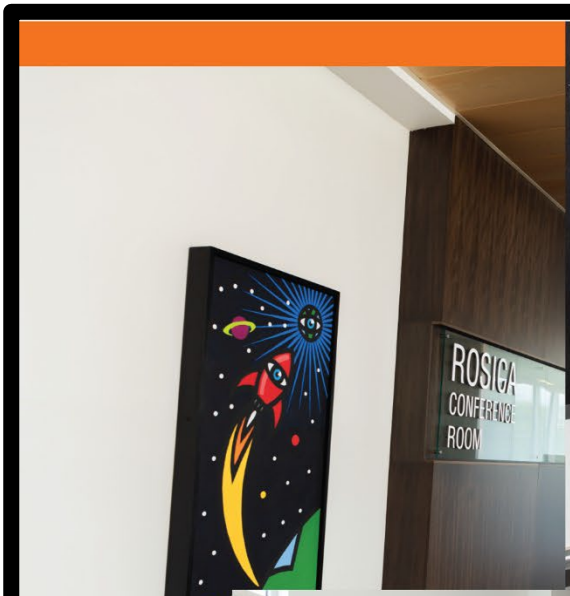
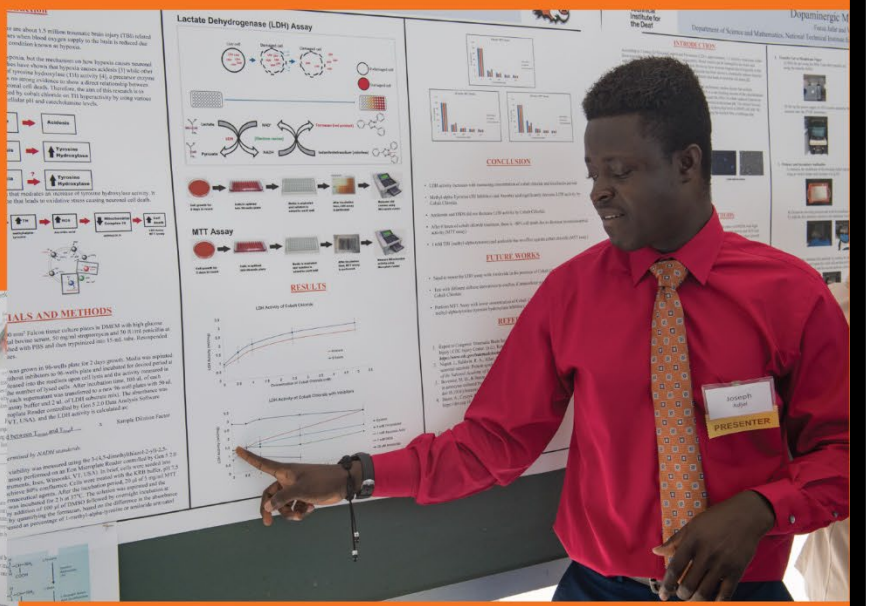


NTID Student Research Fair 2023

Book of Abstracts

Rosica Hall
April 21, 2023
10am-12pm



RIT | National Technical Institute for the Deaf

Sixth Annual NTID Student Research Fair
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Abstracts

1st Floor-Rosica Hall

1	**Deaf/Hard of Hearing Emergency Action Plan system for RIT pool lifeguard** *Joshua Roman, Yousef Sawaqed, Swapnil Patel* *Mentor: James Mallory*

Normally a pool lifeguard would use a whistle to initiate an Emergency Action Plan (EAP) in a swimming pool. This method is inaccessible for Deaf and Hard of Hearing people (DHH) who want to become a lifeguard. This spring semester RIT had its first DHH Lifeguard apply for training and employment. RIT has never before had a DHH lifeguard. Our customer, the pool manager, Mr. Randy Lewis, would like to train and hire more DHH lifeguards in the future and he requested help from our Capstone class to accomplish this. The goal is to research and improve the EAP system and to ensure that everyone has equal access to it, including DHH individuals. The new system includes a coordinated system of push buttons and powerful blue strobe lights. WiFi options were investigated. The pool environment is especially hard on electronic equipment, so we researched a system that can handle this environment as well as following all electric and building codes. In conclusion, we expect our applied research to produce an EAP system so that RIT can hire many more DHH lifeguards in the future because they will have equal access with the hearing students.

2	**Medication app to improve accessibility for Deaf users** *Adira Blumenthal* *Mentors: Mariam Paracha, Wendy Dannels, Aaron Parker, Walter Bubie*

Deaf American Sign Language (ASL) users rely on a visual language that is not available in a written form and tend to have lower literacy rates, causing barriers when comprehending written medical information (i.e., medication labels, instructions, and mobile health apps). Lower literacy is associated with misunderstanding medication instructions and can lead to medication misuse. Medication tracking and information apps can promote medication adherence and education, improving health outcomes. Current medication tracking and information apps are primarily text based and have few visual aids, providing limited access to Deaf and hard-of-hearing (DHH) users with low literacy. In an initial survey, 41.5% of DHH participants indicated that they preferred an ASL-friendly health app over ASL-fluent pharmacy staff, an ASL-friendly health website, or a kiosk in pharmacies. Pharmacists and DHH people suggest that app users should have the option for whether information is presented in text or ASL, and information should be presented with visual supports to aid comprehension. To improve the DHH user experience, we built a prototype of the Apple Health app with accessibility features such as ASL videos with options to add English captions or transcripts and visual supports (i.e., color coding, symbols) to aid understanding of the information. The prototype focuses on five areas: diagnosis information, medication information, side effects, instructions, and interactions. Next, we will collect DHH users' feedback on the prototype. Using that data, we will recommend software developers include accessibility features in the Apple Health app to improve the DHH user experience.

3	**Utilizing biomarkers to differentiate E. coli apoptotic bodies (ABs) from outer membrane vesicles (OMVs)** *Anna Kasper, Martina Videva, Callum Smith, Ulysses Hampton, Nico Burgado* *Mentor: Lea Michel*

Outer membrane vesicles (OMVs) are 20-250nm particles released from Gram-negative commensal and pathogenic bacteria through outer membrane budding. OMVs are thought to promote bacterial communication and pathogenicity. In contrast, apoptotic bodies (ABs) are vesicles produced during programmed cell death, a bacterial SOS response that involves activation of the RecA-LexA mediated pathway. Although ABs can be quite large (hundreds of nm in diameter), there can also be ABs that are similar in size to OMVs, making it difficult to separate and

differentiate between the two populations. Our lab's research focuses on the role of bacterial OMVs in sepsis, but we acknowledge that differentiating OMVs from apoptotic bodies may be a challenge. In addition, there are similar environmental conditions that enhance both OMV and AB production, such as the addition of antibiotics to bacterial cultures. Considering these challenges, we hypothesize that we can utilize AB biomarkers, such as RecA, LexA, and Annexin V, to differentiate ABs from OMVs. Our methods for visualizing these biomarkers include immunoblotting, nanoparticle-tracking analysis, and electron microscopy. Preliminary results show increased expression of RecA in E. coli cells cultured in the presence of apoptotic agent and antibiotic, ampicillin, as well as increased expression of OMV biomarkers such as lipopolysaccharide (LPS), outer membrane protein A (OmpA), toll-like receptor B (TolB), and peptidoglycan-associated lipoprotein (PAL). These results suggest that the production of both OMVs and ABs are increased by ampicillin, but that we may be able to differentiate between the two populations.

4	**Molecular sex determination in Eastern Screech Owls using feather DNA** *Lilly Travers, Gabby Orfanides* *Mentor: Susan Smith Pagano*

In bird species that are monomorphic, males and females cannot be distinguished by plumage differences making identification of biological sex challenging. However, this knowledge is important for informing a variety of studies on avian behavior, ecology, and physiology. In species like owls, measurement of size metrics accompanied by confirmation of biological sex using molecular means may aid in developing a tool for identifying sex of birds in the field or for museum studies. Molecular sexing of birds involves Polymerase Chain Reaction (PCR) to amplify CHD (chromo helicase DNA binding) genes located on the W and Z chromosomes (female ZW, male ZZ). This is usually done using blood samples where DNA is extracted from nucleated red blood cells. However, extraction of DNA from feathers may provide a practical alternative. This study will utilize a protocol for extracting DNA from feathers and then test the viability of the technique for producing reliable molecular sexing. The Eastern Screech Owl (Megascops asio) will be the primary focal species for this study and are found east of the Rockies in most types of woods. Feather samples will be collected from owls by a collaborating raptor biologist, who will also take morphometric measurements on the birds. Feathers will be extracted, DNA will be quantified using a nanodrop, and then PCR will be performed using previously acquired 2550F/2718R primers. Once molecular sex is established, we will correlate with different size metrics to determine their utility for distinguishing sex in the field.

5	**The role of active and intelligent packaging in reducing food waste** *Gibran Perez* *Mentor: Ariella Knight*

Approximately 40% of all food produced remains unconsumed, leading to negative impacts such as greenhouse gas emissions, economic loss, and diminished food security. The objective of this study is to increase awareness regarding active and intelligent food packaging solutions, specifically time-temperature indicators (TTIs) and antimicrobial food packaging, and how those innovative approaches could help to mitigate food waste. This study was done by collecting and analyzing secondary data sources such as academic articles, publications, and reports, to evaluate the impact of time-temperature indicators and antimicrobial packaging on reducing food waste. This data was then organized into tables to more easily compare and contrast the current intelligent packaging landscape. Various factors such as low carbon footprint, non-toxicity, reusability, cost-effectiveness, and biodegradability play a significant role in influencing the efficacy of these packaging arbitrations. Further research is necessary on implementing better techniques for the fabrication of TTIs that are cost-effective for large-scale production as they are challenging to make. To enhance the efficacy of antimicrobial films, research should continue around the long-term performance. The overall findings suggest that the use of TTIs and antimicrobial packaging are emerging and promising strategies for reducing food waste.

6	**Paternalistic assumption by interpreters in medicine** *Hayden Orr, TJ Bartholomew, Ryker D'Angelo, Chase Martin, Lucas Cirrincione* *Mentors: Jordan Wright*

Is the lack of sexual health literacy among American Deaf individuals linked with the unpreparedness of American Sign Language (ASL) interpreters? In this study, we further analyze the high percentage of morbidity rates within the American Deaf community as it correlates with the reported inability of ASL interpreters to communicate sexual health interlocution effectively. Further, we examine how interpreters report and demonstrate paternalistic attitudes which may subconsciously limit the autonomy of Deaf clients. We conducted a series of remote focus groups with interpreters who have experience in sexual healthcare interpreting (N=11), which were conducted entirely in ASL and later transcribed into written English. We found the theme of unpreparedness for various medical situations to be an overarching phenomenon. We also note that the second theme of horizontal violence is significant in which they would place the onus for a lack of knowledge upon other interpreters or Deaf clients, but rarely themselves or the hearing client. Finally, the third theme of paternalism is salient in that many interpreters would claim that the most prominent issues are the Deaf patients' low health literacy, and other interpreters' inability to interpret correctly "for this client" during previous appointments. This demonstrates that one of the most significant barriers to healthcare access can come from the frustrations of working with unqualified interpreters. The results of this study will help us understand how we can elevate the interpreting field as a preparatory response to various medical situations, while reducing interpreters' paternalistic behaviors.

7	**Exploring the extriactable and leachable additives in plastics: Identification and quantification using Pyrolysis GC-MS and industrial standards** *Maximus Schimdt* *Mentor: Nathan Eddingsaas*

The widespread use of plastics has led to the accumulation of plastic waste in the environment, with potential negative impacts on human health and the ecosystem. This study aims to investigate the potential leaching of additives from commonly used plastics, including plastic bags, water bottles, saran wrap, polystyrene (PS), and polypropylene (PP). The study will focus on three parameters, including organic, strong acid, and base solutions, to simulate different conditions that plastics may encounter in the environment. Each parameter will be tested in triplicate trials. The samples will be incubated at 41 degrees Celsius for approximately 21 days to mimic real-world conditions. The leached additives will be analyzed using standard industrial methods, such as gas chromatography-mass spectrometry (GC-MS). The results of this study can help provide insights into the potential risks associated with the use and disposal of these common plastics, and inform future policies and strategies for reducing plastic waste and contamination.

8	**Incidence of sexual assaults on college campus** *Anastasia Mena Vergara* *Mentor: Rain Bosworth*

According to Mellins (2017), as many as 25% of women experience sexual assault on college campuses. The RIT Title IX Office reported 125 incidences of sexual violations in the year 2019. During this time, 5,669 female students were enrolled, putting the incidence rate at about 2.2%. It is possible that the incidence of SA is different depending on demographic background, but unfortunately, this information is not available for RIT. This project studies how many unreported SA incidents happen on RIT campus and assesses whether this rate differs for Deaf/Hard-of-Hearing and Hearing people of different ethnicities/races. I developed a survey to anonymously ask students if they experienced SA, whether it was reported to authorities and if it happened during their time as RIT students. My goal of this project is to create more awareness of sexual assault and make RIT a safer place for the survivors to come forward. No names or personal identifiers are collected in this study and the survey takes only about two minutes. I aim for at least 100 female respondents. Based on Title IX office reports, I would like to assume about at least 40% of the assaults go unreported.

9	**Composition of volatile compounds from rare and endangered illicium ekmanii, a species endemic to Hispaniola** *Antonia Gomes, Pepsi Holmquist, Morgan Bida* *Mentor: Todd Pagano*

Illicium ekmanii Smith is a rare and endangered plant species endemic to the mountainous areas of Hispaniola. Little is known about the volatile oil composition of this species, and it is currently under threat of habitat destruction by mining and agricultural practices. There are 37 known species in the Illicium genus, the most well-known of which is I. verum or star anise which has been used for thousands of years as a traditional medicine and flavor ingredient. The purpose of this study is to identify volatile oil compounds in the leaf essential oil of I. ekmanii Smith and examine how the results compare in relation to other Illicium species, such as I. verum. Samples of separate I. ekmanii populations were tested from different mountain ranges on Hispaniola, Cordillera Central (CC) and Cordillera Septentrional (CS). The leaves of each sample were extracted to collect the oils by hydro-distillation before using gas chromatography with mass spectrometry (GC-MS) for identification of the compounds and flame ionization detection (GC-FID) for relative quantification. CC samples were dominated by the sesquiterpenes: α-copanene, trans-caryophyllene, and bornyl acetate, while CS samples had an abundance of phenylpropenes, including methyleugenol, elemicin, and safrole. I. ekmanii samples from CS were the most similar to the results previously reported for I. verum, where an abundance of phenylpropenes was reported. This project represents the first known analysis of the essential oils found in this species, I. ekmanii from two distinct mountain ranges on Hispaniola. The results from this study will add knowledge about I.ekmanii and bring awareness to the conservation efforts underway to protect this rare plant and its habitat in Hispaniola.

10	**Oxygen sensors using smart watches in health care** *Jaden Reader, Jacob Fontaine* *Mentor: James Mallory*

A smartwatch with biometric monitoring capability is a valuable tool which helps us to research and learn about various IoT and biometric technologies. Gathering research data from smart watches also familiarizes us with health information management, including HIPAA laws and Protected Health Information (PHI). Monitoring oxygen levels is one essential aspect of overall health. Doctors have real-time access to this information which is becoming essential in modern times with our aging population. This research can help us understand smartwatch technology which includes features such as oxygen level, heart rate, and stress level measuring. By accessing my own biometric data and working with customers who are open-minded to helping students, we can learn how to handle PHI information responsibly and ethically. Our research also compares the accuracy of a smartwatch oxygen sensor to traditional finger-monitoring oxygen sensors. We also researched accuracy with smartwatches from different manufacturers such as Fitbit, Apple, and Garmin. These smartwatches are small computers and have significantly changed the IT and healthcare world.

11	**Inventory system for NTID Engineering department** *Rahul Yadav, David Blevins, Denard Johnson* *Mentor: James Mallory*

The NTID Engineering department needed to implement a system to take care of their parts and equipment inventory as well as formalizing a process to loan equipment and supplies to their students. After researching their needs, we concluded that four things were needed: a process flow chart; a software database; a scanner system to scan parts; and security cameras for monitoring their process. We had to research each of these items separately to determine which hardware and software meets that department's needs. Our initial research identified several appropriate, cost-effective database programs from which the customer selected one. We then had to figure out what the best scanners and barcode printers could be implemented for their purposes, because all of these devices work. They needed to maintain a record of office supplies, computers, and lab equipment. A blueprint had to be created to show the placement of this system and how it would work in their area. In conclusion, the NTID engineering department will have a complete system which works together to input and loan equipment and supplies and establish and monitor a system that fits their department's needs.

12	**Utilizing LAs to employ "Career Introduction Model" programming, data collection** *Kiersten Ryan* *Mentor: Kierstin Muroski*

The "Career Introduction Model" programming implemented in the Introduction to Interpretation course is an early intervention strategy intended to support three initiatives (1) increase students' limited professional knowledge, (2) provide tangible connections to professional resources, and (3) increase students' self-efficacy and sense of inquiry with regard to career development. The model is an interactive approach aimed to support the connection between students' academic and career development. The programming, created and implemented by the Learning Assistants, is held outside of the classroom as a series of casual weekly events connecting students to a variety of organizations, social media platforms, professional groups/organizations, individuals working in the interpreting profession, and leaders within the field. Students are encouraged to participate and receive extra credit for their participation. Special consideration is made to ensure opportunities aligned with a variety of diverse groups as an effort to maintain inclusivity. The LAs have begun initial data collection and are developing annual data collection methods for a longitudinal impact study of the career introduction model programming initiative on both the students in the course as well as on the Learning Assistants.

13	**Characterization of polyphenols in wine using 3-dimensional fluorescence spectroscopy** *Leonard James Macisco, Morgan Bida* *Mentors: Susan Smith Pagano, Todd Pagano*

Different varietals and origins of wines were analyzed using three-dimensional fluorescence spectroscopy coupled with chemometrics. The fluorescence spectra of resulting components from the multi-way wine-based chemometric model were compared to the spectra of representative polyphenol standards. Groups of phenols were identified based on spectral matching (and comparison to assays and UV-Vis absorbance spectroscopy, in the case of anthocyanins). The resulting data from these families of phenols were able to discriminate wine samples based on varietal and geography of the used grapes. The fluorescence method provides a rapid, sensitive, and selective method for wine analyses, especially for the characterization of polyphenols (which are important for the healthful antioxidant capacity of wines).

2nd Floor-Rosica Hall

14	**Cognitive reserve questionnaires differentially related to age, executive functioning, and everyday memory** *Bo Allaby* *Mentor: Rebecca Houston*

Given the aging Baby Boomers and increased life expectancy, the senior population is expected to almost double by 2060. A concept that has been explored in the context of the aging brain is cognitive reserve (CR). CR refers to differences in task performance, allowing some to cope with brain pathologies more effectively. However, there is little investigation of CR across the lifespan or among healthy individuals. CR questionnaires have been developed, but research regarding their psychometric properties is lacking. This study examined associations between two CR measures, the Cognitive Reserve Questionnaire and the Cognitive Reserve Index Questionnaire, age, executive functioning (EF; Dysexecutive Questionnaire), and memory (Everyday Memory Questionnaire). Among 197 participants (M = 29.75; SD = 16.01; 54.3% female), regression analyses, with the DEX and EMQ as dependent variables, and CR and age as predictors, indicated that older age (R^2 = .13; β = -.37, p<.001), but not CRQ scores, was related to stronger EF. Higher CRIq scores (R^2 = .21; β = -.47, p<.001), although not age, were linked to better EF. For memory, older age (R^2 = .15; β = -.37, p<.001), but not CRQ scores, was related to fewer memory problems. Similarly, older age (R^2 = .16; β = -.27, p = .03), but not CRIq scores, suggested better memory. Ultimately, the CRIq may be more sensitive in detecting EF differences. Age, but not CR, was a significant predictor of memory. Further research is necessary to assess subjective and objective cognitive measures in relation to CR questionnaires.

15	**Language access services optimization for Deaf adults in healthcare settings: A survey study** *Roshan Mathew* *Mentors: Wendy Dannels, Aaron Parker*

Deaf adults often rely on sign language interpreters and real-time captioners for communication access during healthcare consultations. While deaf adults prefer these access services be offered in-person, previous studies have described that many healthcare providers frequently resort to employing Video Remote Interpreting (VRI) or remote captioning services because of the lack of qualified interpreters or captioners locally and for the shorter turnaround times for availing these services. These remote access services are provided using a computer cart on wheels or handheld tablets. Such approaches present visibility and cognitive challenges for deaf adults as they need to divide their attention between the interpreting or captioning display and the healthcare provider, thereby affecting their ability to access health information shared during consultations thoroughly. This divided attention could be costly in many healthcare scenarios where quick comprehension and time are of the essence. This study proposes an Augmented Reality (AR) based smart glasses prototype as an alternative to traditional VRI and captioning services for optimizing communication access for the deaf in healthcare settings. We then discuss the findings from a descriptive study about the perspectives of deaf adults, interpreters, and captioners about using this prototype for language access in healthcare and biomedical settings.

16	**Household composting to reduce food waste: A comparison of methods** *Hannah DeFelice* *Mentor: Kaitlin Stack Whitney*

Food waste is a significant problem around the world. Each year, in the US, roughly 183 billion pounds of food, worth an estimated $161 billion dollars is wasted at the consumer and retail level. Wasted food frequently ends up in landfills and incineration facilities where it contributes to greenhouse gas emissions. For households and individuals, the best method of reducing food waste is prevention, but unfortunately not all food waste can be prevented. Some food waste results from the preparation of food for cooking (such as peels of fruits and vegetables), or because foods spoil before being eaten. Rather than throwing away this food waste, composting provides a more environmentally friendly method of managing food waste. Traditionally, household composting consisted of some form of outdoor compost pile where food waste, along with other organic waste (such as yard waste) was deposited. More recently, vermiculture and tumbling composting bins have become popular options for household composting. All these methods take time and may not be feasible for individuals who live in small apartments. Newer electric composting machines claim to reduce food waste in a few hours, but there is limited research into the effectiveness of these machines – both in terms of the amount of food waste reduction, usability, and reduction in greenhouse gas emissions. My research has compared four methods of household composting: outdoor compost piles, tumbling composters, vermiculture, and electric composting, in terms of usability and greenhouse gas reduction. This includes a comparison of the time, equipment and other inputs required, and usability factors such as space requirements, potential for noxious odors, “ickiness”, and in the case of electric composing machines, energy usage, heat, and noise production. For the research fair, I will be presenting a poster with the results of my research as well as demonstrating the electrical composting machine that I used in testing.

17	**Impact of missing features in ASL** *Zhavia Lovell* *Mentor: Rain Bosworth*

Imperative mood, such as command, permission, or advice, can be distinguished by morphosyntactic structures but also solely by prosodic cues expressed by changes in eye aperture, head movement, body leans, lengthening of signs, cheek puffing, nose wrinkling, and hand clasping, among other physical behaviors (Sandler, 1999a). Non-manual signals, also known as non-manual markers, are grammatical and semantic features other than hands. The production of signs through arm and hand movements occurs in parallel to the expression of critical linguistic information expressed in signed

languages such as American Sign Language through facial expressions and head gestures that occur in complex combinations and extend over differing phrasal, scopal, domains (Baker, Cokely, 1980; Coulter, 1979; Liddell, 1980; Neidle et al., 2000; Padden, 1988). When these cues and functions are incorrect, incomplete, or absent, there is a disruption to communication. Effective communication is an essential part of learning, and a learning barrier in education is anything that interrupts or prevents learning. Students often face multiple barriers to learning simultaneously, creating a medley of challenges. By understanding and identifying the most common barriers, we can prevent them from getting in the way in the first place. Spoken languages are characterized by flexible, multivariate prosodic systems (an extensive review of theories and data is given in Ladd, 1996). As a natural language, American Sign Language (ASL), and other sign languages (SLs), are also similarly characterized. Does a lack of Access to prosodic cues and non-manual markers, grammatical and semantic features other than hands such as changes in eye aperture, head movement, body leans, lengthening of signs, cheek puffing, nose wrinkling effect comprehension? Research design will utilise a mixed methods research approach and procedure for collecting, analysing, and "mixing" both quantitative and qualitative research and methods by implementing elements of both questionnaire types into the data collection to get a broader understanding of you participants. A lack of non-manual markers and Paralinguistics in ASL production may have adverse effects on comprehension and understanding that could create barriers to learning. With this knowledge we can address barriers to equitable education and better evaluate educational language models.

18	**Removal of Indole from environmental water samples by carbon nanotubes aerogels**
	Maameyaa Asiamah, Leonard James Macisco
	Mentor: Todd Pagano

Indole is in a category of toxic environmental pollutants found in natural water systems from pharmaceutical, cosmetic, petrochemical, coal mining, and agrochemical industries. The purpose of this study is to determine whether carbon nanotubes (CNTs) in aerogel form can adsorb, and thus, remove indole, which is otherwise somewhat recalcitrant in water, from the environment. In particular, it is important to study how indole adsorbs in the presence of Humic Acid (HA), which is found in almost all natural water systems. In this study, we used fluorescence spectroscopy to examine the removal of indole and/or HA by CNT aerogels over time. We used strategic wavelengths for excitation and emission with special probe equipment to monitor competition between indole and HA for adsorption sites. Results show that when either indole or HA is alone in the water matrix, they adsorb to the aerogel. However, when both are present in the same system, the indole seems to adsorb while the HA does not. This finding indicates that CNT aerogel could be a good technique for removing indole from water, including water that is rich in natural HAs. CNT-based aerogels show potential for the removal of dangerous chemicals from water. Future studies will examine other types of pollutant molecules to test removal efficiencies by CNT aerogels in the presence of interferents, like HA.

19	**BSI Benchmark Study: Evaluating L2 ASL learners' proficiency**
	ONe O'Neill
	Mentor: Jason Listman

To successfully communicate with the signing Deaf and Hard-of-Hearing (DHH) population, especially hearing adults who learn ASL as a second language (e.g., teachers of the deaf and ASL-English interpreters), fluency in American Sign Language is critical. Assessments of ASL proficiency serve multiple purposes: ensure appropriate ASL course placement; measure educational attainment over time; satisfy requirements for a job and/or promotion; and research. However, there are limited studies investigating sign language skills of hearing adults who learn sign language. There are a battery of ASL tests that was developed by Hauser et al. at NTID, but not much is known about the relationships between proficiency level, course placement, and educational attainment. Toward that end, this study has three goals: (1) to refine the battery of ASL tests to ensure its psychometrically sounded, (2) to conduct a longitudinal study to evaluate ASL-English Interpretation students' ASL skills as they progress through the program, and (3) to develop a norm that captures a large number of participants' ASL skills; in this case, NTID faculty, staff and BSI interpreting students.

20	**The perspectives of Black Indigenous People of Color students (BIPOC) in interpreter education programs** *Manjot Sidhu* *Mentors: Jeni Rodrigues, Jason Listman*

Interpreter Education Programs (IEP) prepare students to become competent and effective interpreters working in multiple settings with diverse consumers, but there is an issue: Black Indigenous People of Color (BIPOC) are disproportionately underrepresented in the interpreting field. The interpreting field is not the only professional setting that has underrepresentation of BIPOC individuals; the vast majority of practice professions face this issue. Currently, research on BIPOC interpreting student experiences in IEPs is limited. No data exists reporting whether students feel their programs were effective in preparing them for their careers. However, research regarding BIPOC perspectives in predominantly white institutions detail common experiences by BIPOC individuals regardless of the institution, time, place, or setting. Research suggests that BIPOC students experience significant dissatisfaction in their relationships with non-BIPOC faculty and their lack of cultural competency. In addition to the studies previously mentioned, research also indicates that multiple minority groups face similar overarching disparities such as, racism, academic dissatisfaction, and/or a loss of sense of belonging in Predominantly White Institutions. The leakage in the interpreting pipeline between undergraduate IEP enrollment, graduation, and entry into the workforce may be attributed, in part, to structural, institutional, and societal racism/micro-aggressions, experience of burnout, tokenism, and lack of representation and/or cultural competence. This survey collected BIPOC IEP student participants' perspectives to obtain insight into the factors that may impact attrition rates. Based on preliminary findings, most reported experiencing difficulty establishing and maintaining close relationships with their classmates and frequently considered withdrawing from their IEP. Students reported that the majority of their educators were non-BIPOC and the climate was described as multi-culturally incompetent. These findings will inform interpreter training educators, higher education administrators across all predominantly white institutions, and peers/colleagues on how to improve the climate of their program towards BIPOC students, as well as improve the retention of BIPOC individuals within the interpreter pipeline. This increase in retention would help correct the disproportionate ratio of BIPOC interpreters to BIPOC Deaf consumers in the community.

21	**A web-based assessment of medication literacy among Deaf individuals** *Barbara Essex, Maameyaa Asiamah, Olivia Brumfield, Ellen Wagner* *Mentor: Mariam Paracha*

Deaf individuals face unique barriers in accessing and understanding health information, which can lead to medication errors and poor health outcomes. The aim of this survey-based study was to gain an enhanced understanding of medication literacy in individuals who identify as Deaf and hard-of-hearing ASL users. A total of 101 participants responded to a survey on the following topics: 1) source of information on new medication and 2) importance of medication information. Demographics of participants were: 35 years or over (58.2%), male (52%), white (36.3%), and having a college degree (29.7%). About a quarter (24.5%) of participants stated that they learned information on a new medication from their doctor, while 18.7% reported using prescription labels to learn information on a new medication. Additionally, about 65.5% of participants searched for medication information online, on either WebMD or Medscape. Understanding the purpose of and how to take a medication as well as recognizing brand names were reported as most important when it came to medication-related information. These initial findings support developing an assessment tool to measure deaf individuals' ability in understanding and using information on prescription medication labels, which we plan to deploy as a pilot study. The assessment will be administered via an online survey and will include questions related to medication labels, dosage instructions, side effects, and interactions.

22	**Phosphate recovery using dairy manure derived biochar** *Emerson Bartsch, Jennifer Park* *Mentor: Diana Rodriguez Alberto*

Anaerobic digestion is a waste management strategy that is commonly used to treat waste such as animal manure and food waste. A product of the anaerobic digestion process is an effluent called digestate, a nutrient-rich substance that consists of leftover undigested material and dead micro-organisms which is often applied to soils as a form of fertilizer. This practice might lead to nutrient run-off and result in the contamination of water sources. In this research we propose a new digestate management strategy, using dairy manure-derived biochar to recover the nutrients in digestate and applying the resulting nutrient-rich material as a form of fertilizer. Biochar is carbon material, similar to activated carbon, which can be used as an adsorbent. The goal is to determine the efficiency of dairy manure derive biochar in recovering phosphate in solution. In this instance, we targeted phosphorus as our nutrient of interest. Phosphorus is an essential element for plant growth and its loss from agricultural soils has been considered an important cause of soil degradation and environmental pollution. We performed phosphate adsorption testing using dairy manure biochar produced at different temperatures. Although biochar produced at 800C shows more effective phosphate recovery, further research is needed to understand other factors affecting phosphate adsorption.

23	**Deaf ASL and English bilingual language variation on executive functioning** *Chase Martin* *Mentors: Jessica Contreras, Jordan Wright*

This study aims to explore different deaf people's executive functioning based on their modality of communication in everyday life. Research should show a representation of all kinds of deaf people in the deaf community, those that use American Sign Language (ASL) only, or use ASL and written English, in which there is a dearth of research in terms of Executive Functioning, along with hearing devices (cochlear implants or hearing aids) and those who use none. This study examined executive functioning on the use of Stroop Test and written/spoken English (n=16). Participants reported using both ASL and English more frequently than only ASL. A Stroop test was conducted, which has two formats: ASL and English. A series of questionnaires were tested such as American Sign Language Comprehension Test (ASL-CT) to test deaf people's ASL comprehension skills and cognitive processing; TOSCRF-2 (Test of Silent Contextual Reading Fluency), focused on written English; Lastly, participants have the option to do TOAL-3 (Test of Adolescent Language), focusing on spoken English. We hypothesized that those who use ASL and use spoken English would excel more in cognitive processing than deaf people who only use ASL, and have faster reaction time. The preliminary results suggest that there is a significant difference in ASL-English bilingual and ASL monolingual. It has been found that ASL-English bilinguals have a slower reaction time to the Stroop test than ASL monolinguals.

24	**Minoritized accessibility in signing communication** *Hayden Orr, TJ Bartholomew, Ryker D'Angelo, Gigi Zheng, Anna Zeiba* *Mentors: Jordan Wright, Mariam Paracha*

Do clear face masks help reduce the communication barriers that Deaf and Hard-of-Hearing individuals experience? In this study, we attempt to investigate clear mask accessibility factors, and whether the design of four different clear masks could be improved upon. A survey was conducted (N=60) with Deaf and Sign Language-using professionals in which they were asked to wear four different brands of clear masks and provide user experience feedback. Subsequently, they were invited to join a focus group (N=30) where their comments and thoughts were collected regarding the comfort, design, and accessibility of the clear masks that were provided. The data we collected revealed that the discomfort of wearing clear masks outweighed the minor benefit of accessibility of the clear masks provided. Deaf participants generally preferred to wear traditional cloth masks over clear masks; although they largely believed that they would benefit from clear masks if the interpreters or presenters were to use them. There is little research to date concerning how clear

masks affect communication barriers, specifically those affecting Deaf and Sign Language-using individuals. This study attempts to demonstrate that there are considerable design flaws that should be improved upon to increase the comfort and accessibility of the clear mask to better prepare sign-language communities for routine health accessibility and the next pandemic.

25	**Deaf athlete technique and biometric recording** *Shadirah Griggs, Grace Huff* *Mentor: James Mallory*

Deaf and Hard-of-Hearing (DHH) athletes are numerous on RIT's campus. We share our applied research on how to help DHH students succeed in different sports (swimming, rowing, etc.) using biometric technology. One way is to video their technique while measuring their heart rate to see how efficiently they are executing their movements by monitoring their heart rate zones. Using modern smartwatch technologies that are waterproof and combining these technologies with 360-degree GoPro cameras, heart rate straps, etc. will help us to accomplish our DHH customers' goals. Goals, Learning Outcome(s): 1. Assist DHH athletes with improving their technique and performance in their given sport. 2. Research about IoT devices and technology including GoPro Cameras and biometric devices. accelerometers, GPS and Bluetooth devices, and cloud computing. 3. Research about mobile app phone interfaces with the items mentioned above. 4. Research and learn new application software. 5. Perform both independent and team research for technical solutions to a problem. 6. Work with hearing and deaf customers in the field. 7. Work on a team, leveraging each other's time and efforts (instead of being redundant or wasteful with our time). 8. Manage timelines and tasks. 9. Document and report findings. 10. Present and articulate results to an audience.

26	**Deaf, Hard-of-Hearing and hearing college students' willingness to seek mental health therapy** *John Williams* *Mentor: Rain Bosworth*

The state of one's mental health is of critical significance to every individual human being. Mental health is a concern for college students, and therapy and mental illness treatment is helpful. However, the problem is that many students may not seek help when they need it. Knowing 1) how many college students report willingness to obtain therapy and 2) whether certain demographic groups are less likely to ask for help can help colleges be better equipped to serve them. This project seeks to answer the following research questions: 1) Are D/HH students of color more likely to be unwilling to seek therapy? 2) If so, why? Is this unwillingness due to stigmas they may have encountered or heard about? To answer these questions, we collect anonymous survey data to answer these questions, and for a subset of respondents, we ask them if they would be willing to be interviewed. This research would be beneficial to NTID in that it would allow NTID administrators to better understand students' experiences, as well as use their experiences to provide better feedback in order to improve mental health services.

27	**RITE Lab think tank** *Lyn Eaton* *Mentor: Kierstin Muroski*

The aim of this RITE Lab think tank is to encourage NTID interpreting students to actively engage in research and to stimulate further investigation in the field of signed language interpreter education. The think tank facilitates discussions and collaborations among signed language interpreting students, educators, and researchers. It focuses on exploring various research topics related to signed language interpreting, including the effectiveness of teaching methods and curriculum designs, the impact of language and culture on interpretation, and the current experiences of interpreting students at NTID. By fostering a community of research-minded and inquisitive interpreting students, the think tank contributes to the advancement of the profession and the improvement of interpreting education.

28	**Physical vs virtual raspberry Pi comparison** *Denard Johnson, Joshua Roman* *Mentors: James Mallory, Ed Lucas*

Normally physical systems are created using Raspberry Pi computers, motors (servos), and input and output devices such as push buttons and LED lights. These systems often need to be tested before implementing in the field to save time and money. A modern Raspberry Pi can gather input from switches, push buttons, and other devices and control output to external devices such as LEDs and servos. These systems are controlled by programming in Python code. Software testing costs very little or nothing depending on the implementation. On the other hand, physical devices can be costly, especially if the implementation fails. This situation can be resolved using Virtual Machines (VM). The first step of our research was to gain an understanding of the Python programming language. The second step was to learn how to use the GPIOZero Library which communicates with the physical devices. All of these then work together to create code that will run on either the physical hardware or in the VM world. Our study compared the code between the VM and the physical worlds.

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Student Research Microgrants

Students (with approval of a faculty mentor) can apply for a microgrant of up to $1,000 to support a specific research project. Funds could be given to students in need of purchasing a software program, piece of equipment, chemical, etc. to conduct research. Faculty members who want to start new/pilot research projects are specifically encouraged to have their students apply. These microgrants are predominantly for supplies and are not eligible to be paid as stipends or for travel.

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