

## Title: Empowering The Blind Community Through Systems Engineering And Model-Based Languages

Author: Sarah Scheithauer

Sarah Scheithauer (pronounced shy-tower) is a Research Engineer in the Model Based Acquisitions Branch (MBAB) at Georgia Tech Research Institute (GTRI) with over a decade of experience in Systems Engineering. Throughout her career, she has focused on the application of Model Based Systems Engineering (MBSE) and Digital Engineering (DE), particularly within the aerospace and defense sectors. Sarah holds a B.S. and M.S. in Electrical Engineering from Ohio University and began her professional journey with Boeing Defense, where she honed core Systems Engineering principles as a Requirements Management Engineer for the CH-47 Chinook.

Passionate about diversity, equity, and inclusion, Sarah recognizes the importance of increasing accessibility for the use of Systems Engineering and Systems Engineering toolsets for all. In her current role at GTRI, she remains dedicated to learning about the implementation of MBSE and DE across the Department of Defense (DOD). Sarah endeavors to leverage her extensive experience to continuously enhance DE implementation on real-world acquisition programs, navigating the rapidly evolving landscape of DE with a commitment to inclusivity and accessibility.

Abstract: In the realm of technology, inclusivity and accessibility are paramount, especially for the visually impaired. This presentation addresses the intersection of Systems Engineering and the disabled community, with a special emphasis on systems engineering modeling languages for the blind. Beginning with a comprehensive overview of Systems Engineering principles and the renowned Systems Engineering 'Vee' model, we delve into the significance of Model-Based Systems Engineering (MBSE). As we navigate through the intricacies of Object-Oriented Programming (OOP), we highlight the distinctions between textual and graphical programming languages, recognizing their implications for the visually impaired. A pivotal aspect of our discourse revolves around SysML (Systems Modeling Language) and its evolution into SysML v2, elucidating their roles in enhancing system design and development. We underscore the importance of inclusivity by exploring methods to adapt UML (Unified Modeling Language) for the blind, thereby ensuring accessibility in the systems design processes.

Concluding with a call to action, we emphasize the imperative for collaborative efforts in advancing accessibility initiatives within the Systems Engineering domain and tools. By fostering an environment of innovation and inclusivity, we can collectively propel towards a future where technology serves as an enabler for all, regardless of ability. Join us in championing this cause and reshaping the landscape of Systems Engineering for a more inclusive tomorrow.

## Title: Modeling Carbon Burial in Ocean Sediments

Author: Jennifer Doran

I am a PhD student in Marine Geology, also sometimes called Geological Oceanography, at Oregon State University. I just finished my second year, and my current research focuses on carbon burial in marine sediments. I graduated from the same university with a bachelor's degree in Oceanography and a minor in Geology. I am a NASA Aerospace scholar, and received the Lillian S Edelstein scholarship in 2022, as well as the Ada A. Chipman and Alford M. Downs Memorial fellowship in 2023. I am currently the president of Oregon Association of Blind Students, and was the former president of Natural Science and Engineering Student Association. In addition, I was the committee leader for the Phi Sigma chapter's Honors in Action Research Project, Phi Sigma is a part of Phi Theta Kappa. IN 2017, I was a research scientist upon the R/V Oceanus OC1703b cruise and was responsible for collecting two sediment gravity cores in the Santa Barbara Basin. Also worth mentioning is that I was a lab assistant in the Estuarine Microbiology Lab at OSU and did DNA extraction from Sterivex filters for polymerase chain reaction (PCR) analysis during undergrad. In my free time during undergrad, I was the Trumpet and Horn Section Leader for OSU's community band. While I am currently working on my research with carbon burial, I am also advocating for Blind students on my campus who are experiencing ongoing discrimination. This advocacy work has enabled my particular college, the College of Earth, Ocean, and Atmospheric Science (CEOAS), to move towards in house disability services with a Blind graduate student, Ashley Neybert, being in a supervisor role for accessible materials because I emphasized to my college that the motto "nothing about us without us" is crucial to follow for inclusivity.

Abstract: Climate change is a phenomenon driven by excess greenhouse gases in the atmosphere, with CO2 being the primary greenhouse gas responsible. The more CO2 in the atmosphere, the more heat gets trapped at the surface which causes the planet to heat up and leads to a larger temperature gradient in the ocean. This larger gradient means more carbon diffuses into the ocean. Rising carbon levels in the oceans leads to ecological and economic problems such as sea level rise and ocean acidification, with ocean acidification damaging the shellfish industry and sea level rise threatening coastal communities. According to the National Oceanic and Atmospheric Administration (NOAA) the current amount of carbon in our atmosphere is at a record breaking 423 ppm to 424 ppm (NOAA, 2023). Carbon cycling between reservoirs at Earth’s surface and carbon uptake within these reservoirs are the primary control of the CO2 content in Earth’s atmosphere, and hence of fundamental importance to the heat budget of our planet. One of the ways we can mitigate climate change problems is by sequestering it from the atmosphere. This sequestering can be done on two-time intervals –in ocean waters and surface soils for a period of decades to perhaps a few millennia, but in ocean sediments for many millions of years (Khatiwala et. al, 2019). Given the time scale that carbon can remain in ocean sediments, the long-term solution to climate change would be to sequester carbon from the atmosphere into these sediments, and modeling carbon burial in ocean sediments will tell us how much we need to bury to affect atmospheric carbon dioxide levels. Here, attempts will be made to couple carbon burial and sediment accumulation with a dynamically adaptive model that can account for diagenesis in the upper sediment layer, thus allowing us to 3D model carbon burial in ocean sediments.

References

Khatiwala, S., Schmittner, A., & Muglia, J. (2019). Air-sea disequilibrium enhances ocean carbon storage during glacial periods. Science Advance. doi:10.1126/sciadv.aaw4981

National Oceanic and Atmospheric Administration. Broken Record: Atmospheric Carbon Dioxide Levels Jump Again, 5 June 2023, www.noaa.gov/news-release/broken-record-atmospheric-carbon-dioxide-levels-jump-again.