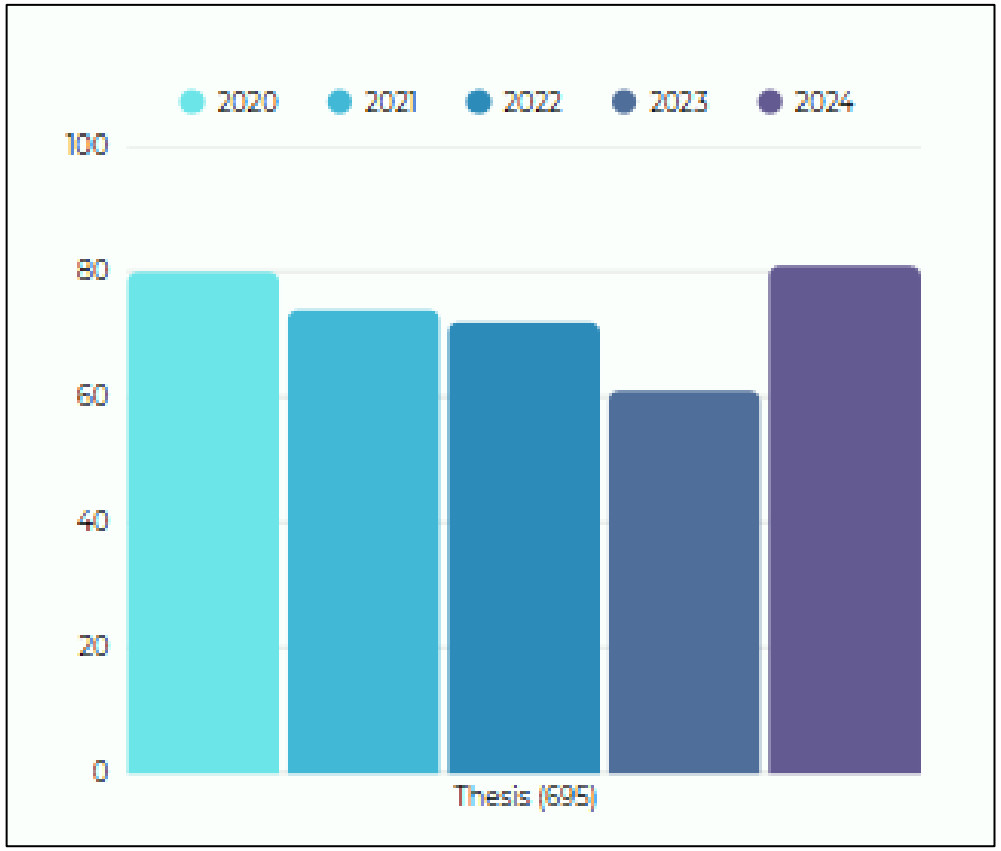
Reach Higher Celebration

Thesis



At Grand Valley State University, a total of 2,833 students completed Project (693) courses and 368 students completed Thesis (695) courses between January 2020 and December 2024.

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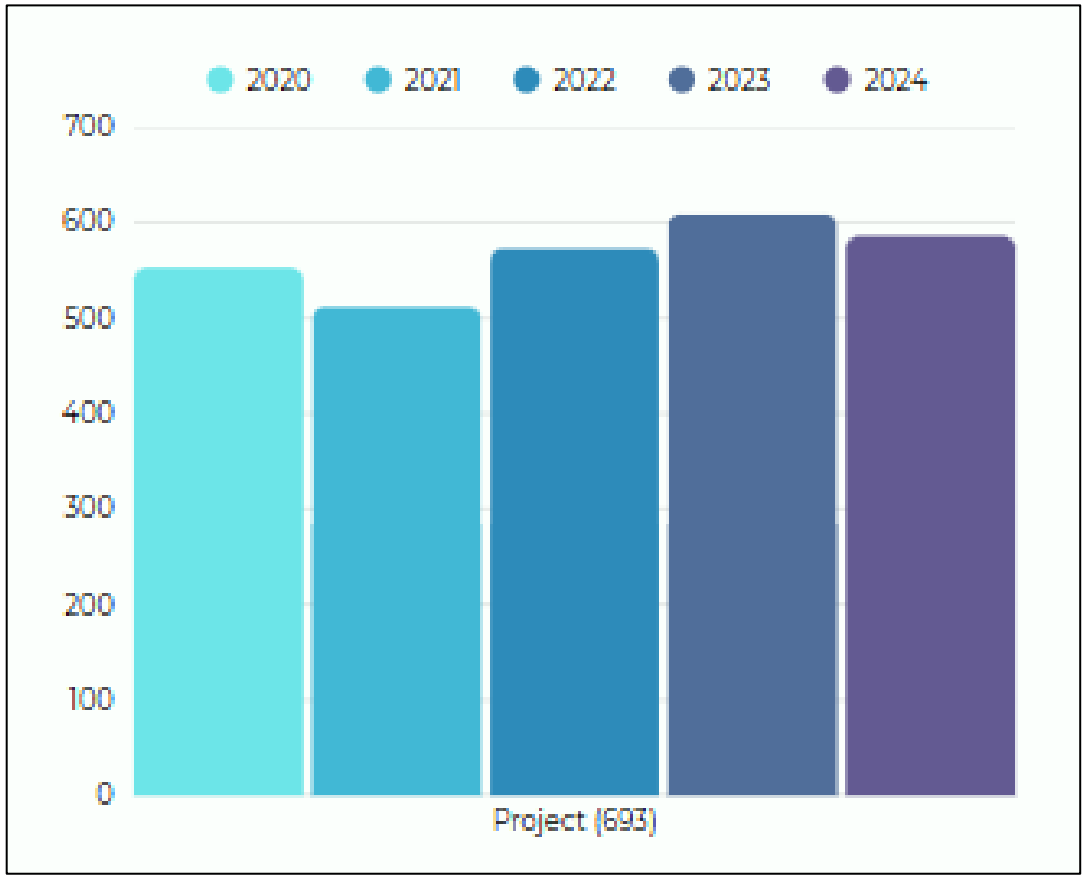
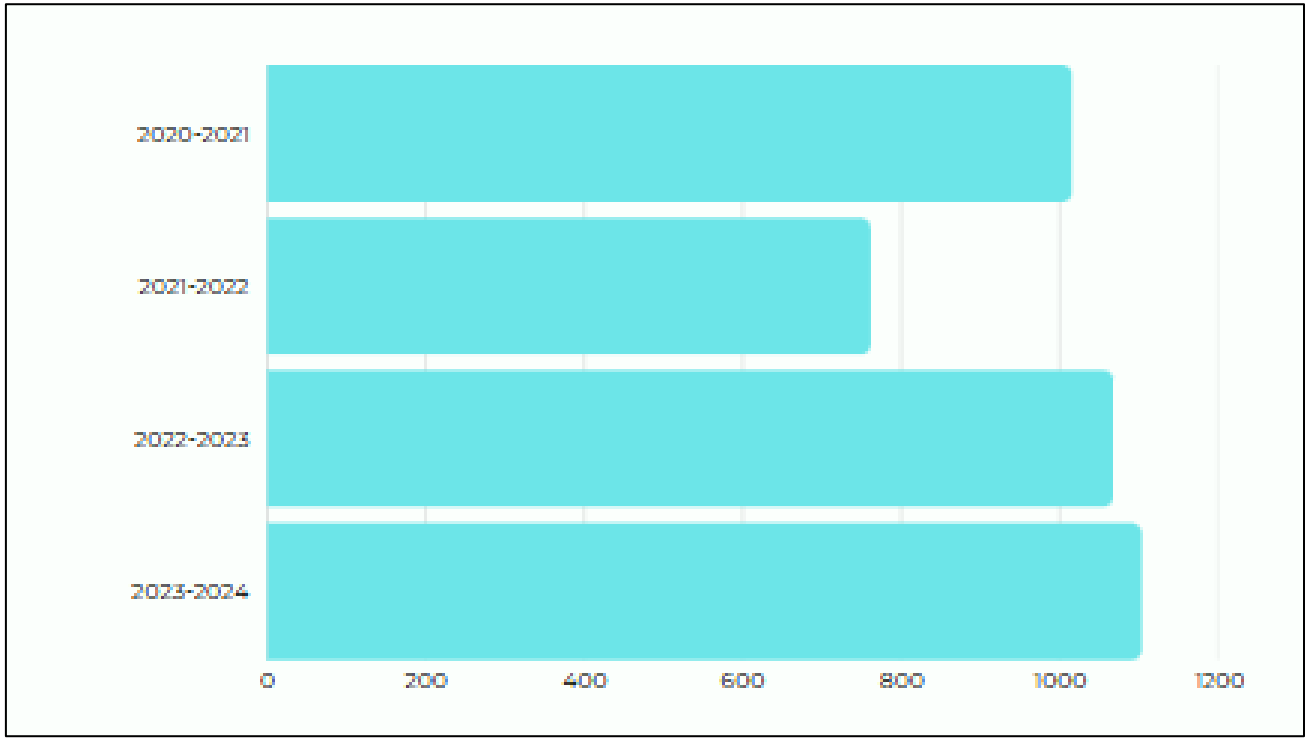
Project



Total Awarded Degrees

Between January 2020 and December 2024, Grand Valley State University awarded a total of 3,948 graduate degrees.



Amanda Anka

Communications

Case Study: Critical editing studies: a textual-intertextual approach to editing, rhetoric, and cultures of sensitivity

This study explores how editing influences public discourse and perception by analyzing two major editing controversies, one involving the written word and the other, image.

Bex Takacs-Britz

Philanthropy & Nonprofit Leadership

Case Study: Volunteer manager perceptions and sentiments about court-ordered volunteers

This study explores the perceptions and experiences of volunteer managers regarding court-ordered volunteer programs. This qualitative analysis includes interviews with Michigan-based volunteer management professionals to examine their sentiments, challenges and strategies in overseeing court-mandated volunteers. The study seeks to understand how these programs are structured, the barriers managers face in implementation, and the broader impact on nonprofit organizations.

Brody Glei

Biology

Brody Glei

Summer experience: Michigan Department of Natural Resources- Wildlife Division, Waterloo Field Office

How did you learn about it: This summer was my second year at this office, but originally, I had found out about this by searching around the DNR website for job opportunities, since I was interested in working with the DNR to help conserve and protect public lands in the state.

What were your primary duties: As a Non-Career Wildlife Assistant, my duties were like those of a full time Wildlife Assistant. These include manipulation and maintenance of water levels with control structures, grassland/oak savannah restoration through chemical and mechanical treatment of invasives and woody vegetation, some cropland management with discing, planting, fertilizing, monitoring, and spraying of food/cover plots for Whitetail Deer, Wild Turkeys, Ring-necked Pheasants, as well as non-game species. Also, I was responsible for heading up access trail maintenance with rotary mowers, brush buckets, chainsaws, and pole saws. Other projects included Canada Goose, Mallard, and Wood Duck banding, and general facility and equipment maintenance i.e. mowing, tractor oil changes, small engine tune ups, cleaning, etc.

What did you learn/gain: Through both of my summers there, I learned a ton about cropland management and soil management as well as the dike maintenance to prevent blowouts of the dams. Additionally, this job gives you tons of opportunities to learn hands on about safe equipment operation, PPEs, and maintenance. There are many pieces of equipment that having experience with is an invaluable tool, from chainsaws to ORVs, and small garden tractors up to 100+ hp farm utility tractors and all the implements used with them. Educationally, the Wildlife Biologists and Technicians at these field offices are great people to learn from about anything and they want you to succeed. There are opportunities to have them help with resumes or mock interviews and build your knowledge base.

Cristhel Morlidge

Social Innovation

Dalia Torres Leon

Social Innovation

David E Lyons

Social Innovation

Emily Eberly

Biology - AWRI

Grace Forthaus

Biology - AWRI

Forthaus, Grace	Grand Valley State University	Unraveling the Invasion: Genomic Insights into the Spread and Adaptation of Hemlock Wooly Adelgid in Eastern North America	Hemlock trees are a vital foundation species in forests across the Eastern United States, crucial for ecological stability and supporting biodiversity. Unfortunately, they are under threat from the invasive Hemlock Woolly Adelgid (HWA), which has already caused widespread damage. Despite HWA's impact, the genetic and physical mechanisms driving its range expansion and adaptation to new environments are still somewhat unclear. My research will use advanced genomic techniques to unravel the genetic adaptations and dispersal strategies that have allowed HWA to thrive. This project will contribute to NASA's goals through advancing our understanding of life on Earth with ever changing environmental influences and sharing this information with on the ground stakeholders.

Kel Nemetz

Social Innovation

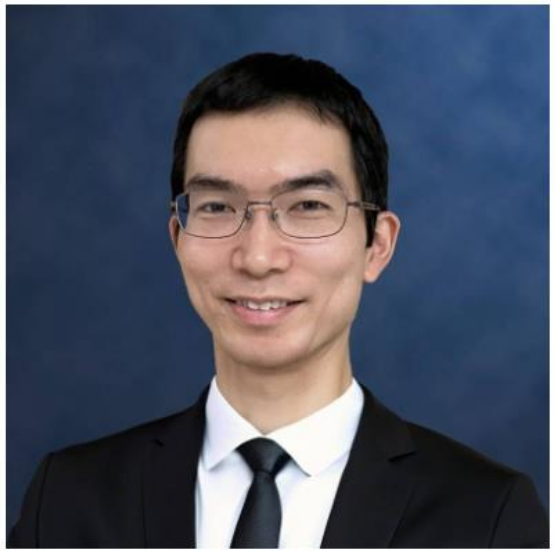
Kenta Abe

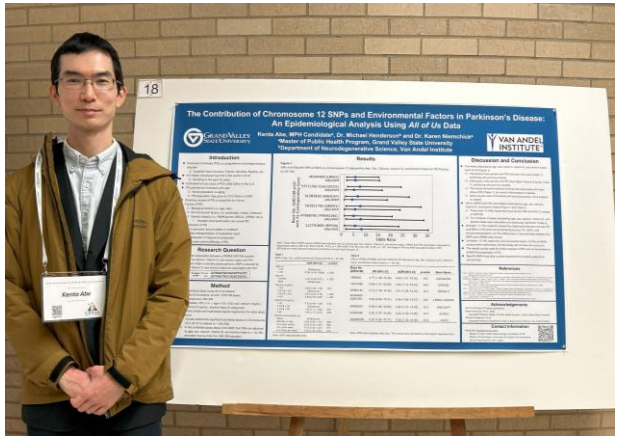
Public Health

PEOPLE'S CHOICE WINNER - KENTA ABE

Kenta Abe, an international student from Japan, is a current Master of Public Health Candidate at GVSU, studying epidemiology. He obtained a Bachelor of Intercultural Communication at the Hosei University in Tokyo, and a Master of Technology in Innovation for Design and Engineering (AI and Data Science Enhanced) at the Advanced Institute of Industrial Technology in Tokyo. His interest is now epidemiological analysis of Parkinson's disease.

Presentation Title: How Chromosome 12 SNPs and Environmental Factors Contribute to Parkinson's Disease?





Ruth Yeboah

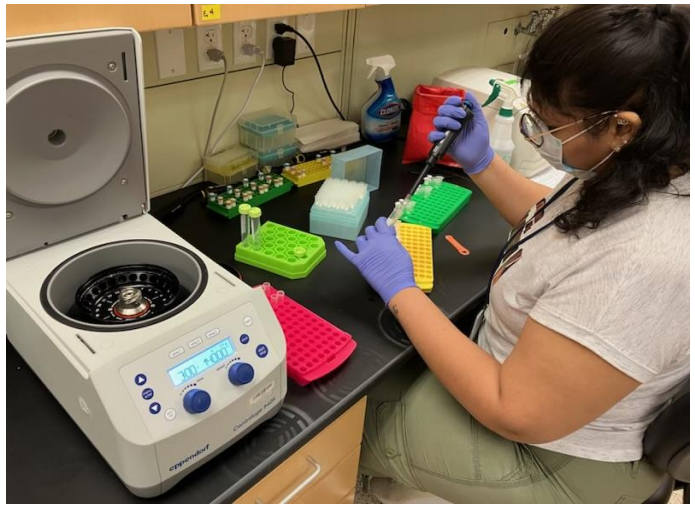
Communications

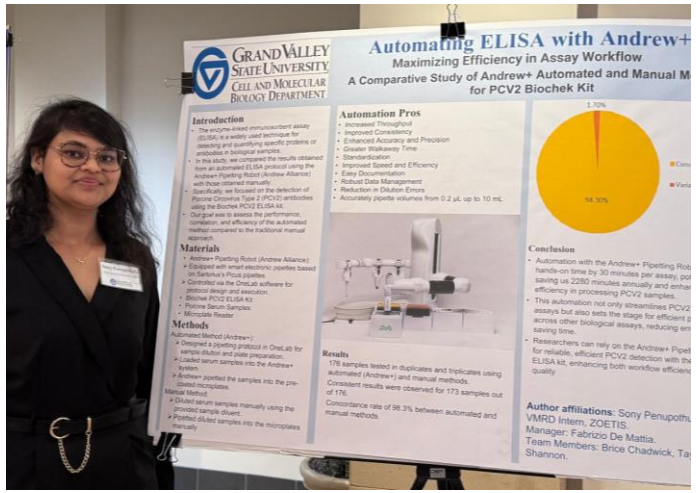
Case Study: Africanism In America: Exploring Hybrid Identities Of African Students In The US

This study interrogates the intercultural experiences of african international students (ais) in a us midwestern university. With a focus on west african students, the study explores how students confront and overcome linguistic, cultural, and systemic barriers as they create new dynamic spaces which are neither american nor african, but a mixture of both.

Sony Penupthula

Cell and Molecular Biology



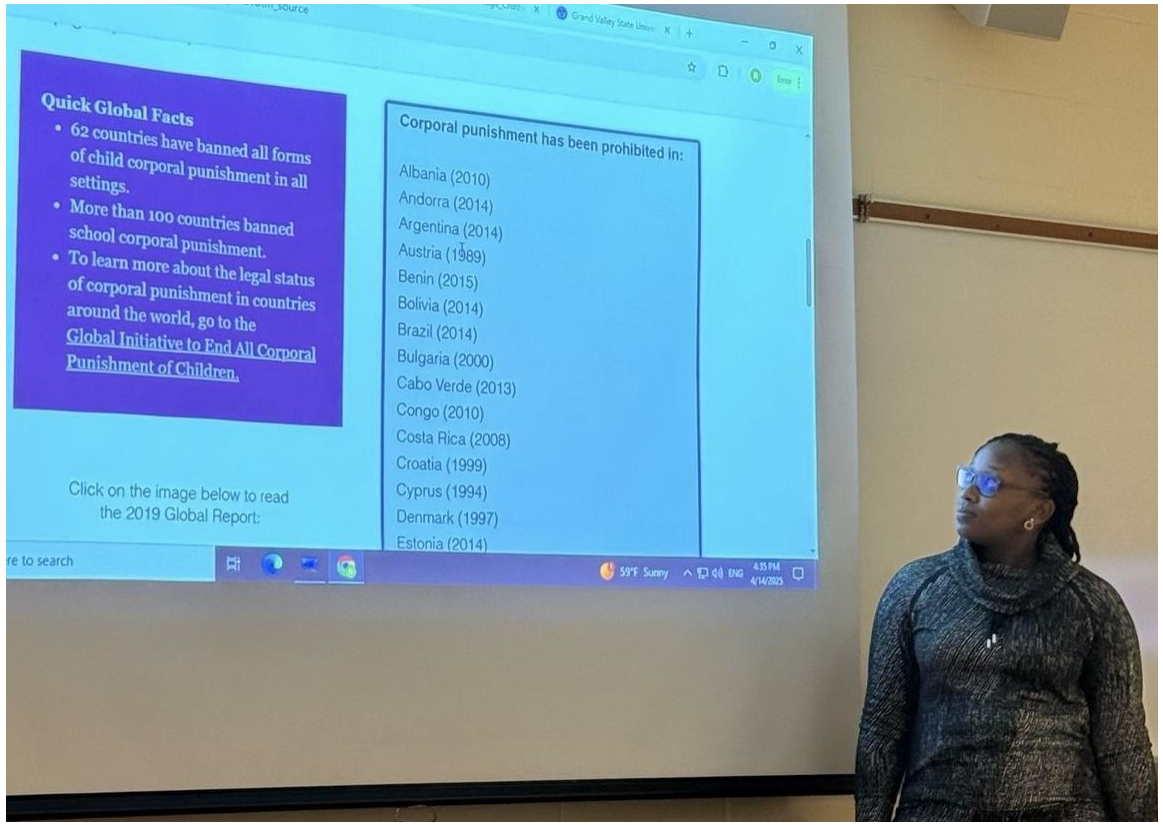


Case Study: Automating Elisa With Andrew+: Maximizing Efficiency In Assay Workflow

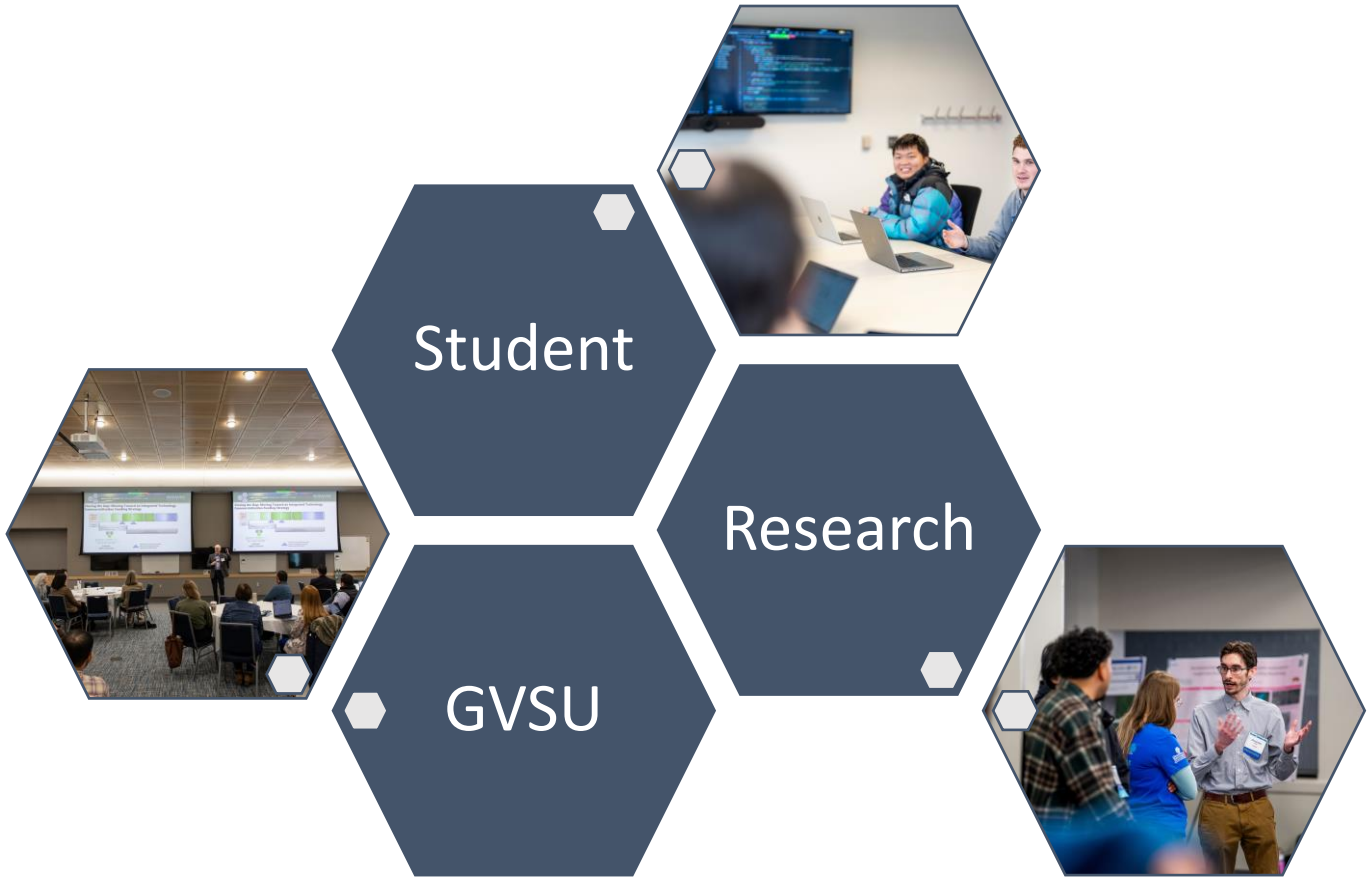
The enzyme-linked immunosorbent assay (ELISA) is essential for detecting specific proteins or antibodies. This study evaluated the efficiency and accuracy of an automated ELISA protocol using the Andrew+ Pipetting Robot compared to the traditional manual approach for detecting Porcine Circovirus Type 2 (PCV2) antibodies.

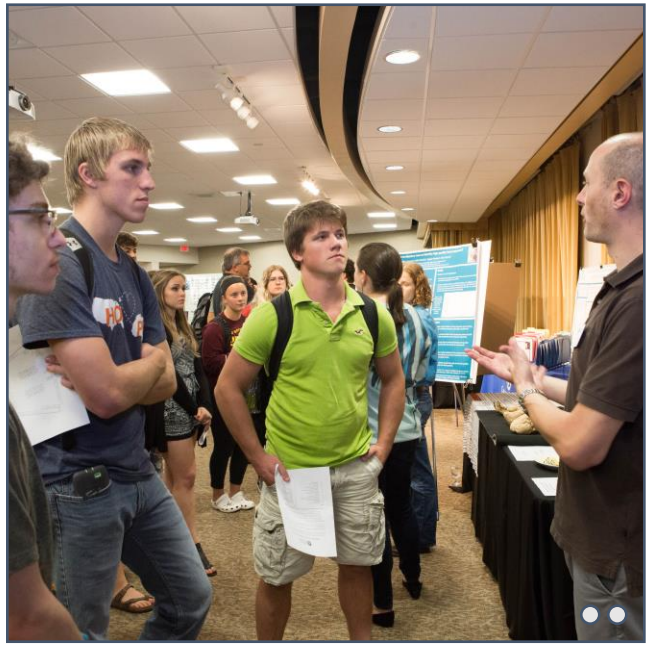
Terry Mueni

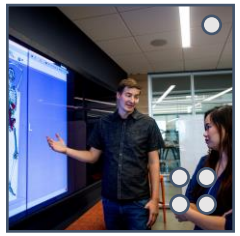
Criminal Justice

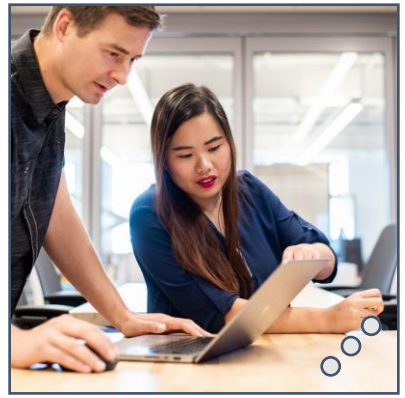


Graduate Student Research









Graduate Student Research

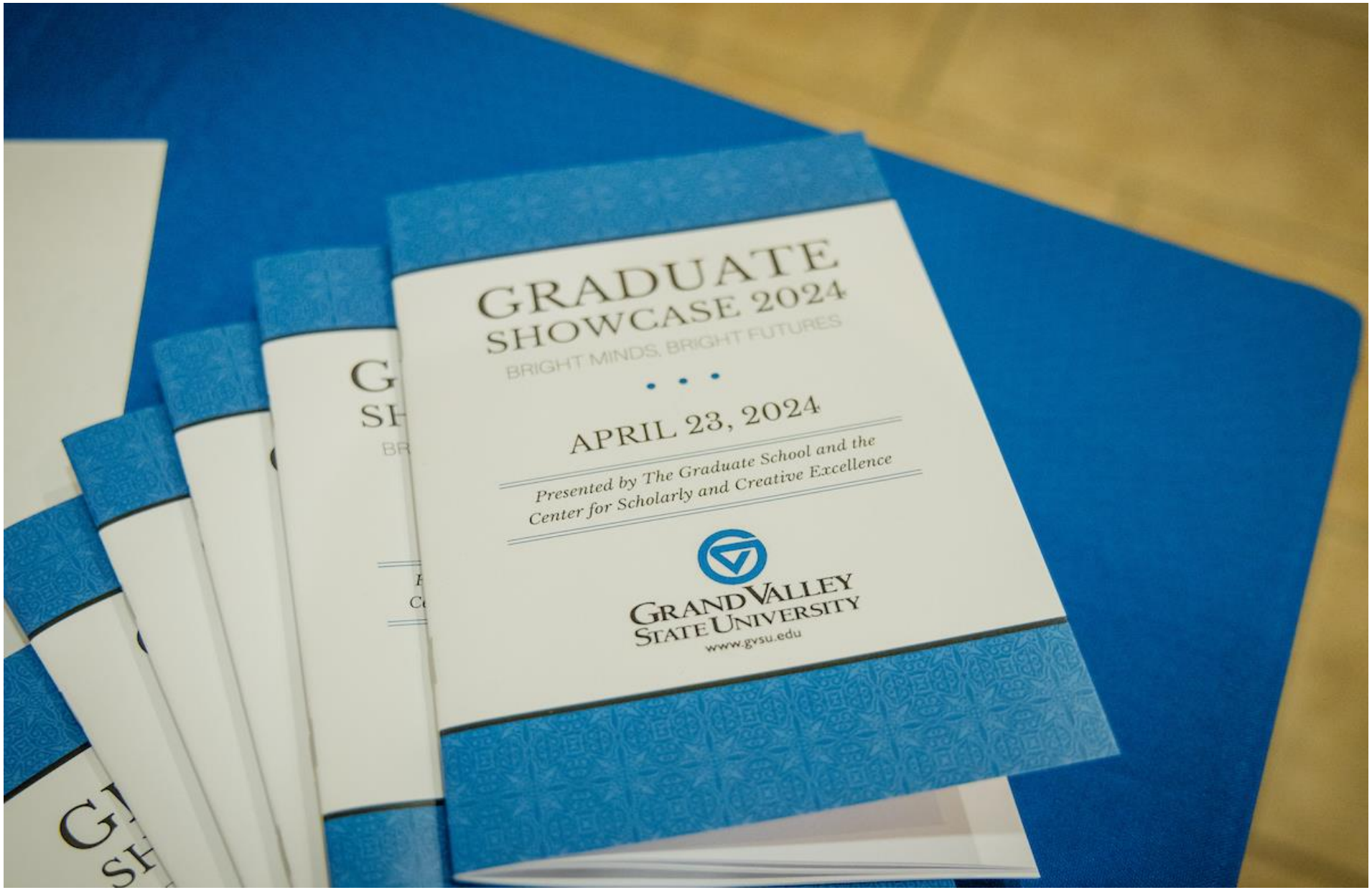
Graduate Student Research

Graduate Student Research

Graduate Student Research

Graduate Student Research

Reach Higher Showcase



Graduate Student Research

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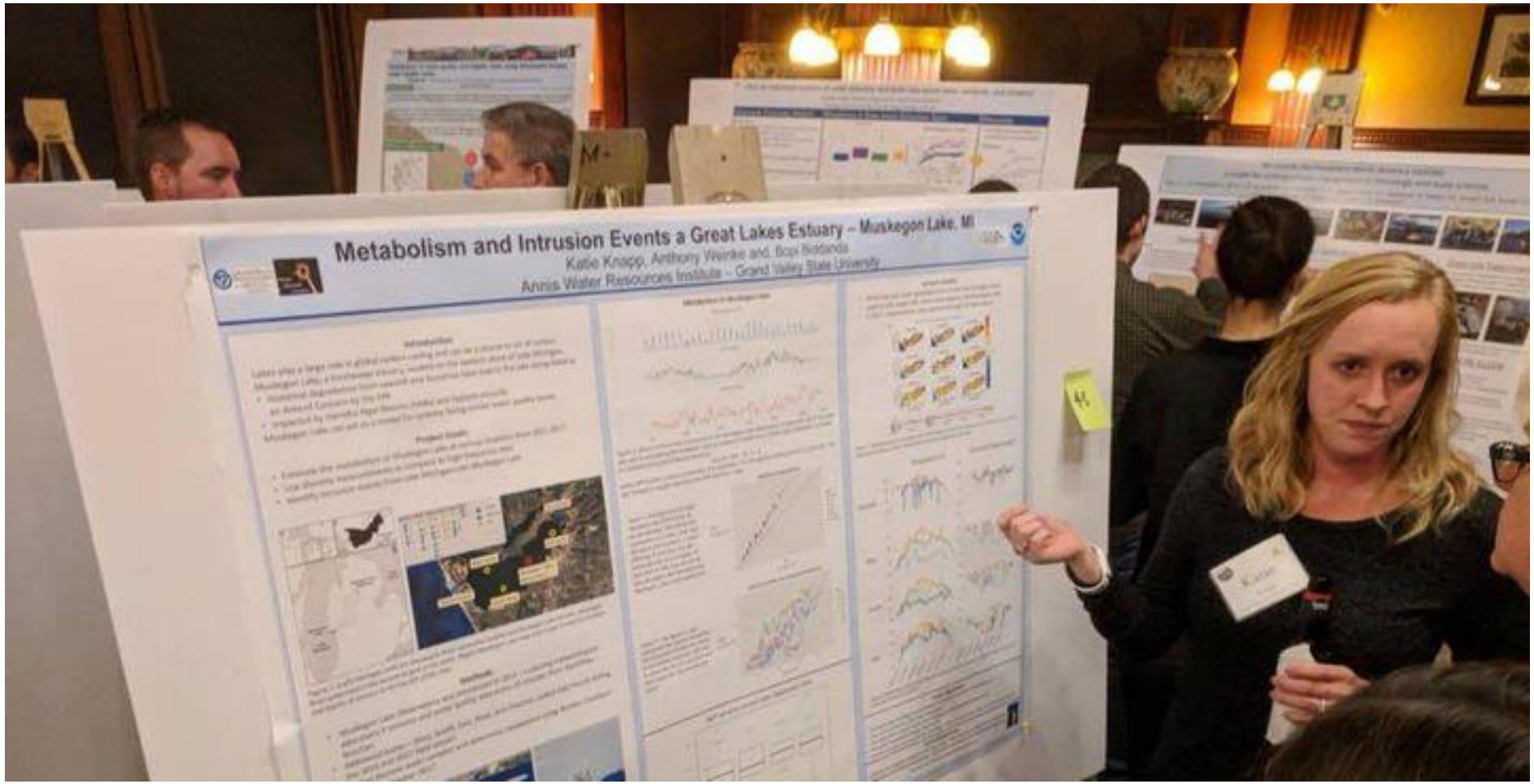

Graduate Student Research

Graduate Student Research

Melo and Corneal *International Journal of Quality Innovation* (2020) 6:3
https://doi.org/10.1186/s40887-020-00037-y

International Journal of Quality Innovation

CASE STUDY Open Access

Case study: evaluation of the automation of material handling with mobile robots

Adriana F. Melo* and Lindsay M. Corneal

* Correspondence: corneall@gvsu.edu
School of Engineering, Grand Valley State University, Allendale, MI 49401, USA

Abstract

The automation of material handling is one of the solutions that many companies are relying on to reach their goals related to productivity increment, floor space optimization, higher standards for factory's safety, and allocation of workers to value-added activities. Therefore, the objective of this study was to evaluate the current state of the material flow of finished goods for an automotive parts supplier plant and the technology available on the market to verify if it was worthwhile to invest in material handling automation. The analysis included the use of discrete event simulation to evaluate the different layout approaches combined with the mobile robots' performance. It was proven that the tandem layout was the most beneficial approach to the analyzed plant's reality with a minimal of three robots. Improvements to the material flow and automation of the labeling process were also proposed based on the study.

Introduction

Automated guided vehicles (AGVs) first started to be used in the 1950s for manufacturing. This technology began the trend of automation of material transportation. They have proved to be reliable and efficient technological equipment for more than 50 years. However, the need of fixed routes and the minimal on-board intelligence were restricting the use of AGVs to applications that required little variability on the pickup and drop off points of materials, as well as no interruption to its path. Changes to the pathways were simply too expensive and disruptive to be cost-effective as they are typically installed in the floor.

Adriana Melo

Engineering

Winter 2019

Alan Mock
Biology - AWRI
Winter 2019

Article

Evaluating Remote Site Incubators in Michigan Streams: Implications for Arctic Grayling Reintroduction

October 2020 · North American Journal of Fisheries Management 41(2)
DOI:10.1002/nafm.10534

Authors:

Alan Mock
Florida International University

Carl Ruetz
Grand Valley State University

James N. McNair
Grand Valley State University

Dan Mays

Show all 5 authors

To read the full-text of this research, you can request a copy directly from the authors.

Citations (1) References (49)

Request full-text

The successful use of remote site incubators (RSIs) to rear Arctic Grayling Thymallus arcticus eggs along Montana streams has sparked interest to reestablish the species in Michigan. As a preparatory step, we assessed the efficacy of RSIs by deploying them along three Michigan streams during two years using surrogate eggs from Rainbow Trout Oncorhynchus mykiss. Our objectives were to: (1) compare hatching success between two different RSI designs (19-L vs. 265-L RSIs), (2) test whether the removal of dead eggs ("picking") from 19-L RSIs affected hatching success, and (3) develop a simple model to predict fry yield and its uncertainty. Overall survival was 41.3% in 2018 and 52.4% in 2019. Differences in survival between unpicked 19-L and 265-L RSIs tended to be small, with mean differences from 4.82% (95% CI, -0.60 to 10.25%) in 2018 to 0.08% (95% CI, -0.14 to 0.30%) in 2019. On average, picked 19-L RSIs had greater survival—although not always statistically significant—than unpicked 19-L RSIs during both years (mean difference = 1.6% [2018] and 10.4% [2019]). We documented a significant positive correlation between survival and RSI flow rate. Survival abruptly declined in unpicked 19-L RSIs when RSI flow rates dropped below ~0.3 L/min, suggesting removing dead eggs from 19-L RSIs likely increased survival when RSI flow rates were <0.3 L/min. The most notable result from our fry yield model was that increasing the number of RSIs reduced the coefficient of variation in fry yield following a pattern of diminishing returns, suggesting two or three RSIs usually will be a good choice. We showed that 19-L and 265-L RSIs can be used successfully in Michigan streams with our model providing a tool for managers to explore the relative importance of several properties of RSI design and operation on fry yield and uncertainty.

DOI: 10.1002/ece3.10029

RESEARCH ARTICLE

Ecology and Evolution WILEY

Diet of a threatened rattlesnake (eastern massasauga) revealed by DNA metabarcoding

Alyssa Swinehart[1] | Charlyn Partridge[2] | Amy Russell[1] | Arin Thacker[1] | Jennifer Kovach[1] | Jennifer Moore[1]

[1]Biology Department, Grand Valley State University, Allendale, Michigan, USA

[2]Annis Water Resources Institute, Grand Valley State University, Muskegon, Michigan, USA

Correspondence
Alyssa Swinehart, Biology Department, Grand Valley State University, Allendale, Michigan, USA.
Email: alyssa.m.swinehart@gmail.com

Funding information
U.S. Fish and Wildlife Service, Grant/Award Number: F17AP00580

Abstract

Characterizing the diet of imperiled species using minimally invasive methods is crucial to understanding their ecology and conservation requirements. Here, we apply a DNA metabarcoding approach to study the diet of the eastern massasauga rattlesnake (*Sistrurus catenatus*), a Federally Threatened snake found throughout the Great Lakes region. Eighty-three fecal samples collected across 10 different massasauga populations located in Michigan, USA, were sequenced, with 70 samples containing prey DNA. We used universal metazoan primers and developed a host-specific oligonucleotide blocker to characterize their diet. We identified at least 12 different prey species, with eastern massasaugas exhibiting opportunistic feeding and a strong preference towards small mammals. Meadow voles (*Microtus pennsylvanicus*) were the most common prey item (70% of diet) followed by the northern short-tailed shrew (*Blarina brevicauda*) and masked shrew (*Sorex cinereus*; 15.7% of diet each), along with occasional bird and snake prey. Adult individuals exhibited a more generalized diet, consuming a larger number of prey taxa on average. Younger snakes consumed a smaller variety of prey items and tended to consume smaller-sized mammals such as masked shrews (*Sorex cinereus*) and northern short-tailed shrews (*Blarina brevicauda*). We conclude that small mammals are a crucial part of eastern massasauga rattlesnake diet and recommend this be taken into consideration when conservation strategies are developed. The methods developed in this study can be applied to other reptile species, providing an accurate, minimally invasive, and thorough diet assessment for at-risk reptile species.

KEYWORDS
diet analysis, DNA metabarcoding, rattlesnake, reptiles, *Sistrurus catenatus*, threatened species

TAXONOMY CLASSIFICATION
Conservation ecology, Genetics

Alyssa Swinehart

Biology

Winter 2021

Arin Thacker

Biology

Fall 2022

Global Ecology and Conservation 43 (2023) e02422

Contents lists available at ScienceDirect

Global Ecology and Conservation

journal homepage: www.elsevier.com/locate/gecco

Modeling occupancy and detection probabilities to update the status of threatened eastern massasauga rattlesnake populations

Arin J. Thacker [a], Eric T. Hileman [b], Paul Keenlance [a], Eric M. McCluskey [a], Alyssa Swinehart [a], Jennifer Kovach [a,*], Jennifer A. Moore [a]

[a] Department of Biology, Grand Valley State University, 1 Campus Drive, Allendale, MI 49401, USA
[b] Department of Wildlife, Fisheries and Aquaculture, Mississippi State University, MS 39762, USA

ARTICLE INFO

Keywords:
Reptile
Sistrurus catenatus
Habitat quality
Canopy cover
Habitat management
Michigan

ABSTRACT

Knowledge of a species' distribution throughout a landscape is crucial for developing long-term conservation practices and effective management plans. Accurate distributional data are particularly important for threatened or rare species with a broad geographic range and low detectability in their preferred habitats, as surveying and successfully encountering this type of species is oftentimes difficult. One such species is the eastern massasauga (*Sistrurus catenatus*), a small-bodied, federally threatened rattlesnake with a distribution centered around the Great Lakes region. The current status of many massasauga populations remains uncertain, hindering effective recovery efforts. We used single-season occupancy models to reassess the status of historic massasauga sites (n = 33) distributed throughout Michigan's Lower Peninsula. We assessed site- and survey-specific covariates at both the local- and landscape-scale to inform occupancy and detection probabilities. Average canopy cover best predicted occupancy probabilities, while search effort best predicted detection probabilities. Our top model which included canopy cover (occupancy) and search effort (detection) estimated an average occupancy probability of 0.30 (CI = 0.15–0.50) and average detection probability of 0.55 (CI = 0.31–0.78). Landscape-scale covariates derived from remotely-sensed data did not improve model fit for occupancy models. Our findings suggest that persistence of eastern massasauga populations relies upon canopy cover of < 60%, so management practices aimed at reducing woody invasive species, or setting back natural succession, will benefit this species. Our results may also be used to guide future survey efforts for massasaugas and have implications for current population predictions that form the basis of recovery strategies.

A Low Cost sEMG Development Platform for Hand Joint Angle Acquisition

Publisher: IEEE

Cite This

PDF

Brendan P. Beauchamp ; Christian P. Vollmers ; M.M. Suvro Shahriar ; Nabeeh Kandalaft **All Authors**

Abstract:

A consolidation of sEMG to Muscle Force signal processing and Fingertip Workspace Mathematics (FWM) is hypothesized in this literature. Consequently, this hypothesis suggests a projection matrix from muscle force to joint angles of the hand. Using a supervised kinematic algorithm, an sEMG device can learn to describe an individual's fingertip positions in two steps. The first step is inverse kinematics to learn a projection from joint angle to muscle force. The second step is forward kinematics of muscle forces to predict joint angles without direct observation. This literature presents low cost hardware design for acquiring forearm sEMG signals and fingertip joint angles. The consolidation of sEMG to muscle force and kinematic hand modeling bridges the gap between physiologic research and human interfacing technology.

Published in: 2020 11th IEEE Annual Information Technology, Electronics and Mobile Communication Conference (IEMCON)

Brendan P. Beauchamp

Engineering

Winter 2023

Bryan Westra
Engineering
Winter 2019

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Corpus ID: 67911669

VHF Transmitter Development For Wildlife Tracking

B. Westra • Published 2019 • Engineering, Environmental Science

TLDR It was found that the Silicon Labs Si4010 chip was the best solution based on these criteria; the design allowed for flexibility in output frequency and power, a low BOM cost, and very low power consumption.

Highlight Information | Methods | Results

Abstract Wildlife biologists often use collars with VHF transmitters to gather wildlife data. The purpose of this project is to determine the best approach to designing a wildlife tracking VHF transmitter on a Printed Circuit Board (PCB). A variety of frequency generation methods were considered for the transmitter, including transistor-based crystal oscillators and chip based solutions from the chip manufacturers Analog Devices and Silicon Labs. Prototypes of the feasible options were built and evaluated for cost, power consumption, efficiency, size, frequency range, signal bandwidth, and frequency stability. It was found that the Silicon Labs Si4010 chip was the best solution based on these criteria; the design allowed for flexibility in output frequency and power, a low BOM cost, and very low power consumption.

Collapse

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Cliffton Young

English

Spring/Summer 2019

“Not to Be Loved but to Lead”: Homosocial Soldiering in Tim O’Brien’s The Things They Carried

Young, Cliffton M.

URI: ${sadil.baseUrl}/handle/123456789/572

Date: 2019-08

Abstract:

This study explores the presence of homosocial bonds for Tim O’Brien’s characters in his short story collection, The Things They Carried, and examines the value of them for soldiers in and out of the war theatre. Their vulnerabilities and fragilities create for the soldiers false fronts of masculinity, and they attain comfort in and attach themselves to others with whom they share military experiences. Members of Alpha Company deal with both physical and mental burdens stemming from battle. Their timidity and emotional / physical ineptness complicate their being able to have honest and affectionate interactions with other men in the platoon, in spite of needing those in order to ease anxiety, fear, and self-doubt. Soldiers generally find civilians unable to recognize the burdens and trials soldiers bear: loved ones cannot understand their being scared and / or uninterested in taking part in war; their longing for and need to escape to what was left behind, and most importantly, their striving against emasculative moments. The final focus in the paper considers transitioning among the Alpha Company men from soldier to civilian, highlighting the difficulties of acclimating to peace-time society. Many of the men feel inadequate, unsure how to position themselves in a society that has drastically changed since they left it— and since they have been left behind by it. O’Brien’s characters—himself included—are caught between fantasy and reality, a forced rift between some ideal of comradeship and the reality of patriarchal and national images they have been expected to embrace. The need to excel in war in a manly way proves to be the heaviest weight the men have carried, but the homosocial bonds the soldiers form during war create formidable and lasting ties that sustain these men, permitting them to stay above the killing and destruction that embodied Vietnam.

Jacob Harris

Biology

Winter 2021

Understanding the climate impacts on decadal vegetation change in northern Alaska

Authors: Jacob A. Harris, Robert D. Hollister, Timothy F. Botting, Craig E. Tweedie, Katlyn R. Betway, Jeremy L. May, Robert T.S. Barrett, Jenny A. Leibig, Hana L. Christoffersen, Sergio A. Vargas, Mariana Orejel, and Tabatha L. Fuson | AUTHORS INFO & AFFILIATIONS

Publication: Arctic Science • 17 June 2021 • https://doi.org/10.1139/as-2020-0050

Abstract

The Arctic is experiencing rapid climate change. This research documents changes to tundra vegetation near Atqasuk and Utqiaġvik, Alaska. At each location, 30 plots were sampled annually from 2010 to 2019 using a point frame. For every encounter, we recorded the height and classified it into eight groupings (deciduous shrubs, evergreen shrubs, forbs, graminoids, bryophytes, lichens, litter, and standing dead vegetation); for vascular plants we also identified the species. We found an increase in plant stature and cover over time, consistent with regional warming. Graminoid cover and height increased at both sites, with a 5-fold increase in cover in Atqasuk. At Atqasuk, the cover and height of shrubs and forbs increased. Species diversity decreased at both the sites. Year was generally the strongest predictor of vegetation change, suggesting a cumulative change over time; however, soil moisture and soil temperature were also predictors of vegetation change. We anticipate that plants in the region will continue to grow taller as the region warms, resulting in greater plant cover, especially of graminoids and shrubs. The increase in plant cover and accumulation of litter may negatively impact non-vascular plants. Continued changes in community structure will impact energy balance and carbon cycling and may have regional and global consequences.

Emily Dickinson, the Tyrant, and the Daemon: A Critique of Societal Oppression, and the Significance of Artistic Truth

Debra Kue, *Grand Valley State University*

Debra Kue

English

Fall 2020

Abstract

This thesis argues that art, for Dickinson, was an alternative system of salvation which her society could not provide her. Unwilling to surrender herself to the mold of her society, the institutional practice of Christianity and gender expectations, Dickinson chose to take ownership of her life through art, which allowed her to develop a personal language to combat the oppressive forces of the world around her. As a conscious "revolutionist of the word" Dickinson embarked on a path of self-discovery that enabled her to conduct a life in self-imposed exile as a means to emancipate herself from the constraints of conventional living (Howe xi). As Gelpi explains, "the normal man can follow the general trend without injury.... but the man who takes to the backstreets and alleys because he cannot endure the broad highway will be the first to discover the psychic elements that are waiting to play their part." (Gelpi 83)

Because Dickinson refused to struggle or integrate herself into her society, she enabled herself to fiercely explore her imagination and question the tyranny of institutionalized Christianity, patriarchy, and gender expectations. The commitment she would make to art was not for the sake of an elusive promise of redemption and transcendence of the 'earthly,' but rather a temporal goal which sought to uncover the full potential of her humanity as intensely as possible no matter the consequence. As a woman who harnessed and manifested an unnameable gift of language that defied and challenged the people and concepts of her time, Dickinson's work depicts the struggle between succumbing to the expectations of society and the will to live by the dictates of her imagination.

Ellen Foley
Biology
Winter 2023

Sci Total Environ. 2023 Dec 20:905:167139. doi: 10.1016/j.scitotenv.2023.167139. Epub 2023 Sep 20.

Urban lake water quality responses to elevated road salt concentrations

Ellen Foley [1], Alan D Steinman [2]

Affiliations + expand

PMID: 37739074 DOI: 10.1016/j.scitotenv.2023.167139

Free article

Abstract

Road salt runoff from de-icing applications is increasingly impacting water quality around the globe. Excess salt (especially chloride) concentrations can negatively impact the biological, chemical, and physical properties of freshwater ecosystems. Though road salt pollution is a prevalent issue affecting many northern temperate lakes, there are few studies on how freshwater salinization interacts with other ecological stressors such as eutrophication. We investigated how chloride from road deicers influences water quality in an urban lake. We sampled a tributary and lake receiving large amounts of road salt runoff from a nearby highway in Grand Rapids, Michigan over a 20-month period. Chloride concentrations in the deepest part of the lake consistently exceeded the US EPA chloride chronic toxicity threshold of 230 mg/L, at times reaching up to 331 mg/L. These high chloride concentrations appear to be responsible for preventing part of the lake from complete mixing, and causing hypoxia in the deepest regions of the lake. Total phosphorus concentrations near the surface averaged 35 µg/L but exceeded 7500 µg/L in the deepest part of the lake, which occupies 3-5 % of total lake volume. Phosphorus release rates from the sediments were low and unlikely to be a current source of the high phosphorus concentrations. Rather, both phosphorus and chloride likely have been accumulating in the hypolimnion over a relatively long period of time. Lake management actions will require control of both internal and external phosphorus and chloride sources in the future. We recommend that phosphorus be addressed first to avoid the extremely high phosphorus concentrations from reaching the photic zone and stimulating algal blooms, which would occur if salt was removed first and the halocline broke down. Our findings and recommendations are applicable to other lakes facing similar issues.

Keywords: Chloride; Hypoxia; Internal phosphorus loading; Meromixis; Salt de-icer runoff.

Analysis of Connectivity in EMG Signals to Examine Neural Correlations in Muscular Activation of Lower Leg Muscles for Postural Stability

Diana McCrumb, *Grand Valley State University*

Abstract

In quiet standing the central nervous systems implements a pre-programmed ankle strategy of postural control to maintain upright balance and stability. This strategy is comprised of a synchronized common neural drive being delivered to synergistically grouped muscles. In this study connectivity between EMG signals of unilateral and bilateral homologous muscle pairs, of the lower legs, during various standing balance conditions was evaluated using magnitude squared coherence (MSC) and mutual information (MI). The leg muscles of interest were the tibialis anterior (TA), medial gastrocnemius (MG), and the soleus (S) of both legs. MSC is a linear measure of the phase relation between two signals in the frequency domain. MI is an information theoretic measure of the amount of information two signals have in common. Both MSC and MI were analyzed in the delta (0.5 – 4 Hz), theta (4 – 8 Hz), alpha (8 – 13 Hz), beta (13 – 30 Hz), and gamma (30 – 100 Hz) neural frequency bands for feet together and feet tandem, with eyes open and eyes closed conditions. Both MSC and MI found that overall connectivity was highest in the delta band followed by the theta band. Connectivity in the beta and lower gamma bands (30 – 60 Hz) was influenced by standing balance condition and indicative of a neural drive originating from the motor cortex. Instability was evaluated by comparing less stable standing conditions with a baseline eyes open, feet together stance. Changes in connectivity in the beta and gamma bands were found be most significant in the muscle pairs of the back leg of tandem stance regardless of foot dominance. MI was found to be a better connectivity analysis method by identifying significance of increased connectivity in the agonistic muscle pair between the MG:S, the antagonistic muscle pair between TA:S, and all the bilateral homologous muscle pairs. MSC was only able to identify the MG:S muscle pair as significant. The results of this study provided insight into the neural mechanism of postural control and presented an alternative connectivity analysis method of MI.

Diana McCrumb

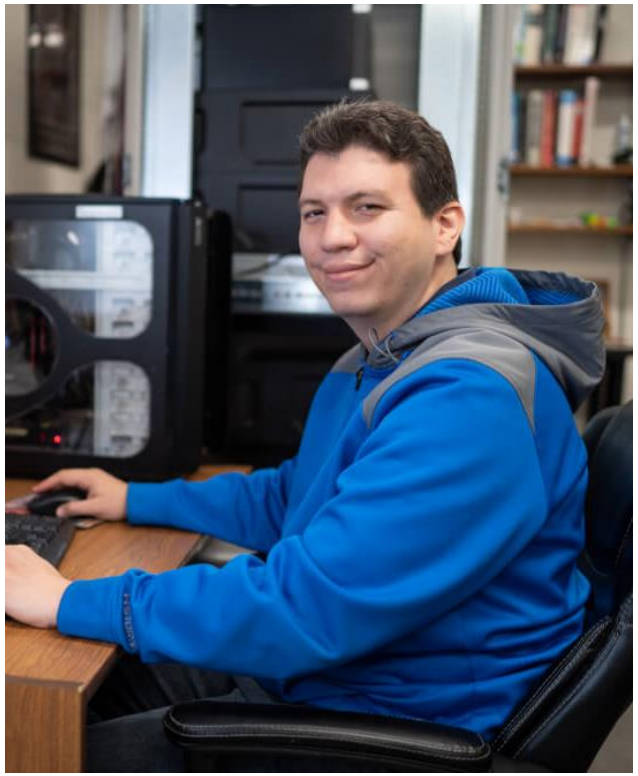
Engineering

Fall 2019

Juan Gonzalo Carcamo Zuluaga

Computer Science

Fall 2018



Deep Reinforcement Learning for Autonomous Search and Rescue

Publisher: IEEE Cite This PDF

Juan Gonzalo Cárcamo Zuluaga ; Jonathan P. Leidig ; Christian Trefftz ; Greg Wolffe **All Authors**

Abstract:

Unmanned Aerial Vehicles (UAVs) are becoming more prevalent, more capable, and less expensive every day. Advances in battery life and electronic sensors have spurred the development of diverse UAV applications outside their original military domain. For example, Search and Rescue (SAR) operations stand to benefit greatly from modern UAVs since even the simplest commercial models are equipped with high-resolution cameras and the ability to stream video to a computer or portable device. As a result, autonomous unmanned systems (terrestrial, marine, and aerial) have begun to be employed for such typical SAR tasks as terrain mapping, task observation, and early supply delivery. However, these systems were developed before recent advances in artificial intelligence such as Google Deepmind's breakthrough with the Deep Q-Network (DQN) technology. Therefore, most of them rely heavily on Greedy or Potential-based heuristics, without the ability to learn. In this research, we investigate a possible approximation (called Partially Observable Markov Decision Processes) for enhancing the performance of autonomous UAVs in SAR by incorporating newly-developed Reinforcement Learning methods. The project utilizes open-source tools such as Microsoft's state-of-the-art UAV simulator AirSim, and Keras, a machine learning framework that can make use of Google's popular tensor library called TensorFlow. The main approach investigated in this research is the Deep Q-Network.

Published in: NAECON 2018 - IEEE National Aerospace and Electronics Conference

RESEARCH ARTICLE

Journal of Vegetation Science
IAVS

Species-specific trends and variability in plant functional traits across a latitudinal gradient in northern Alaska

Katlyn R. Betway[1] | Robert D. Hollister[1] | Jeremy L. May[2] | Steven F. Oberbauer[2]

[1]Biology Department, Grand Valley State University, Allendale, MI, USA
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Co-ordinating Editor: Zoltán Botta-Dukát

Abstract

Questions: Many studies explore how plant functional traits may change as the climate warms by observing traits over environmental gradients. The amount of intraspecific variation (ITV), however, is often unknown and unaccounted for in most trait-based studies. Our objectives are to: (a) determine if species-level patterns across a latitudinal gradient match those of other members within the same growth form; (b) compare distributions of trait values across regions; and (c) quantify the amount of ITV within each trait relative to the amount of variation within the growth form and across taxonomic levels (family and species).

Location: Utqiaġvik, Atqasuk, and Toolik Lake, Alaska.

Methods: This study examines seven plant functional traits for 12 arctic species. Traits were measured on 10 individuals of each species at each region and analyzed using one-way ANOVA and variance partitioning via nested ANOVA.

Results: Comparison of mean trait values across the three regions for each species showed considerable variability within a growth form. Within deciduous shrubs, for example, one species increased in specific leaf area (SLA) with latitude while another species decreased. Results from variance partitioning differed among functional traits. Across the three regions, plant height, leaf area, SLA, leaf thickness, and leaf dry matter content (LDMC) had relatively low amounts of intraspecific variation (ITV; <15%) while normalized difference vegetation index (NDVI) had a high amount of ITV (>50%). All traits showed significant differences across regions for at least some species.

Conclusions: Because our results showed considerable variability in levels of ITV among functional traits, we emphasize the need to investigate ITV in trait-based studies spanning multiple regions. Levels of ITV are important in determining how different populations respond to local environmental conditions. Incorporating ITV in studies investigating vegetation change with warming will provide more robust and reliable predictions.

Katlyn Betway

Biology

Spring/Summer 2020

The Impact of Trauma and the Use of Trauma-Informed Programming Within a Correctional Facility

Kayla Bates, *Grand Valley State University* Follow

Description

PURPOSE: The "tough on crime" narrative has dominated the corrections system for the past few decades, which has led to mass incarceration and high recidivism rates. The emphasis on punishment within corrections ignores many important patterns that emerge within the United States' prison population, specifically examining how trauma plays a role in offending. The need for trauma-informed care will be demonstrated through an extensive literature review on trauma and examining the impact of trauma-informed care at Carson City Correctional Facility in Michigan. **CHALLENGE:** The main challenges during the experience were navigating the administration of the Michigan Department of Corrections and learning how to effectively communicate with the various populations within the facility. **EXPERIENCE:** Worked with counselors, social workers, and psychologists to develop treatment plans for individuals. Observed violence prevention, domestic violence, sex offender, and mental health programming. Developed rapport with inmates of various criminal backgrounds and levels of security. **OUTCOME:** Established a deeper understanding of programming within a correctional setting and how trauma impacts individuals within the justice system, specifically adult males. **IMPACT:** The internship provided vital insight into the correctional system and reiterates the literature on trauma within correctional facilities. The experience exposed me to different age groups, communities, and cultures that are affected by the criminal justice system.

Kayla Bates

Criminal Justice

Spring/Summer 2020

Kundan Joshi

Engineering

Spring/Summer 2019

J Appl Biomech. 2022 Aug 25;38(5):293-300. doi: 10.1123/jab.2021-0254. Print 2022 Oct 1.

Methods of Estimating Foot Power and Work in Standing Vertical Jump

Kundan Joshi [1], Blake M Ashby [1]

Affiliations + expand

PMID: 36007877 DOI: 10.1123/jab.2021-0254

Abstract

Experimental motion capture studies have commonly considered the foot as a single rigid body even though the foot contains 26 bones and 30 joints. Various methods have been applied to study rigid body deviations of the foot. This study compared 3 methods: distal foot power (DFP), foot power imbalance (FPI), and a 2-segment foot model to study foot power and work in the takeoff phase of standing vertical jumps. Six physically active participants each performed 6 standing vertical jumps from a starting position spanning 2 adjacent force platforms to allow ground reaction forces acting on the foot to be divided at the metatarsophalangeal (MTP) joints. Shortly after movement initiation, DFP showed a power absorption phase followed by a power generation phase. FPI followed a similar pattern with smaller power absorption and a larger power generation compared to DFP. MTP joints primarily generated power in the 2-segment model. The net foot work was -4.0 (1.0) J using DFP, 1.8 (1.1) J using FPI, and 5.1 (0.5) J with MTP. The results suggest that MTP joints are only 1 source of foot power and that differences between DFP and FPI should be further explored in jumping and other movements.

Abstract

The Facility for Rare Isotope Beams (FRIB) will use a sub-atmospheric helium refrigeration process operating at 2 K (31 mbar) to support the superconducting radio frequency (SRF) Niobium structures (known as cavities), which are housed within 'cryo-modules'. The cryomodules are large containers whose exterior forms a vacuum chamber that serves as a thermal shield. The cryo-modules, and the superconducting devices contained within, are used to accelerate charged particles. The accelerator at FRIB is comprised of three separate linear segments, separately or collectively, called a linear accelerator or 'LINAC'. The helium used as the working fluid to cool the SRF Niobium cavities is supplied from a 4.5 K refrigerator, but the sub-atmospheric condition will be produced by 'pumping-down' the LINAC using cryogenic (cold) centrifugal compressors to remove mass, thus reducing the pressure within the SRF Niobium cavities. The initial condition of liquid helium before starting a 'pump-down' can range from a 2 K sub-cooled liquid to a saturated liquid at around 1 bar. These initial condition extremes will result in pump-down processes that are different. This variability of initial conditions increase the complexity of the overall process. As such, a process model can provide considerable insight into the best approach to use for a particular pump-down.

This research has developed a simplified model of sub-atmospheric components downstream of the 4.5 K cold box. The initial condition of the helium within the SRF Niobium cavity is assumed to be a saturated mixture at near atmospheric pressure and remain a saturated mixture as the pump-down proceeds. The prime mover in this study is a single radial centrifugal cold compressor removing mass from the Niobium SRF cavities. A model for the return transfer line is incorporated to simulate pressure drop, heat in-leak, and mass accumulation of the sub-atmospheric helium returning from the LINAC back to the cold compressor. A counter flow heat exchanger is also a part of the model. This heat exchanger uses the sub-atmospheric helium stream leaving the SRF cavity to the cool the supply stream from the 4.5 K cold box. The model accounts for the non-constant thermal capacity rates present in this heat exchanger. The sum of the SRF cavities are modeled as a single dewar process, with a non-flowing two-phase mixture. The dewar process involves heat transfer to the liquid, and mass and energy depletion. The model is used to study the time to achieve a desired final within the dewar for a given set of system parameters. The component models are individually validated. The overall process can be extended and validated and compared to the FRIB process after such commissioning is complete. This model serves as the foundation for further process studies.

Modeling of Cold Compressor Pump Down Process

Kyle A. Dinger, *Grand Valley State University*

Follow

Kyle Dinger
Engineering
Spring/Summer 2018

Michael Cox
English
Spring/Summer 2019

Cormac McCarthy's Border Trilogy and the Modern American Identity Crisis

Michael G. Cox, *Grand Valley State University*

Abstract

The narrative trope of the American western is a long-standing literary convention rooted in a convoluted history of conquest, exploration, settlement, and exploitation. At the heart of the western genre is the idyllic vision of self-reliance. From its inception, the United States developed westward, pushing the limits of self-governance into the farthest reaches of empty terrain. As a result, the frontier has long been a symbol of personal liberty, a place where travelers and homesteaders have the freedom to achieve private independence in its purest form. Hollywood has done much to nurture this nostalgic image of prairie life. Iconic silver screen portraits of a bow-legged John Wayne or a cigarillo-chewing Clint Eastwood have endured in the eye of the American imagination for decades, and have perpetuated the classic vision of selfsufficiency in the twentieth and twenty-first centuries. Yet, while the genre has propagated the beliefs and values of an American monoculture, the cliché of the virtuous cowboy who tames the savagery of his natural surroundings is an image that comes under great scrutiny in Cormac McCarthy's southwestern spaces.

McCarthy's border novels foreground the problem of cultural identity in the postwar American mythos. In the years following the Second World War, McCarthy's characters find themselves alone along the high plains of the Mexican-American border. Although the two countries did not fight one another during the war, the border is representative of the cultural barrier that exists between them. At different moments in each of the three novels, protagonists John Grady Cole and Billy Parham come of age in a time period marked by cultural ambiguity. As each of the boys explores the sparse, empty spaces of the mountain terrain, he is faced with existential dilemmas that challenge his sense of self. In their quests, both boys find that their national heritage is obscured by the lifestyles of the indigenous men and women they encounter long the way. As they travel between two countries that seem diametrically opposed to one another in terms of political and cultural ideology, the boys struggle to reconcile a sense of personhood. Since the boys do not feel at home in either country, the problem of unhomeliness forces them to live as cultural refugees in a land of similarly displaced persons. They become, in effect, men without countries. In the lonesome wastes of the desert, where geographical parameters of nations become abstract, the boys inhabit a liminal space outside any national boundary. Having grown up in culturally homogeneous environments, their cultural identity is challenged when they cross the border. It is in this space that they grapple with questions of ethnic heritage, ancestral worldviews, absolute morality, and the notion of a national epistemology.

Innovation and Green Development
Volume 2, Issue 2, June 2023, 100052

Full Length Article

Development of a tiny house design tool to increase safety, efficiency, and cost-effectiveness

Michael J. Stratton II, Lindsay M. Corneal

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https://doi.org/10.1016/j.igd.2023.100052 Get rights and content

Abstract

The popularity of tiny houses is increasing, but the technical details are rarely covered. Therefore, this study examines the structural, stability, weight, and thermal requirements of tiny houses. A configurable SolidWorks model was created, and the location and quantity of structural supports were determined by performing structural finite element analyses (FEA). The center of mass, tip angles, overall weight, and tongue weight were computed to ensure stability while stationary or during transit. The heating and cooling needs for the tiny houses were calculated using thermal FEA for twelve cities of varying climates across the United States.The result was a Scilab design tool that takes as input, items such as location, desired size, utility needs, etc. It calculates the materials needed for the structure and the projected cost. This design tool, along with the provided construction drawings, allows the user to build a safer, efficient, and cost-effective tiny house.

Michael Stratton

Business

Winter 2021

Modeling of Optimized Neuro-Fuzzy Logic Based Active Vibration Control Method for Automotive Suspension

Mohammad Adom Safiullah, *Grand Valley State University*

Follow

Abstract

In this thesis, an active vibration control system was developed. The control system was developed and tested using a quarter car model of an adaptive suspension system. For active vibration control, an actuator was implemented in addition to the commonly used passive spring damper system. Due to nature of unpredictability of force required two different fuzzy inference system (FIS) were developed for the actuator. First a sequential fuzzy set was built, that resulted lower vertical displacement compared to basic damper spring model, but system had limited effect with disturbances of higher magnitude and continuous vibrations (rough road). To improve the performance of the sequential fuzzy set, the main fuzzy set was improved using an adaptive neuro fuzzy inference system (ANFIS). This model increased the performance substantially, especially for rough road and high magnitude disturbance scenarios. Finally, the suspension's spring constant and damping co-efficient was optimized using a genetic algorithm to further improve the vibration control properties to achieve a balance of both ride stability and comfort. The final result is improved performance of the suspension system.

Mohammad Adom Safiullah

Engineering

Winter 2019

Ecol Evol. 2021 Jun; 11(11): 6276–6288.
Published online 2021 May 2. doi: 10.1002/ece3.7480
PMCID: PMC8207425
PMID: 34141217

Intact landscape promotes gene flow and low genetic structuring in the threatened Eastern Massasauga Rattlesnake

Nathan Kudla,[1] Eric M. McCluskey,[✉1] Vijay Lulla,[2] Ralph Grundel,[3] and Jennifer A. Moore[1]

Abstract

Go to: ▸

Genetic structuring of wild populations is dependent on environmental, ecological, and life-history factors. The specific role environmental context plays in genetic structuring is important to conservation practitioners working with rare species across areas with varying degrees of fragmentation. We investigated fine-scale genetic patterns of the federally threatened Eastern Massasauga Rattlesnake (*Sistrurus catenatus*) on a relatively undisturbed island in northern Michigan, USA. This species often persists in habitat islands throughout much of its distribution due to extensive habitat loss and distance-limited dispersal. We found that the entire island population exhibited weak genetic structuring with spatially segregated variation in effective migration and genetic diversity. The low level of genetic structuring contrasts with previous studies in the southern part of the species' range at comparable fine scales (~7 km), in which much higher levels of structuring were documented. The island population's genetic structuring more closely resembles that of populations from Ontario, Canada, that occupy similarly intact habitats. Intrapopulation variation in effective migration and genetic diversity likely corresponds to the presence of large inland lakes acting as barriers and more human activity in the southern portion of the island. The observed genetic structuring in this intact landscape suggests that the Eastern Massasauga is capable of sufficient interpatch movements to reduce overall genetic structuring and colonize new habitats. Landscape mosaics with multiple habitat patches and localized barriers (e.g., large water bodies or roads) will promote gene flow and natural colonization for this declining species.

Nathan Kudla

Biology

Spring/Summer 2019

Sindhuja Moravineni

Engineering

Spring/Summer 2019

To Study the Current Distributions of Electrically Short Dipoles in Magnetized Collisional Plasma via FDTD Simulations

Publisher: IEEE

Cite This

PDF

Sindhuja Moravineni ; Jeffrey Ward **All Authors**

Abstract:

This paper presents the study of current distributions on dipole antenna immersed in warm, magnetized collisional plasma. The PF-FDTD (Plasma Fluid- Finite Difference Time Domain) model is used to model the antenna in warm, collisional and magnetized plasma. Three different types of current distributions (i.e) one-dimensional current distribution(analytical), three-dimensional current distribution(analytical), PDTD model for current distributions (numerical) are compared with each other and results are observed. These comparisons of the analytical and numerical solutions show that numerical solutions have higher resolution in analyzing the current distributions of an antenna then the analytical solutions and also the advantages and disadvantages of these different analysis methods are discussed.

Published in: 2018 USNC-URSI Radio Science Meeting (Joint with AP-S Symposium)

Date of Conference: 08-13 July 2018

DOI: 10.1109/USNC-URSI.2018.8602509

Date Added to IEEE *Xplore*: 06 January 2019

Publisher: IEEE

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Conference Location: Boston, MA, USA

Travis Garvin

Biomedical Science

Winter 2019

The relationship between feeding type and temporomandibular joint morphology in superfamily Musteloidea

Travis L. Garvin, *Grand Valley State University*

Follow

Abstract

Many studies have focused on the soft tissue analysis of carnivores and have demonstrated a relationship between feeding biomechanics and feeding types. Herbivores and omnivores rely heavily on anteroposterior and helical movement of the mandible and teeth for the breakdown of fibrous foods resulting in a flat mandibular fossa while the function of the carnivore TMJ is different, as they need a much stable joint for ripping and tearing of the flesh. I aim to look at whether the bony morphology of the temporomandibular joint (TMJ) can be directly related to feeding type, specifically in the superfamily Musteloidea. I sampled the complete TMJ of Gulo gulo, Lontra canadensis, Potos flavus, and Procyon lotor, a dietarily diverse selection of musteloid carnivorans. I used three-dimensional scans of specimens and evaluated them by use of principal component analysis (PCA) and phylogenetic principal component analysis (pPCA) to look for data that correlated feeding type and TMJ morphology. The resulting PCA and pPCA data indicates that the feeding type is only one influential piece of bony TMJ morphology and other characteristics including locomotor habitat, soft tissue dependencies, and other non-TMJ bony characteristics contribute to the masticatory apparatus and feeding biomechanics of the TMJ. Specifically, characteristics such as snout length, coronoid process angulation, tubercle positionings, and fossa shapes, sizes, and orientations all influence TMJ morphology.

Simulated Fire Season and Temperature Affect *Centaurea stoebe* Control, Native Plant Growth, and Soil (±)-catechin

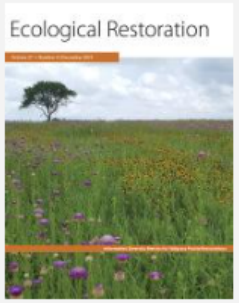
Zachery T. Pitman and Todd A. Aschenbach

Ecological Restoration, December 2019, 37 (4) 246-255; DOI: https://doi.org/10.3368/er.37.4.246

Abstract

Invasive species, including the non-native forb *Centaurea stoebe* (spotted knapweed), constitute a threat to degraded and restored native prairies. Considering the threat that *C. stoebe* poses to prairie ecosystems, we examined the effectiveness of fire as a control for *C. stoebe* and (±)-catechin, a known allelopathic compound. We conducted an experiment in a reconstructed tallgrass prairie community at Pierce Cedar Creek Institute in Barry County, Michigan starting in May 2016. Our experiment consisted of individually burning 60 1-m^2 plots with a propane torch to achieve high (316°C) and low (103°C) temperatures across spring and summer seasons over two years, then planting and seeding six native prairie plant species to monitor their establishment after burning. We compared the effects of the different burn treatments on the plant community by estimating percent cover and biomass of all species within each plot in August 2017. We also examined the effects of the simulated burn treatments on soil (±)-catechin levels, which we quantified using High Performance Liquid Chromatography. *Centaurea stoebe* was less dominant in burned plots than unburned plots, with summer-burned plots having the lowest biomass and cover. Differences in burn temperature failed to produce significantly different results. Planted native grasses increased more after spring burns than after summer burns. Preliminary findings suggest that high-temperature spring burns may indirectly reduce soil (±)-catechin levels. Overall, these results indicate that prescribed burning is an effective tool for controlling *C. stoebe* and promoting native species establishment in restored tallgrass prairies.

In this issue



Ecological Restoration
Vol. 37, Issue 4
1 Dec 2019
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Zachery Pitman

Biology

Spring/Summer 2018

Science of The Total Environment
Volume 650, Part 2, 10 February 2019, Pages 1969-1979

Impact of sediment dredging on sediment phosphorus flux in a restored riparian wetland

Kimberly A. Oldenborg, Alan D. Steinman

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https://doi.org/10.1016/j.scitotenv.2018.09.298 Get rights and content

Abstract

Many riverine wetlands have been drained for the creation of agricultural land; however, global declines in freshwater biodiversity have begun to motivate wetland restoration projects around the world. Legacy phosphorus (P) increases the risk that wetland restoration may liberate excess P to the water column and connecting waterbodies, resulting in a trade-off of restored habitat for degraded water quality. To avoid this trade-off, we dredged a former agricultural parcel prior to hydrologic reconnection, and evaluated restoration success by comparing sediment P dynamics before and after dredging. First, results from P adsorption isotherm experiments suggested that after dredging, the sediment would act as a sink for dissolved P only when water column soluble reactive phosphorus (SRP) concentrations exceeded 40 $\mu g\ L^{-1}$. Additionally, the dredging depth (~1 m on average) exposed sediment with significantly reduced P sorption capacities. Second, P release rates were measured in sediment cores that were incubated under two water temperatures (ambient; +2 °C) and two oxygen levels (oxic; hypoxic). Average maximum total phosphorus (TP) release rates ranged from 40 to 85 $mg\ m^{-2}\ d^{-1}$ before dredging and from 0 to 7 $mg\ m^{-2}\ d^{-1}$ after dredging, resulting in a 95–99% reduction in TP release rates after dredging. Similar reductions were measured also for SRP release rates. The significant reduction in sediment P release after dredging now creates a high potential for this restored wetland to reduce net P loads into downstream waters by facilitating the deposition and burial of particulate P. We conclude that sediment dredging can be a useful technique for balancing the goals of habitat restoration and water quality improvements in wetlands restored on former agricultural lands.

Kimberly Oldenborg

Biology

Fall 2018

“Who has a right to say what focus is the legitimate focus?” Tennessee Williams and Julia Margaret Cameron’s Theatrical Portraits of Women

Jennifer M. Klug, *Grand Valley State University*

Follow

Jennifer Klug

English

Fall 2018

Abstract

In the production notes preceding *The Glass Menagerie*, Tennessee Williams said: “Everyone should know nowadays the unimportance of the photographic in art: that truth, life, or reality is an organic thing which the poetic imagination can represent or suggest, in essence, only through transformation, through changing into other forms than those which were merely present in appearance.” In spite of Williams’s emphasis on the limitations of literal representation, some of his most famous female characters were created in a tradition similar to that of portraits of women by the Victorian-era photographer Julia Margaret Cameron. Both Cameron and Williams made portraits of women that encouraged an understanding of and allowance for multiple truths. This thesis explores the parallels between Williams’s theatrical “portraits” and Cameron’s “theatrical” portraits, and demonstrates that both artists empowered women characters with the ability to perform truth that is much larger than (and frequently contradicts) that which is “merely present in appearance.” This discussion examines the visual techniques that Cameron used in her portrait photographs in order to illuminate the ways Williams built similar performances in his scripts, and then tracks women characters from four of Williams’s plays— “Portrait of a Madonna,” *A Streetcar Named Desire, Cat on a Hot Tin Roof,* and *Sweet Bird of Youth* —tracing a progression of their power through their dialogue, Williams’s stage directions, and his writings about the characters and plays.

ScholarWorks Citation

Klug, Jennifer M., ""Who has a right to say what focus is the legitimate focus?" Tennessee Williams and Julia Margaret Cameron's Theatrical Portraits of Women" (2018). *Masters Theses*. 904.

https://scholarworks.gvsu.edu/theses/904

Dynamic Carbon Cycling in Muskegon Lake – a Great Lakes Estuary

Katie Lynn Knapp, *Grand Valley State University*

Abstract

Ecosystem metabolism is the coupling of carbon and oxygen through photosynthesis and respiration. Gross primary production (GPP) is the carbon fixation by photosynthesis, ecosystem respiration (R) is carbon remineralization by bacterial and plankton respiration, and net ecosystem production (NEP) is the balance. Metabolism estimates determine if ecosystem is a sink or source of carbon to the atmosphere. When a lake has a positive NEP, or the GPP:R ratio is greater than 1, it is considered autotrophic and less carbon is being lost to the atmosphere than taken in, whereas if NEP is negative (GPP:R-1d^{-1}, respectively and the BOD 7-year average (±SD) of GPP, R, and NEP was 0.332 ± 0.226, -0.117 ± 0.069, and 0.214 ± 0.177 mg C L^{-1} d^{-1}, respectively. The BUOY method consistently yielded higher rates for GPP and R and much lower rates of NEP compared to the BOD method. For the second objective, the spatial component of the study, GPP and R were significantly different across sites, but NEP was not significantly different. Our results suggest Muskegon Lake is annually a net sink of carbon. NEP may not vary much across the lake, but GPP and R and vary widely at each location. Our high frequency time-series data from multiple buoys demonstrates that freshwater lakes may display significant differences in metabolism across the ecosystem along with seasonally unequal rates of metabolism. Muskegon Lake NEP rates were comparable to NEP rates at upwelling zones in the ocean indicating more focus should be placed on inland waters when researching global carbon cycles.

ScholarWorks Citation

Knapp, Katie Lynn, "Dynamic Carbon Cycling in Muskegon Lake – a Great Lakes Estuary" (2019). *Masters Theses*. 947.
https://scholarworks.gvsu.edu/theses/947

Katie Knapp

Biology

Fall 2019

Investigation of Selective Laser Melting Fabricated Internal Cooling Channels

Colin Jack, *Grand Valley State University*

Colin Jack

Engineering

Winter 2019

Abstract

Channels where coolant is run to cool a system are common in injection mold tooling. Conventionally, these channels are machined into the mold. This has limited the design of mold cooling systems to the constraints of traditional machining processes, where straight circular channels machined from cast material are typical. The transfer of heat away from the part cavity into these cooling channels has a large effect on the cooling time of the injection mold cycle. In this investigation, laser powder bed fusion processes were used to create non-circular cooling channels. To compare cooling performance, elliptical and circular channels of equal crosssectional area were investigated for mass flow rate and rate of heat transfer. Between conventionally machined and additively manufactured channels, surface roughness of the channel wall and condition of the parent material were investigated as potential factors as well. Through simulation, analysis of channel surface roughness, and experimentation, the results indicated that: the channel machined from cast 316L stainless steel had higher flow rate and rate of heat transfer compared to the machined channel fabricated from selective laser melting 316L metal powder, the machined channel had higher flow rate and rate of heat transfer compared to the as-fabricated additively manufactured sample, and the circular additively manufactured channel had higher flow rate and rate of heat transfer compared to the elliptical channel. Overall, the traditionally machined circular channels had superior cooling performance than the additively manufactured elliptical channels. However, the results demonstrate that changing the length-to-width ratio of elliptical cross channels can be used to locally control cooling on regions of the part to reduce hot-spots in the mold and part defects.

Eric VanDyke

Engineering

Winter 2019

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Leveling the Playfield: Development of Multimedia Resources for Hands-On Learning

Though the central premise of engineering is to design artifacts, processes, systems to solve problems informed by science and technology, at the most rudimentary level, transforming the design into a physical object completes the solution. Grand Valley State University (GVSU) engineering program while emphasizing theoretical development, promotes transforming the design into a physical system by hands-on-teaching. The hands-on philosophy is so ingrained in the curriculum, that it is expected that all students, at any level undergraduate or graduate, are capable of operating common machine tools and equipment to translate their design projects into a functioning prototype. Students who enter GVSU-Engineering with no hands-on knowledge may struggle to participate in their projects. This negatively impacts the confidence of the student, making it a difficult skill gap to recover from. Inspired by initiatives like 'Khan Academy' and recent success of online courses, an attempt is made to address the hands-on knowledge gap. A GVSU-hosted website was developed as a learning tool that teaches safety, scientific theory, and operation of the processes and equipment used by engineering students to create projects. Development of the web based modules are targeted to two groups of students. The first group needs background knowledge for a class or certification to safely operate a machine tool. The second group is students that need guidance and resources for design projects which are often sponsored by external industry partners. A how-to video series demonstrates the basic concepts, theory, tips and tricks, safety, and operation of various processes. A cheat-sheet style PDF accompanies each video for rapid learning. Lastly, a "web of knowledge" space on the website allows users to converge on resources specific to their needs. This paper describes the modules of this non-intimidating learning environment which will address the skill gap issues.

Improving Heart Failure Care Plan Coordination Across the Health Care Continuum

Amy Veltkamp, *Grand Valley State University*

Abstract

Heart failure costs the United States 31 billion dollars each year, with much of those costs attributed to hospital admissions. Coordinating care across the health care continuum is a critical factor in improving heart failure care and reducing readmissions. An organizational assessment was conducted using the Burke and Litwin Causal Model of Organizational Performance and Change. The quality improvement project implemented a longitudinal plan of care (LPOC) across 10 hospitals and numerous ambulatory care sites at a large Midwestern health organization. Nurse care managers (NCMs) were the focus of this project due to their high-level of involvement in care coordination. Kotter's Eight Step Change Model was used to guide implementation. Key implementation strategies included creating a steering committee, involving end users in LPOC design and testing, auditing and providing feedback to end users, and planning for optimization. Due to a delayed go-live date, post-implementation hospital readmission rates were not available at publication. No significant differences were found in staff perception of heart failure care coordination (pre to post implementation). However, NCMs communication of key patient elements in ambulatory settings were lower than NCMs in inpatient settings. LPOC adoption rate was 48% at five weeks post-implementation. LPOC implementation should include examining care coordination to contribute to the limited literature on LPOC use in practice and the effect of LPOC use on coordination of care for heart failure patients across the health care continuum.

ScholarWorks Citation

Veltkamp, Amy, "Improving Heart Failure Care Plan Coordination Across the Health Care Continuum" (2019). *Doctoral Projects*. 67.

https://scholarworks.gvsu.edu/kcon_doctoralprojects/67

Amy Veltkamp

Nursing

Winter 2019

Bloom and bust: Historical trends of harmful algal blooms in Muskegon Lake, Michigan, a Great Lakes estuary

Jasmine L. Mancuso, Anthony D. Weinke, Ian P. Stone, Sarah E. Hamsher, M. Megan Woller-Skar, Eric B. Snyder, and Bopaiah A. Biddanda

PDF | PDF PLUS | Abstract | Full Text | Supplemental Material

Abstract

Around the world, freshwater lakes are increasingly suffering from harmful algal blooms (HABs) as a result of anthropogenic eutrophication. Muskegon Lake (Muskegon, Michigan, USA), a drowned river mouth, Great Lakes estuary, was declared an Area of Concern by the Environmental Protection Agency in 1987 with nuisance algal blooms cited as a beneficial-use impairment. The objective of this study was to quantify changes in HAB prevalence and assemblage composition in Muskegon Lake over 14 y (2003–2016) and explore the environmental factors potentially driving the changes. We performed univariate and multivariate analyses on long-term monitoring data, including environmental and phytoplankton data, to understand their relationships and temporal variation. Using linear regressions, we assessed changes in environmental variables over time and relationships between cyanobacteria biovolume and environmental variables. We used non-metric multidimensional scaling to visualize variation in annual cyanobacteria assemblage composition and association with environmental variables. Analyses revealed that, despite generally rising water temperatures, which would be expected to increase HABs, a reduction in nutrient concentrations caused by restoration efforts has likely led to substantial decreases in HAB abundance over time. Additionally, HAB assemblage composition appears to be driven by temperature and nutrient form and amount, with *Microcystis* (Lemmermann, 1907) often dominating. HABs in freshwater bodies should be closely monitored into the future as we enter an era of uncertain climatic conditions.

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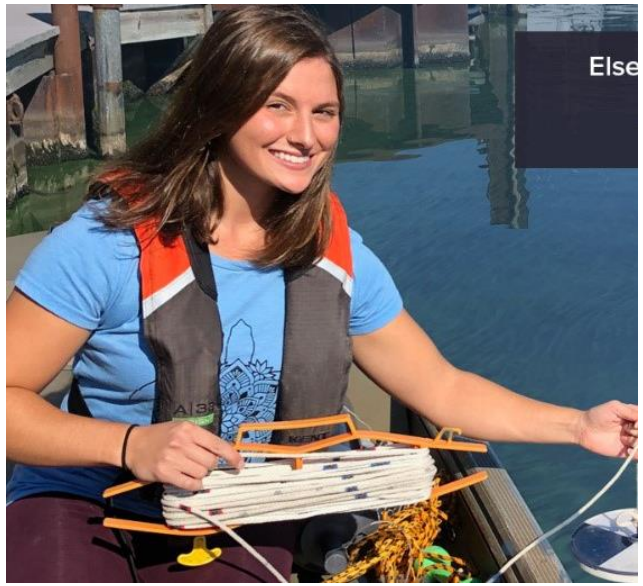
Jasmine Mancuso

Biology/AWRI

Winter 2021



Analysis of Center of Pressure and Center of Mass to Determine Patterns of Postural Stability in Neurotypical Subjects

Natalie Tipton, *Grand Valley State University*

Natalie Tipton

Engineering

Fall 2021

Abstract

The body's postural control mechanism is responsible for responding to perturbations of balance and keeping the body upright. One of the main ways that this is completed during quiet standing, where both feet are planted on the ground, is through center of pressure oscillations. In these oscillations, the center of pressure circles around the center of mass, constantly counteracting any lean that exists in the body. These oscillations can be recorded with floorembedded force plates and center of mass can be recorded with a motion capture system. In this research, these signals were recorded for stances with feet together and feet tandem with eyes opened and eyes closed with neurotypical subjects. Center of pressure and center of mass were compared to determine if they provide the same information as one another. Through different correlation measures, it was shown that they generally have a very strong relationship to one another, and that COP provides as much information as COM.

From there, center of pressure was further analyzed using approximate entropy, velocity measures, and regression. This analysis showed evidence of increased irregularity, increased velocity, and increased frequency content in center of pressure oscillations during standing conditions with lower stability. ApEn indicated significant differences between the most stable eyes open, feet together condition and all of the less stable feet tandem trials for eyes open and eyes closed in nearly every subject. Velocity, however, only indicated significant differences between the most stable condition and the least stable eyes closed, feet tandem trials. Regression analysis showed a decrease in the content that could be explained by the model as stability decreased. Regression also provided a general illustration of what each stability condition may be expected to look like, which can be used to compare future data against. The results of this study will be useful to compare non-neurotypical subject data to moving forward.

› Disabil Rehabil Assist Technol. 2021 May 28:1-5. doi: 10.1080/17483107.2021.1931966.
Online ahead of print.

Outcomes of a child-based manual wheelchair skills peer training program: an exploratory case report

Lisa K Kenyon [1], Elizabeth N Hesse [1], Katelynn J Pakkala [1], Sebastian Vanderest [1]

Affiliations + expand

PMID: 34048664 DOI: 10.1080/17483107.2021.1931966

Abstract

Purpose: The purpose of this exploratory case series was to describe the outcomes for both a child-learner and a child-peer after a single manual wheelchair (MWC) skills training session involving child-based peer training techniques, followed by related home-based skills practice.

Materials and methods: Participants were a 9-year-old with L4-L5 spina bifida (pseudonym: Amari) and a 3-year-old with T10 spina bifida (pseudonym: Mary). Pre-intervention examination included administration of the Wheelchair Skills Test Questionnaire (WST-Q), the MWC short scale within the Mobility domain of the Paediatric Evaluation of Disability - Computer Adapted Test (MWC PEDI-CAT), and the Canadian Occupational Performance Measure (COPM). The peer training session, facilitated by a physical therapy team, involved games and activities involving MWC use. When appropriate, Amari was asked to talk aloud and verbally describe the components of the skills she was performing. Each child and her mother were instructed in specific MWC skills to practice at home over a 3-week period.

Results: Both participants' post-intervention WST-Q capacity, confidence, and performance scores increased. Increases in parent-proxy COPM scores indicated clinically meaningful change in all identified occupational performance problems. Mary's total MWC PEDI-CAT post-intervention score increased by 11 points. Both mothers reported that the participation in the activities helped also to improve their child's self-esteem and self-image.

Conclusions: Both the participants in this exploratory case appeared to demonstrate improvements in MWC skills, self-esteem, and self-image following a single child-based MWC skills peer training session and related home-based skills practice. Future research involving such peer training methods is warranted.

Sebastian Vanderest

Physical Therapy

Winter 2022

April Butler

Nursing Practice, Doctorate

Winter 2022

Development of a Care Management Program within an Urban Health Center

April M. Butler, *Grand Valley State University*

Follow

Abstract

Abstract

Care management (CM) services offered in primary care settings are used to increase patient engagement in self-care and improve communication between patients and health care providers. The aim of this article is to describe the creation of an evidenced-based toolkit within an urban health center that addresses the structures, processes, and outcome measures necessary for the development of a sustainable CM program. Based on the findings from an organizational assessment and comprehensive literature synthesis, several policies, procedures, and workflow diagrams of processes within the health center were created to guide the implementation of a CM program.

ScholarWorks Citation

Butler, April M., "Development of a Care Management Program within an Urban Health Center" (2022). *Culminating Experience Projects*. 104.
https://scholarworks.gvsu.edu/gradprojects/104

Daniel Dietsche

Applied Computer Science

Fall 2023

Divide-and-Conquer Algorithms for Computing Three-Dimensional Voronoi Diagrams

Abstract:
While Voronoi diagrams are used in a wide range of applications, leading algorithms (e.g., Fortune's algorithm) are limited to two-dimensional Voronoi diagrams. Problematically, many of the space-dividing applications of Voronoi diagrams exist in three-dimensional spaces rather than two-dimensional spaces. While two-dimensional Voronoi diagrams have been used in cases where three-dimensional space can be simplified to two-dimensional space with an acceptable loss of precision, such simplification is not always feasible. In this paper we extend existing work on divide-and-conquer algorithms for computing two-dimensional discretized Voronoi diagrams by introducing and comparing two novel algorithms for calculating three-dimensional discretized Voronoi diagrams. A comparison of the two algorithms is presented for a range of both space sizes and number of sites.

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Abstract

Bottom water hypoxia, a condition of low dissolved oxygen in the bottom waters, negatively effects lakes and freshwater and marine coastal estuaries globally. As climate change shifts climatological and ecological patterns, hypoxia continues to shift in duration and severity. In Muskegon Lake, Michigan, hypoxia occurs annually, restricting fish habitat, increasing cyanobacteria blooms, and disrupting ecological and socioeconomic prosperity. In the current study, we examined the duration and severity of hypoxia over a 11 years (2011-2021) utilizing data from the Muskegon Lake Observatory buoy (MLO, https://www.gvsu.edu/wri/buoy/). During 2021, we analyzed the dissolved oxygen (DO) concentrations observed by the MLO, conducted biweekly sampling of nutrients across the gradient of the lake ecosystem, and investigated seasonal surface and riverine loading to understand the impact these sources have on the drawdown oxygen in the hypolimnion. A new hypoxic severity index was devised to illustrate the severity of the hypoxia across the decade, with the years 2021 and 2012 being the most severe and 2015 and 2019 being the least severe. Spring air and surface water temperatures correlated with stratification strength within Muskegon Lake leading to varying levels of hypoxia. High spring precipitation and high summer algal growth correlated with high severity of hypoxia. Low spring precipitation and low summer algal growth led to reduced severity of hypoxia. Within 2021, frequent wind-mixing events, and an intrusion of cold, oxygenated upwelled Lake Michigan waters intermittently alleviated hypoxia, although never fully disrupting it, leading to a long duration of stratification and hypoxia severity throughout the year. Oxygen drawdown experiments revealed that riverine organic matter inputs to the hypolimnion contributed to the development of hypoxia more readily than surface primary production in the spring, whereas the opposite was true in the summer and fall, suggesting seasonally variable sources drive hypolimnetic hypoxia. Biweekly nutrient analyses revealed that soluble reactive phosphorus accumulated in the hypolimnion during late summer, indicative of internal phosphorus loading. Our findings on temperature and precipitation as major causative agents of hypoxia, seasonal oxygen drawdown, and internal phosphorus loading have relevance to similarly afflicted ecosystems in the Great Lakes basin and lakes and estuaries everywhere.

ScholarWorks Citation

Dugener, Nate M., "Running out of oxygen: Revealing the interannual and intra-annual dynamics of bottom water hypoxia in a Great Lakes estuary using time-series observations, experiments, and analyses" (2022). *Masters Theses*. 1071.
https://scholarworks.gvsu.edu/theses/1071

Running out of oxygen: Revealing the interannual and intra-annual dynamics of bottom water hypoxia in a Great Lakes estuary using time-series observations, experiments, and analyses

Nate M. Dugener, *Grand Valley State University*

Follow

Nathan Dugener

Biology

Fall 2023

Michael Doran

Engineering

Fall 2023

seL4 on RISC-V - Developing High Assurance Platforms with Modular Open-Source Architectures

Michael A. Doran Jr., *Grand Valley State University*

Follow

Abstract

Virtualization is now becoming an industry standard for modern embedded systems. Modern embedded systems can now support multiple applications on a single hardware platform while meeting power and cost requirements. Virtualization on an embedded system is achieved through the design of the hardware-software interface. Instruction set architecture, ISA, defines the hardware-software interface for an embedded system. At the hardware level the ISA, provides extensions to support virtualization.

In addition to an ISA that supports hypervisor extensions it is equally important to provide a hypervisor completely capable of exploiting the benefits of virtualization for securing modern embedded systems. Currently there does not exist a commercial hardware design that leverages the RISC-V ISA hypervisor extension co-designed with an open-source microkernel.

This research describes an implementation of the seL4 open-source microkernel with the latest version of the RISC-V hypervisor extension (H-extension v0.6.1) specification in a Rocket chip soft core. The combination of open ISA, open-source OS and open-source hardware enables hardware and software co-design for securing embedded applications.

The implication of this research provides a meaningful evaluation of RISC-V with the seL4 open-source microkernel by providing an open-source hardware implementation on a Zynq Ultrascale+ MPSoC ZCU102 to assist the RISC-V community towards implementation and evaluation of hypervisor technology such as seL4.

ScholarWorks Citation

Doran, Michael A. Jr, "seL4 on RISC-V - Developing High Assurance Platforms with Modular Open-Source Architectures" (2023). *Masters Theses*. 1106.
https://scholarworks.gvsu.edu/theses/1106

Children Have Faced Several Challenges: Analyzing Reports of Children Who Became Orphans Caused by COVID-19

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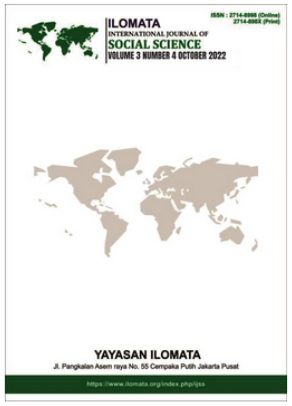


Download

Abstract

Many children have become orphans due to COVID-19. Their experiences have been under reported due to focus on other areas. This study explores adverse social consequences of children who became orphans due to COVID-19. With the aid of a documentary review approach, this study extracts and analyzes reports from 11 highly ranked news reporting sites in the United States of America that contained expert opinions and narratives on the negative social consequences of being orphaned by COVID-19. Analysis of data followed the narrative thematic analysis procedure. The outstanding themes identified are the loss of caregivers and primary social support system, and increased risk of mental health concerns. The findings demonstrate the need for emergency financial support for COVID-19 related orphaned children and the involvement of experts trained in Trauma-Focused Cognitive-Behavior Therapies (TF-CBT) to help children's psychosocial needs.

Keywords

COVID-19 orphanhood | children | social consequences | mental health | social support

Sarah Hassan

Social Work

Fall 2023

Hyeong Gyu Jang

Applied Computer Science

Winter 2023

Building a Deep Model for Multi-class Coral Species Discrimination

Hyeong Gyu Jang, *Grand Valley State University*

Follow

Abstract

The goal of this qualitative research project is to develop and optimize a multi-class discrimination model to identify different species of coral based on their digital images. Currently, there are artificial intelligence (AI) models that can distinguish between coral and other undersea objects such as sand or rocks, but to our knowledge the problem of multi-species classification has not yet been addressed. Given that coral reefs are a good indicator of overall ocean health, it is important to develop models that can classify the presence of different species in underwater images as a way to monitor the effects of climate change.

The dataset for this project consists of images of various species of coral; collected from the reef regions of offshore Florida and Bonaire, sanitized, labeled, and organized according to species. This study explores multiple options for image pre-processing, compares different model architectures, and experiments with hyperparameters such as learning rate with a goal of developing the most accurate coral species classifier. Our preliminary results: using only a portion of the complete dataset, a multi-class coral species classifier was produced that achieves 92.2% accuracy.

ScholarWorks Citation

Jang, Hyeong Gyu, "Building a Deep Model for Multi-class Coral Species Discrimination" (2022). *Culminating Experience Projects*. 223.
https://scholarworks.gvsu.edu/gradprojects/223

The Application of Microbial Source Tracking to aid in Site Prioritization for Remediation in Lower Michigan

John J. Hart, *Grand Valley State University*

Follow

Abstract

Non-point source fecal pollution is a threat to both the environment and public health. Climate change, aging infrastructure, and intensified agricultural practices are predicted to accentuate this issue. In Michigan, due to the high instance of aging infrastructure and intensified agriculture, non-point source fecal pollution has caused many waterbodies to exceed the state standards posing a risk to recreational activities and source water. Due to this threat, there is an increased effort to identify and remediate these sources. My study focused on improving the identification of non-point source fecal pollution through a combination of culture-based and molecular fecal indicator bacteria (FIB) identification, combined with geospatial and statistical modeling approaches. In Chapter 2, I assessed associations between measured FIB and key watershed characteristics in two watersheds located in Ottawa County, Michigan: Bass River and Deer Creek. Results indicated several associations between watershed characteristics and monitored FIB, which should be considered in future non-point source monitoring efforts. In Chapter 3, I created a new tool to aid stakeholders in interpreting FIB monitoring results. This tool was applied to FIB data from the previous chapter as well as FIB data from five public beaches in Macomb County, Michigan. Results indicated that the framework could improve the interpretation of monitored data. Using this tool, stakeholders can better identify and remediate the most impaired areas first, maximizing their impact and minimizing costs. In Chapter 4, I assessed potential improvements to components of a commonly used geospatial model, the Agricultural Conservation Planning Framework (ACPF), and looked at the model's ability to assess non-point source fecal pollution from runoff derived events. To determine this, I first updated the sediment delivery ratio (SDR) in runoff risk and compared the updated outputs to measured FIB to identify ACPF's ability to assess FIB concentrations. Results indicated a significant difference between model outputs, but limitations in experimental design precluded an adequate assessment of my objective for this chapter. Recommendations on future studies to properly assess these objectives were offered.

ScholarWorks Citation

Hart, John J., "The Application of Microbial Source Tracking to aid in Site Prioritization for Remediation in Lower Michigan" (2023). *Masters Theses*. 1084.
https://scholarworks.gvsu.edu/theses/1084

John Hart

Biology

Winter 2023

Jessica Ensing

Cell and Molecular Biology

Winter 2023

Evaluating the microbial experience influence on anti-tumor immune response

Jessica A. Ensing, *Grand Valley State University*

Abstract

Despite the steady increase of hygienic standards, the CDC continues to report an increase of immune-mediated diseases such as allergies and asthma. Human avoidance of microbial exposure and subsequently less experienced immune systems may be the cause for this increase. We investigated if increased microbial exposure results in increased immunity to cancer (B16 melanoma) by measuring activated lymphocytes between two groups of C57Bl/6 mice: specific pathogen free (SPF) mice (which had little microbial exposure) and cohoused (COH) mice (which were exposed to numerous microbes). Previous research shows that the CoH mouse model mimics a human adult's immune system, while the SPF mouse model mimics that of a human infant's. Activated lymphocyte levels were quantified with weekly bleeds using antibody staining flow cytometry. Anti-tumor response was evaluated through multiple harvests in which blood, lymph nodes, spleens, and tumors were collected and analyzed with flow cytometry. CoH mice were expected to have heightened levels of activated lymphocytes and an anti-tumor response superior to the SPF mice. The CoH mice did gain microbial experience and showed in a higher quantity of activated CD8+ T cells. Preliminary results suggest that this may have resulted in an increased anti-tumor response and slowed cancer proliferation.

OUTSTANDING PUBLICATION

Alyssa McCord

Major: Criminal Justice

"I officially graduate with my masters degree this spring, and then I am moving to Colorado to pursue a career in law enforcement. I am going to miss Grand Rapids a lot but I'm so thankful for all of the opportunities Grand Valley has provided me these past 6 years. My favorite GV memory would probably have to be meeting amazing people who have become my best friends and some great professors that I still keep in touch with. I'm grateful to be a Laker for a Lifetime!"

Winter 2021

Gaining a Victim-Centered Approach to Policing

Alyssa McCord, *Grand Valley State University*

Description

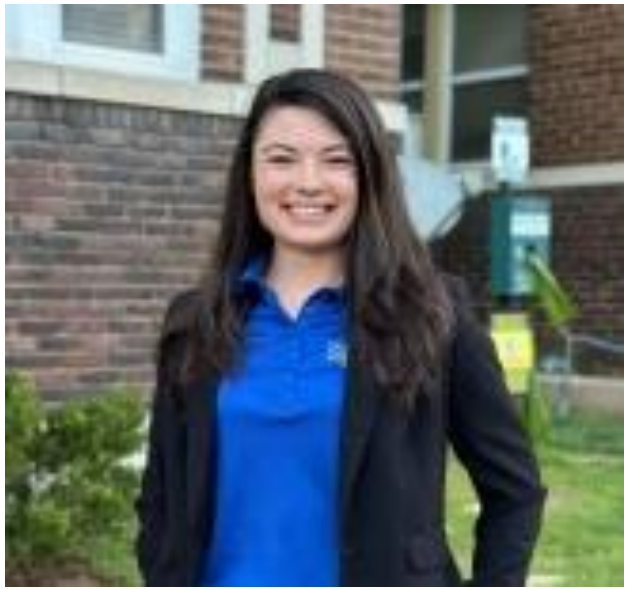
PURPOSE: Practical work experience is invaluable when obtaining a degree in a community and public service field such as criminal justice. My work with the Grand Rapids Police Department's Victim Services Unit has helped me understand the social work facet of criminal justice, which I feel is difficult to be taught within a classroom. **CHALLENGE:** The most challenging aspect of my internship experience was getting pushed out of my comfort zone and interacting with people in a completely new way, with the focus being on victims' feelings and well-being rather than fact-finding. **EXPERIENCE:** This internship forced me to shift my focus from the offender to the victim and learn to connect with clients to gauge their well-being rather than taking an investigative role and asking who/what/where/when/why questions. **OUTCOME:** As a student with aspirations to go into law enforcement, this experience taught me how to look at the entire picture within the realm of crime and law enforcement, giving me the ability to recognize victims' traumatic experiences and the ways in which I can respond to address their needs and minimize secondary victimization. **IMPACT:** Working within the Victim Services Unit gave me the unique experience of working directly with victims following traumatic events. I gained knowledge on trauma responses and saw firsthand the range of reactions victims may exhibit after being impacted by crime. I believe this has helped me develop a greater sense of empathy and understanding of victims' needs that will benefit me immensely in a career in law enforcement.

Occupational Therapists' Perceptions on Addressing Spirituality: A Cross Sectional Survey

The Open Journal of Occupational Therapy

ABSTRACT

Occupational Therapy (OT) was founded as a holistic profession that addresses the mind, body, and spirit. Research indicates that occupational therapists feel uncomfortable incorporating spirituality into practice This study aimed to identify perceptions of OT practitioners in addressing the spiritual needs of their clients. A cross-sectional Qualtrics survey was adapted from the Religious/Spiritually Integrated Practice Assessment Scale (RSIPAS). The survey was electronically sent out by several professional OT organizations. It was sent to occupational therapists and OT assistants to obtain their perspective of incorporating spirituality in practice. Quantitative and qualitative data analysis was completed. 46 of the 52 participants that completed the Likert scale items on the survey were open to learning about spiritual beliefs that differ from their own. 97% of participants believed incorporating spirituality can improve client outcomes and achieve goals; 95% could address unfamiliar beliefs; and >90% that it was essential to address clients' spiritual beliefs. Qualitative themes involving barriers to spiritual implementation included: too little time, lack of education, and workplace integration complications. Although spirituality is accepted as part of the OT process, there are a multitude of barriers that impact the feasibility and inclusion of spirituality in



Shannon Metzger

Occupational Therapy

Fall 2023

Disability and Rehabilitation
An international, multidisciplinary journal

Jerika Schmitt
Physical Therapy
Winter 2020

DISABILITY AND REHABILITATION: ASSISTIVE TECHNOLOGY
2020, VOL. 15, NO. 6, 708-717
https://doi.org/10.1080/17483107.2019.1617358

Taylor & Francis
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Providing paediatric power wheelchairs in the USA then and now: a survey of providers

Lisa K. Kenyon[a], Jerika Schmitt[a], Sango Otieno[b], and Laura Cohen[c]

[a] Department of Physical Therapy, Grand Valley State University, Grand Rapids, MI, USA; [b] Department of Statistics, Grand Valley State University, Allendale, MI, USA; [c] Rehabilitation & Technology Consultants, LLC, Arlington, VA, USA

ABSTRACT

Aims: To explore and describe current practices in the USA related to the provision of paediatric power wheelchairs (PWCs) from the perspective of professionals involved in recommending, ordering or prescribing a PWC, and to compare and contrast current PWC practices to findings of a 2001 survey.

Materials and methods: This descriptive study utilized a web-based survey to collect quantitative and qualitative data related to paediatric PWC evaluation activities, recommendations, decision-making considerations and other issues related to the provision of paediatric PWCs.

Results: Both child and non-child related PWC evaluation activities were reported as frequently occurring and important. Recommendations for a child who was evaluated for a PWC but who was not endorsed to receive one included extended PWC practice and determining a child's mobility prognosis. The average age of the youngest child for whom respondents had recommended a PWC was 3 years, 3.56 months. Significant differences between the responses to this 2018 survey and a 2001 survey were found suggesting possible changes in practice pertaining to PWC evaluation activities as well as to recommendations for a child who is not endorsed to receive a PWC.

Conclusions: Findings of the current survey suggest that barriers exist to a child, especially a younger child, obtaining a PWC.