

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Millard, Mitchell

eRA COMMONS USER NAME (credential, e.g., agency login):

POSITION TITLE: Director of Research and Development, WWS4Life 501(c)(3)

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Traverse City Central High School, Michigan	High School	05/2026	STEM & Global Studies Summa cum laude
Northwestern Michigan College, TC, MI	Dual Enrollment	05/2026	25+77(AP)=102 credits
Climate Reality Leadership Corps Training, Nashville, TN	Certificate	05/2026	Climate Advocacy
NIH-Office of Clinical Research Education Certificate (IPPCR): Introduction to the Principles and Practice of Clinical Research	Certificate	07/2026	Clinical Research
University of Penn Center for Social Impact Intensive 8 Month Program-Support Leaders and Innovators with Big Ideas for Impact	Certificate	By: 12/2026	Executive Social Impact 8-month & 40% towards Master of NPL complete
Duke University, Durham, North Carolina			Statistical Science

A. Personal Statement

I am researching a Better95™ respirator, improving public health through innovative health solutions, and applying research using advanced statistical analysis to make a meaningful impact.

The research I have conducted sheds light on health disparities in my local community. In Traverse City, I grew up surrounded by cherry orchards and vineyards, playing tag and hide-and-seek with my friends. However, at a young age, I saw trucks full of people being driven down the dirt road by my house, heading to work on the farms. I saw these people spraying chemicals without any protective equipment (masks or gloves), and not even the tractor operator had an enclosed cab. When you walk by, even hours later, I can still smell the chemicals and realize that the same substances meant to kill insects and weeds are entering people's respiratory systems as airborne gases, vapors, dust, or fumes. Once inhaled, these substances can cause localized damage to the airways or be absorbed directly into the bloodstream through the alveoli, both of which are potentially avoidable with proper respiratory protection.

Now I realize that it is not purely a matter of access to personal protective equipment (PPE). Instead, it is the workers' intensive workload and thermal demand, along with the trapped exhalation increasing the heat index, that make it unreasonable to require such protections. With a new breathing apparatus, PPE has the potential to become more comfortable to wear, allowing workers to live longer and healthier lives.

As I have been fortunate to be exposed to a breakthrough technology that can fix the complex relationship between health and the environment, significantly reducing avoidable respiratory disease, I can't help but be excited about the opportunities and collaborations I can be part of at Duke University.

Data-driven research can make a better tomorrow for all. However, this cannot be done alone. Duke understands that addressing global health issues is an interdisciplinary effort. By integrating statistical science, global health, and entrepreneurship, Duke equips students with the academic foundation to develop successful medical solutions.

Just as Professor Heather Stapleton, who is an environmental chemist and exposure scientist in the Nicholas School of the Environment at Duke University, is working with the North Carolina Firefighter Cancer Cohort Study, which is exploring these same toxic connections I believe we can begin to study and see a difference in the health of not only workers exposed to harmful chemicals but also be able to dramatically research and develop solutions for both wildfire and city firefighter who need actually have different challenging environments and need researchers to begin to break down the barriers of discomfort and inhaling CO₂ to make a significant impact on the ability to breathe in less toxic hazards.

I now understand the devastating effects and lives lost that could have been avoided, all with a properly worn N95 respirator for both 9/11 Disease and Burn Pit Disease. Research has shown that a lack of compliance due to discomfort was a contributing factor in significant loss and damage to many lives. All of which can at times be overwhelming for a young researcher who holds in his hands the low-tech solution, but together we can work towards safer and more comfortable respirators.

Ongoing and recently completed projects that I would like to highlight include:

Ongoing projects

1. Invent & Develop a Unique Breathing Simulator Device for Testing Heat, Humidity, & other measures. Provisional Patent Application, Sole Applicant, Breathing Simulator to submit Nonprovisional on or before October 12, 2026. To see my presentation of a biomedical application of use for a future scientific instrument which measures the CO₂, heat, and humidity trapped in a mask cavity to quantify the comparison of any size or shape N95 respirator to that same respirator with a small tube adaptation validating that a low-tech ducted channel has the power to eliminate CO₂, heat, and humidity with every exhalation on a dummy head manikin utilizing aerosol generated gases. Watch here:

<https://www.youtube.com/watch?v=OBRGr3dgoA0&t=1s>

2. Preparing and continuing to work towards a completed preprint publication on medRxiv: Focusing on four distinct subject health-related articles under three different subject categories as follows:

- 1st Preprint Pub. medRxiv: Global Public Health Category, Filtering Facepiece Respirator (FFR)
- 2nd Preprint Pub. medRxiv: Global Public Health, Elastomeric Half-mask Respirator (EHMR)
- 3rd Preprint Pub. medRxiv: Emergency Medicine, Surgical Filtering Facepiece Respirator (FFR)
- 4th Preprint Pub. medRxiv: Respiratory Medicine, Full-face Respirator

The authors will include Dr. Liu, who is my mentor, as the lead author. I am the second author, and Mark Millard is the third.

3. Continue to create and mini-prototype manufacture medical device development of Better95™ Tech

- Fusion 360- Respiration Flow Apparatus (Tech): fit, align, & attach to PPE
- Prusa 3D Printer experimental printing of new innovative designs
- Silicone- Molding of Tech (Directed Device & Heat Shield) Part A
- Heat Fusion- Heat Shield Part A & B fuse as one for Source Control

LEADERSHIP ORGANIZATIONAL SKILLS

• WWS4Life 501(c)(3) Director of Research & Development Technology	Scientific Data Collection	June 18, 2024-Now
• High School Student Advisory Council, 12 th Grade Representative	Traverse City Central High	Sept 2025-2026
• Leader NMC College Research: I/S Biomed Engineering, 2 students	Prototype Design & Creation	Summer 2025
• NMC College Research: Characterization & Synthesis of Microplastics	College Biology Lab	Summer 2025
• Created & Led: Physics Study Support Group Thurs Nights 8 to 19 students	Teaching Peers Proofs	Sept-June 2024-25
• Founding 5 Leader: Awaken Christian Outreach in Public School-Friday's	3 Yrs Disruptive Group	Nov 2023-Now
• Founded Chess Club: 10th created new rules, Prizes, & Money for Homeless	Inclusion Game Advocate	Oct 2023-Now

SCHOLARLY AND SPORT AWARDS

• 2026 Summa Cum Laude Honor Award	Traverse City School Award	May 31, 2026
• National Honor Society Scholarship	Traverse City Senior Award	May 31, 2026
• President's Education Award for Educational Excellence	Traverse City Senior Award	May 31, 2026
• Varsity Award Track and Field	Discus & Shot Put: 12 th Grade	May 2026
• TC Central High School Senior Silver Medal	Traverse City School Award	Sept 22, 2025
• National Outstanding Academic Achievement Rural & Small Town Award	Big Future	Aug 19, 2025
• Phi Theta Kappa, Alpha Rho Pi Chapter Membership Acceptance Letter	NMC Honor Society	Aug 14, 2025
• AP Scholar with Distinction Award	College Board	July 3, 2025
• Varsity Sport Recognition & High Academic Grade Awards	Discus & Shot Put: 11 th Grade	June 2025
• TC Central High School Student of the Month	World Language Department	May 2025
• Mock SCOTUS: All-Star Advocate Award, AP U.S. Gov. & Politics	Exemplary Case Argument	May 27, 2025
• TC Central High School Junior Bronze Medal	Traverse City School Award	Sept 24, 2024
• AP Scholar Award	College Board	July 3, 2024
• Varsity Sport Recognition & High Academic Grades Awards	Discus & Shot Put: 10 th Grade	June 2024
• TC Central High School Student of the Month	Student Services Department	June 2024
• National Honor Society (NHS): Regional Award	3 Yrs High GPA & Service	Oct 2023-Now
• National Society of High School Scholars Honor Society (NSHSS)	3 Yrs High GPA	Sept 2023-Now
• National Alternate & State Finalist Individual Exhibit, Michigan History Day	27 Exhibits in Junior Division	April 30, 2022
• (MAA) Special Award: Best Entry in Use of Primary Sources	\$100 for Debate & Diplomacy	April 30, 2022
• (NHD) Qualified for State Finals, District 3: Michigan History Day	Compromise of 1850 Slave Act	March 19, 2022

INSTRUMENTAL STRING ORCHESTRA

• TC Phil Civic Sinfonia String Orchestra	4 Yrs Advanced Orchestra	Sept 2022-Dec 2025
• Sinfonia String Cellist Leader Position	2 nd Chair Recognition	Sept 2024-Dec 2025
• TC Phil Civic Prelude String Orchestra	5 Yrs Student Orchestra	Sept 2021-Dec 2025
• Prelude String Cellist Leader Position	Principal Chair Recipient	Sept 2024-Dec 2025
• TC Chamber Sinfonia Music Ensemble	Advanced Quartet	Sept-May 2023-24
• Prestigious Interlochen Arts Academy: Intermediate Division	Merit Award	Summer 2022
• TC-EMS Student Award: Outstanding Orchestra Contributions	School Plaque & Award	June 2022
• Cello Inspired- 1 st concert I heard a cellist solo, I immediately switched	Private Instructor	Jan 2020
• Violin Inspired- I heard a fiddler at school & told my parents I want to learn	Private Instructor	Oct 2018

COMMUNITY VOLUNTEER SERVICE

• Cumulative Hours for Others: School, Music, & Church Extra Events	400+ Hours	End: May 2026
• Physics Re-Teaching and Mentoring Program created & performed	56 Volunteer Hours	11 th Grade
• Mentor Students: TC Philharmonic Prelude Cellists	52 Volunteer Hours	10 th - 12 th Grade
• Tutor TC Central High Support Services - Known as "Fun Math Tutor"	80 Volunteer Hours	10 th - 12 th Grade
• Washington, D.C., Third District: Church Summer Mission Trip	Yard Work & Cleaning	June 2023
• Milwaukee, Wisconsin: Church Summer Mission Trip	Food Bank & Farming	July 2022
• Sunday School: 2 nd to 5 th Grade, I am Easter Bunny for Egg Events, +	217 Volunteer Hours	June 2021-May 2026

MITCHELL'S UNIQUE OPPORTUNITY

MENTORS

1. Youcheng Liu, MD, ScD, MPH, MS (Preprint Publication medRxiv First Author for Study)

Current Employment: Wayne State University, Detroit, Michigan

Associate Professor of Environmental and Occupational Health Sciences

Associate Director, Preventive Medicine Residency Program

Dr. Liu trained in medicine, preventive medicine, and public health sciences at Harvard University School of Public Health, Yale Schools of Medicine and Public Health Sciences. He also worked as a faculty member at the University of Kentucky and the University of North Texas Health Sciences Center. His teaching and research more specifically focus on environmental and occupational health sciences, especially in exposure control and how to prevent workers and community members from exposure to toxic hazards and resultant adverse health outcomes using respirators. He has taught and trained numerous occupational and environmental physicians, residents, fellows, physician assistants, nurses, and undergraduate and graduate students in public health sciences. For over 30 years, he has also been conducting laboratory and field studies to assess comforts/discomforts, use barriers, and symptoms during use associated with respirators.

2. Mark Millard, Dad to Mitchell, Sole Inventor of Novel Tech in PPE U.S. Patent #11,491,355-B1

Graduated from The University of Michigan, Ann Arbor, Michigan

Bachelor of Science in Engineering, Mechanical Engineering, 1989

3. Deborah DeGroot, Mom to Mitchell, Founder of Global Respiratory Advocates Institute (GRAI)

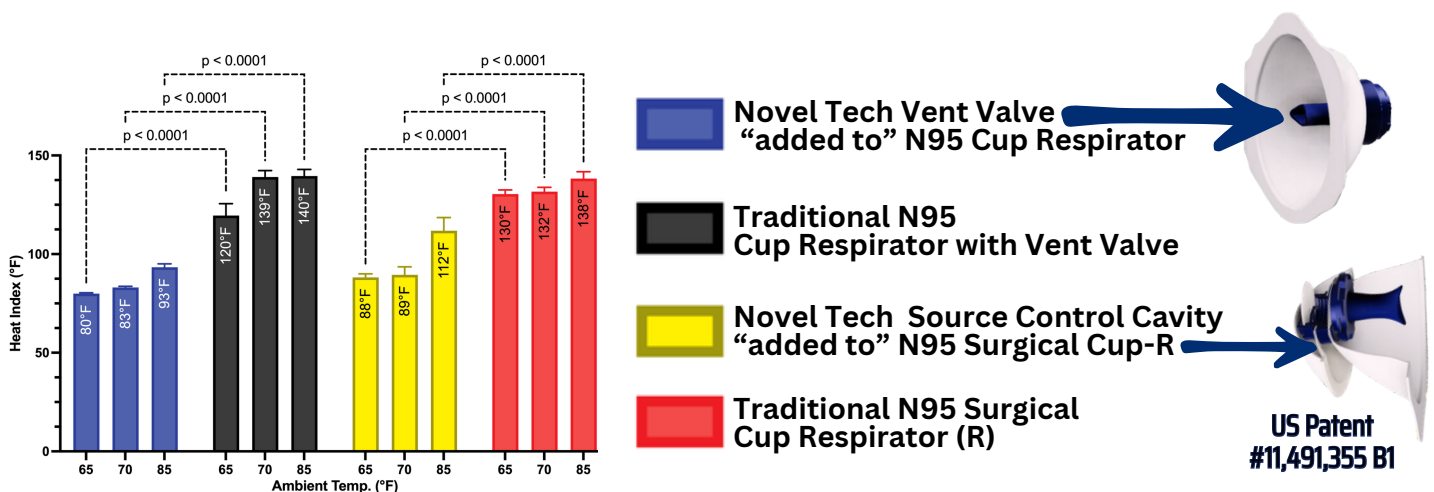
Graduated from Calvin University, Grand Rapids, Michigan

Bachelor of Arts, Business Administration, 1992

Novel Tech N95 Internal Cavity Performance Evaluation (Non-peer reviewed Initial In-house Test)

Calculated heat index results from mask cavity microenvironment testing during active use. Plotted as average values for time series (n=60 over 5 min.) for each group and condition. Error bars show range of distribution. Ordinary two-way ANOVA with Tukey's multiple comparisons test for calculation of p-values.

Test Results: 40°F Cooler Heat Index



Safety Solution's Journey

Dad had an Ischemic Stroke of the Brainstem - Most Lethal - ER Dr's Gave Medicine & Flew Downstate

11/30/2019



12/01/2019



Medicine Worked-New Dr's said My Dad Won the Health Lottery as No Surgery Needed and No Damage to His Body

Downstate Surgery to Fix a Hole in His Heart -PFO-Probably Caused Stroke Told Possible High Risk to Repeat

2/11/2020



3/12/2020



Schools Shutdown & Since My Dad Retired Aug 2019, Family Locked Down to Protect Him & My Mom Only Left House

ONLY 1 DAY I Left My House Till I had the Vaccine, but that DAY in August Would **Change My Future** & the Future of Safety for the Global Workforce

Family Drove 3hrs to Drop Off Car at Junkyard and Visit Family Outside

Dad Took Off His Mask While Visiting Family Outside. My Mom Was Upset & Said He Was Never Leaving the House Again, Till Covid-19 Was Over.

8/21/2020



My Dad Started Fixing Concrete Siding on Our House, and He Realized He Should Figure Out How to Wear His Mask to Protect Himself From Asbestos.

8/22/2020



He Took His 3M® Reusable Respirator, Cut End of Balloon & Placed Over a Tube Then Attached to the Exhalation Valve
Now: No Heat, No Humidity, No CO2

U.S. Provisional Patent Filed-11/3/2020
Patent US 11,491,355 B1 on 11/8/2022
Trial & Error Realized Needed Cupcake Liner or Heat Shield for Medical Mask

11/3/2020

