The Science and Engineering Division of the National Federation of the Blind Annual

Meeting Minutes for July 8, 2021

To become a registered member of the Science and Engineering division of the NFB visit "<http://www.nfb.org/divisiondues>".

A sound recording of this meeting (in m4a format) can be found at

<https://drive.google.com/drive/u/2/folders/1tU6Z-3xngHPGYidOodaIgPIUrouelOrV>

In the recordings folder.

The file name is "2021-07-08 SEDNFB Annual Division Meeting Audio Only.m4a".

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

The file name is

"2021-07-08 Science and Engineering Division of the NFB Annual Meeting Minutes.docx".

A meeting of the Science and Engineering Division of the National Federation of the blind (SEDNFB) was held, online, by Zoom, on Thursday, July 8, 2021. Our official National Federation of the Blind (NFB) host was Jennifer Dunnam. Most of the Zoom logistics of this meeting were handled by the meeting's co-host: Vice President Ashley Neybert. We had between 70 and 80 attendees.

The meeting was called to order by President John Miller at 3:00 p.m. Eastern Daylight Time (EDT).

Several program items were presented, after which President Miller called the business meeting to order at 4:10 P.M.

# Minutes

The membership agreed that the minutes from the SEDNFB 2020 business meeting need not be read since the minutes had been distributed by e-mail. The minutes were approved.

# Treasury Report

In 2020, the SEDNFB moved its treasury to the NFB national organization. The NFB provided us a treasury report covering the time July 19, 2020, through July 7, 2021. This report was emailed to the SEDNFB email list; therefore, the membership agreed that the report need not be read. On July 7, 2021, the SEDNFB general fund treasury balance was $890.50. The treasury report was approved.

Notes:

The NFB national organization asked all divisions to move their accounting year to January 1, of the current year, to December 31, of the current year. This would make the terms of all NFB members be the same for all chapters, affiliates, and divisions.

For this reason:

1. The SEDNFB will move its accounting year from July 1 of the current year through June 30 of the next year; to January 1 of the current year through December 31 of the current year.

2. The membership terms of all people who paid dues in 2021 would have their membership terms end on December 31, 2021.

# Elections

Since 2021 is an odd-numbered year, no elections were held. There are four officers and two Board members. They are: John Miller, President; Ashley Neybert, Vice-president; Louis Maher, Secretary; Harry Staley, Treasurer; Nathanael Wales, Board position one; and Jamie Principato-Crane, Board position two.

# Future Presentations

President Miller asked the meeting attendees if they would like to give a ten-minute talk, remotely, to the division, either in the upcoming spring or summer. Anyone who is interested in giving such a presentation can write to President Miller at (johnmillerphd@hotmail.com). During the meeting, the following individuals volunteered to give a talk:

Tashara Cooper: Research Psychologist

Lucien Gandarias (scholarship Finalist WA): physics

Tuan Nguyen: Master's Candidate in Biochemistry

Candace Luther: Bachelor of Liberal Studies specialized in Environmental Sciences. Will soon change to Geophysics.

Amelia Palmer: math/topology/systems

Presentation volunteers will be contact in September 2021 to check their availability.

# STEM Scholarship

The Science and Engineering Division and the Computer Science Division are raising funds for a $3000 or $5000 "Science Technology Engineering and Mathematics" (STEM) scholarship given by the NFB, to a worthy student at the NFB convention. In 2021, we were able to raise $5,000 for this scholarship.

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 make your contributions by February 1, 2022, so that your contributions can count towards the 2022 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.**

As of June 23, 2021, the scholarship fund had a balance of $3,626.70 towards the 2022 STEM scholarship. (Note that this amount is after the $5,000 2021 NFB STEM scholarship has been accounted for.)

# Presentations

Below is a list of talks that were given during the 2021 SEDNFB meeting. Available speaker introductions and abstracts are given after the Adjournment item.

Engineering tips and division goals – John Miller, President

Muscle Memory and The Microbiology Lab - Emily Schlenker

Remote Learning in STEM for the Blind - Ashley Neybert and Amelia Palmer

College and Graduate School Blindness Accessibility Review Project - Don Winiecki

Being Blind in the Electronics Laboratory - Matthew Duffell-Hoffman

Panel Discussion: Methods of Teaching STEM to The Blind -

Emily Gibbs, Susan Osterhaus, and Natalie Shaheen

# 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 "newton@caltech.edu".

# Adjournment

The division meeting adjourned at 5:11 P.M. EDT.

After the division meeting, there was a social hour using the meeting Zoom link from 5 PM to 6 PM hosted by Nathanael Wales.

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

## Title - Engineering tips and division goals

Speaker: John Miller, President

Presentation

John spoke of the need-to-know Braille. Among many other things, Braille can help you with public speaking, a skill that becomes increasingly important in life. Being able to read a well-organized presentation smoothly is a major factor in public speaking.

In engineering, John found it necessary to know Microsoft Windows, word, Excel, and PowerPoint.

John said that you should find a passion in science that is project-related to your work. You can become a project matter expert in this field. You can share this knowledge with others.

John has a sighted person who helps him part time. John's company values his output and is happy to let him produce results more efficiently with this sighted help.

## Title - Muscle Memory and The Microbiology Lab: how being totally blind did not hinder me from learning the various techniques and aseptic procedures in what has always been portrayed as a very visual discipline.

Speaker: Emily Schlenker

Emily Schlenker has a bachelor's degree in Global studies and one in biology with a minor in chemistry from Wichita State University.  She will be attending a Doctor of Pharmacy program at the University of Kansas this fall.

Presentation:

As a biology major, one of the requirements was to complete a general microbiology lab. I was able to do this with a few basic modifications and a whole lot of practice. All though I spent a lot of time feeling awkward and uncomfortable, what people do not tell you is that almost all students who are faced with these new techniques feel the same way and are experiencing difficulties.

Aseptic procedures are how you take a wire with a loop on the end, sterilize it, pick up bacteria that is to be studied, and transfer the bacteria to your test tube containing a growth medium. You must avoid picking up other bacteria that might contaminate your sample. She had to practice this procedure three hours a day for two weeks.

## Title - Remote Learning in STEM for the Blind

Speaker: Ashley Neybert and Amelia Palmer

Ashley Neybert is the Lead Curriculum Specialist at Independence Science, a company run by and for blind scientists. She graduated with a bachelor’s in chemistry from Rockhurst University in Missouri in 2015 and is currently in her final semester of her Masters in Curriculum and Instructional Design at Wichita State University in Kansas. Her goal is to always push the envelope on what is considered possible for blind students in STEM fields.

Presentation:

Covid-19 has made many things inaccessible for the blind as many teachers push for simulations and other inaccessible materials. This new technology will allow a student to still have some autonomy over their laboratory during remote learning and opens the door to collaborations with laboratories that had not been possible before Covid and can even introduce students to the possibility of international collaborators. Amelia Palmer, a blind engineering student at Boise State University, will demonstrate how she can complete a simple experiment remotely with the use of JAWS Tandem and a Sci-Voice Talking LabQuest.

Ashley showed a recording that demonstrated:

Ashley opening the talking LabQuest,

Amelia using JAWS Tandem to take control of Ashley's computer so that Amelia could hear and control the LabQuest,

Amelia taking data,

Amelia reviewing the data in numeric form or by using sonification to review the graph of her data, and

Amelia doing statistics on her data.

## Title - College and Graduate School Blindness Accessibility Review Project

Speaker: Don Winiecki

Don Winiecki is a faculty member in the Boise State University College of Engineering. He has a Doctor of Education degree in instructional technology, and a Doctor of Philosophy in sociology. He is the Treasurer of the Idaho Affiliate of NFB, a member of the Science & Engineering Division of NFB, and the NFB President's Committee for the Advancement and Promotion of Braille, moderator of the ""Ask an Expert"" forum for tactile graphics of the National Braille Association, and the BANA representative to the International Council on English Braille committee on Technical UEB.

Presentation:

The SEDNFB and the Jernigan Institute are progressing on empirical research to identify barriers and drivers experienced by blind STEM students in higher education, and to use findings to provide advice and guidance to students, faculty members, and colleges and universities, on how to best help students succeed. Division chairperson John Miller is leading this effort. Don Winiecki has conducted structured interviews with 75 current students and professionals in STEM fields and has drafted a survey to facilitate this research. The survey is available at "[https://forms.gle/4NH5f6gM7UHyMziW8](https://na01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fforms.gle%2F4NH5f6gM7UHyMziW8&data=04%7C01%7C%7C63b04a99a0cc41e7e24a08d947ae3802%7C84df9e7fe9f640afb435aaaaaaaaaaaa%7C1%7C0%7C637619635859899971%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C1000&sdata=68ldgjLBeh6VqIsz8F81xNrmpaeFBwY9H1VnNsHpgM0%3D&reserved=0)".

To date, Don has received approximately 40 responses to his survey. While this is a good start it is not enough to allow SEDNFB to complete the project. Don will work with Lou Ann Blake at the NFB Jernigan Institute to set up a process enabling an ongoing flow of respondents across a broader set of Colleges and Universities and create an accessible interface to make his data more widely available.

The survey continues to be available so new individuals may report on their experiences. Also, those who have already participated can update information based on new experiences. This will provide up-to-date information to allow students and guardians to make informed decisions about higher education, and to provide colleges and universities with current information on the accessibility of their services.

Interested individuals on this matter are John Miller, Ashley Neybert, Harry Staley, Newton Nguyen, and Don Winiecki. Blind individuals and parents of blind children could review this information and select a college that had a favorable experience for a blind STEM student.

## Title - Being Blind in the Electronics Laboratory

Speaker: Matthew Duffell-Hoffman

Matthew Duffell-Hoffman is a rising junior at the University of South Carolina Honors College studying Electrical Engineering and Computer Science. He plans to continue directly to grad-school for an Entrepreneurial Engineering program, and then pursue a career in the field of autonomous vehicles.

Presentation:

I will talk about my experience in the Introductory Electrical Engineering Laboratory and the projects completed during the course. I will discuss how I used equipment such as a multimeter, function generator, and oscilloscope. I will talk about the techniques I used to work with small electronic components, both with solderless protoboards and soldering to a printed circuit board. I will talk about working with and programming a microcontroller.

Matthew built a simple circuit. He compared the circuit performance to its calculated performance. He used a breadboard or protoboard. The holes on the protoboard were too small to be felt; therefore, he used a Braille slate stylus to detect the holes.

Some of his lab equipment had buttons which could be labeled or manipulated by using a Braille reference sheet for the device.

He used Seeing AI to read the numbers on an instrument's visual display.

He could export his data to a spreadsheet where he could sonify the data.

He learned to solder. He learned to load computer code into a circuit board.

## Title - Panel Discussion: Methods of Teaching STEM to The Blind

Speakers: Emily Gibbs, Susan Osterhaus, and Natalie Shaheen

Emily Gibbs has been teaching blind students for the last 17 years. She has served as NFBTX lead NFB BELL Academy teacher and Coordinator since its inception in 2010. She is especially interested in tactile graphics and innovative methods of creating them. Currently, she is serving as President of the Texas Parents of Blind Children and working as the Director of Youth and Education Services for the National Federation of the Blind of Texas.

Susan A. Osterhaus taught secondary math for 29 years at the Texas School for the Blind and Visually Impaired before becoming the statewide mathematics consultant in their Outreach Program 13 years ago. 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.

Dr. Natalie Shaheen is an assistant professor of blindness at Illinois State University and director of the NSF-funded Spatial Ability and Blind Engineering Research project. For over a decade, Dr. Shaheen has worked to increase blind people’s access to STEM learning opportunities in formal and informal environments. In her research, Dr. Shaheen uses interdisciplinary approaches to study equity and access for disabled students in technology-mediated learning environments to disrupt systemic ableism and to reimagine technology-mediated education as a place that values and actively makes space for disabled ways of knowing and being.

Presentation:

The Panel will discuss methods of teaching STEM to blind students.

A paper on this topic is:

Dismantling the Compulsory Sightedness of STEM Education and Empowering Blind Learners: by Natalie Shaheen "<https://nlshaheen.com/dare/>".

Natalie writes that she has identified 5 principles for empowering blind learners in STEM.  The principals are:

1. Embrace Nonvisual Ways of Knowing.
2. Create an Environment that Empowers Blind People to Participate Fully in All of the Learning.
3. Provide Opportunities for Blind People to Learn Nonvisual STEM Process Skills.
4. Use Equipment that is Non visually Accessible.
5. All Instructional Materials are Available in Non-visually Accessible formats at the Same Time and in the Same Place as Visual Formats.

Louis Maher asked the questions. Interested individual should listen to the recording to get a full answer.

Note that UEB stands for Unified English Braille.

1. Natalie has said "STEM is spatial rather than visual". What does this mean?

Natalie: An object must be explored in two and three dimensions. This can be done with sight, touch, and sound. The blind would emphasize touch and sound oversight.

2. Natalie has said that "we need to dismantle the compulsory sightedness of STEM education, and of education in general". What does this mean? Which parts of the education process does this effect?

Natalie considers compulsory to mean default. Therefore, Natalie is saying that we need to dismantle the default sightedness of STEM education. This can be done using the "five principles for empowering blind learners in STEM" listed in the introduction to the panel discussion.

3. Emily: How do you teach kids Braille remotely in the BELL program?

4. Emily: What do you send your blind students in the BELL at home program?

5. Emily: What kind of graphics do you send the kids?

Emily: All the material that the students need is sent to students' homes. The parents are sent videos to explain the lessons. The students do the lessons before they get together with their instructors. We support the students intensely. We had a social hour each day. Each student had a blind adult mentor who called the student every day.

Instead of trying to adapt lessons to the level of the student, we had three levels of lessons—beginner, intermediate, and advanced.

We used games and graphics in the lessons.

6. Everyone: What are your thoughts on the UEB or Nemeth math codes? Is it correct to say that for a specific equation, the Nemeth math code requires about half the symbols to represent the equation as does the UEB math code?

Susan: The Nemeth code is more compact than is UEB; however, Nemeth is not half as compact as UEB.

7. Everyone: Do students have to learn both the UEB and Nemeth math codes?

Panel: Yes.

The American Printing House for the blind (APH) Nemeth tutorial is at:

"https://tech.aph.org/nemeth/".

The APH UEB tutorial is at:

"<https://uebmath.aphtech.org/>".

8. Everyone: Will the Braille Authority of North America (BANA) be able to agree upon a decision about which math code to use?

Susan: No.

9. Susan: What does the Tactical Graphics committee consider?

Susan: The committee creates guidelines and standards for transcribers, educators, and producers to create readable graphics.

10. Susan: What is the Pearson Nemeth Curriculum?

<https://accessibility.pearson.com/resources/nemeth-curriculum/index.php>

WEB:

* The step-by-step **Nemeth Braille Code Curriculum** is designed to teach students who are visually impaired in grades Pre-Kindergarten through second grade how to read and write the Nemeth Code. It includes hands-on activities and games that reinforce grade-level math concepts and make learning the Nemeth Code fun and meaningful.
* The engaging **Nemeth Braille Focused Lessons** for students in grades 3 through 8 provide a fun and supportive way to learn new symbols and practice reading and writing these symbols within grade-level math problems. Focused lessons include:
	+ Division
	+ Exceptions to the five-step rule (commonly used in place value and repeating decimals)
	+ Five-step rule (commonly used in geometry and with repeating decimals)
	+ Fractions
	+ Mixed numbers
	+ Multiplication
	+ Number lines
	+ Radical expressions
* The user-friendly **Nemeth Symbol Library** provides definitions of how to write symbols used in Kindergarten through Calculus in Nemeth Code, helpful hints for remembering how to read and write many of the symbols and examples in print and braille.

11. Everyone: Is there a practical method for the blind to provide math homework in Nemeth code and have it painlessly translated to and from the electronic equivalent of print?

Natalie: Some notetakers have this capability.

Susan: The process can be buggy. Things should improve when the new Nemeth book is released.

12. Susan: What is "Project INSPIRE (Increasing the STEM Potential of Individuals Who Read Braille)" about?

<https://www.uscupstate.edu/academics/school-of-education-human-performance-and-health/graduate-programs/project-inspire/>

webpage: Our goal is to support professionals, youth in grades 6-12, and young adults in building their skills in the two braille codes used in the United States for STEM classes. To accomplish our goal our project continues to develop:

* Six-week online courses for teachers of students with visual impairments, braille transcribers, adult service providers, and university disability resource center personnel.
* Engaging virtual STEM Braille Boot Camps that provide multiple opportunities to learn and practice STEM braille codes for students in 6th grade through college.
* Fun virtual STEM Braille Bowl Competitions to challenge braille users in grades 6th-12th throughout the U.S. to demonstrate their skills and knowledge in the STEM braille codes.

13. Natalie: What is the Spatial Ability and Blind Engineering Research project?

Natalie: In 2017, the National Science Foundation awarded the National Federation of the Blind a new five-year grant focused on spatial ability and engineering education for blind high school students.

<https://nfb.org//sites/default/files/images/nfb/publications/bm/bm18/bm1804/bm180406.htm>

Think of spatial ability as the way in which you imagine an object, its various characteristics, and then mentally manipulate that object to consider how it might change under certain conditions or as the result of certain actions. An example of this is if you consider a cube, and then you think of how its two halves would appear if it were cut in half at a forty-five-degree angle, and how those halves would appear based on the angle of perspective.

This grant funded summer, week-long, STEM events such as the nfb eq program.

14. Everyone: Should blind students be allowed more time on tests than sighted students?

Natalie: You cannot make a blanket statement about this. It depends on the format of the test, who is the student, and what is the context in which the test is being given.

Emily agrees with this. These decisions can be made in the individualized education plan (IEP) process.

Susan: A blind student will need more time in a standardized test especially when graphics are involved. Sighted people can comprehend a graph as a whole whereas the blind student must mentally construct the graph one fingertip bit of information at a time.

Natalie: A lot of standardized tests in grade and high school are computerized and are almost completely inaccessible. The tests are accessed by a human reader. The graphs are created on the fly; therefore, the reader must use a tactile drawing tablet to draw the graphs for the student before the student can access them.

John Miller was given double time on his AP calculus test. He would have to dictate his answers to a scribe. In college he would have to Braille his own test then dictate his answers to a scribe.

Louis Maher was given double time on high stakes tests such as the SAT and GRE.