

# MEMS Project

# 2023 January Progress

Author: Yahriel Salinas-Reyes

Mentors: Dr. Thomas Ward & Dr. Martin Thuot

# IOWA STATE UNIVERSITY

Happy New Years!



## Meeting Agenda

- Happy New Year's + Updates
- Scheduling + Research Work
- Address Uploaded Materials (Cybox)
- Crafting a Manuscript
- Visuals Progress
- Solidworks & Open Discussion

## Updates and Check-In

After some deep reflection over break, this is what I've learned.

### Priorities & Plan:

- Eliminate Distractions → Left IT Position
- Focus & Availability → Freedom To Pursue Interests
- Dedicate My Best → Commit To Personal Development & Dreams

### Action Item: Drop 490 Credit and request compensation for research position

### Messages:

- I am more motivated and excited than ever; I am ready for what's next!
- I am fully dedicated to our research and path to Ph.D.
- Willing and grateful to accept any guidance or feedback offered
- \*(Me-to-you)\* If you will have me, I offer my full capacity and service as a researcher

# Semester Availability

	06:00	07:00	08:00	09:00	10:00	11:00	12:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00
Mon																
Tue								AER E 461								
Wed									AER E 301				AER E 411			
Thur								AER E 461			AER E 461				AER E 411	
Fri																
Sat																

# Cybox Materials

 Crafting A Manuscript MEMS (INCOMING)	1/12/2023 4:19 PM	Microsoft PowerPo...	4,387 KB
 Experimental Work (FULL COMPLETE)	1/12/2023 4:16 PM	File folder	
 SWP	1/12/2023 3:51 PM	File folder	
 Background Lit	1/12/2023 1:50 PM	File folder	

# Scientific Writing Program (SWP)

## Offers:

- Manuscript Writing Track (multi-year)
- Thesis Development Track (multi-year)

## Related Files:

 Thesis Manual  
12/15/2022 5:17 AM

Microsoft Edge PD...  
3,012 KB

 Salinas-Reyes Project Management Sh...  
12/14/2022 3:53 PM

Microsoft Excel W...  
56 KB

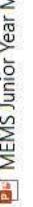
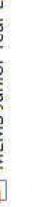
- ## Will Use:
- Github Repositories
  - Overleaf & Latex

Project Name: Stakeholder management	File name:	Start date	End date	Status	Comments
Advisor					
Other					
Project Plan					
This project aims to: Sub-question 1					
Experimental approach 1					
Task 1					
File 1					
File 2					
File 3					
Task 2					
Task 3					
Data collection					
Data analysis					
Methods write-up					
Summary of results					
Experimental approach 2					
Task 1					
File 1					
File 2					
File 3					
Task 2					
Task 3					
Data collection					
Data analysis					
Methods write-up					
Summary of results					
Sub-question 2					
Experimental approach 1					
Task 1					
File 1					
File 2					
File 3					
Task 2					
Task 3					
Data collection					
Data analysis					
Methods write-up					
Summary of results					

## Experimental Work

Research Journey Through All 4 Years

### Related Files:

 MEMS Soph. Year End	1/12/2023 2:29 PM	Microsoft PowerPo...	87,638 KB
 MEMS Junior Year Midterm	1/12/2023 2:29 PM	Microsoft PowerPo...	69,817 KB
 MEMS Junior Year End	1/12/2023 2:29 PM	Microsoft PowerPo...	70,246 KB
 MEMS Fresh. Year GMIS Poster	1/12/2023 2:29 PM	Microsoft PowerPo...	12,315 KB
 Demos	1/12/2023 2:28 PM	File folder	
 Model Files (CAD & ANSYS)	1/12/2023 2:25 PM	File folder	

## Background Lit

All Related Papers/Writings Which Have Been Used In This Work

### Related Files:

 Material Science	1/12/2023 1:50 PM	File folder
 Project Related Papers	1/12/2023 1:50 PM	File folder
 Data Analysis	1/12/2023 1:50 PM	File folder

# Crafting A Manuscript

## Journal Publishing Opportunities

### Main Publisher Candidates

- (ASME) The American Society of Mechanical Engineers



- [Journal Archive](#)
- [Journal Author Guidelines](#)

- (AIP) American Institute of Physics



- [Journal Archive](#)
- [Journal Author Guidelines](#)

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## Journal Selection



Top Choice

- Open Journal of Engineering



Top Choice

- Journal of Undergraduate Reports in Physics

Secondary Choices

- Mechanical Design
- Manufacturing Science & Engineering
- Renewable & Sustainable Energy
  - Machine Learning
  - Energy
- Engineering Materials & Technology
- Electrochemical Energy Conversion & Storage
  - Chaos: Interdisciplinary & Nonlinear Science

## Developing a Framework

- Study Target Audience
  - Specialist vs General/Non-specialist Readers
- Publishing + Journal Opportunities
- Review Scope of Research
- Create General Structure

Draw a logical path that guides the reader through the following:

- Why the topic is of broad interest
- The current state of knowledge on the topic
- Why the system or method is a good choice to study the topic

## Identifying Themes & Stakes

- Make Story Relevant
  - Framing the research question/topic as a shared problem with the audience
- Communicating The Major Takeaways
  - Develop claims and show agency as a researcher
  - Help reader interpret the results section (w/ level of details required)
  - Provide clear + logical progression from **Background → Rationale → Results + Conclusions**
- Produce a Comprehensive Scientific Dramatic Arc

# Building A Narrative

- Results and Rationale
  - Report findings + present the clearest narrative, allowing reader to understand the story
- Methods and Credibility
  - Describe the author's initiative and agency as a researcher
  - Describe experimental approach and analytical techniques and processes used
  - Provide level of detail required and acknowledgements
- Interpretations and Discussion
  - Draw together supporting information and elaborate upon interpretations that cut across experiments and data sets.
  - Find a balance between providing the rationale for your conclusions while also being succinct

# Addressing Elements

- Evaluate Subsections

Each subsection should support a conclusion and include the following content:

- Explanation of underlying hypothesis with a clear rationale as to why you performed each experiment
- Brief description of experimental set-up—in depth explanation isn't necessary as the reader can reference the methods section for greater detail.
- Specific mention of each panel of the figure when referring to the data (as opposed to citing the entire figure at the end of the section)
- Brief summary of the results in the subsection to help the reader reinforce their understanding of the figures
- Short interpretation can be used to transition into the next section, if this forms the basis of the rationale for the next series of experiments.

- Evaluate Logical Framework

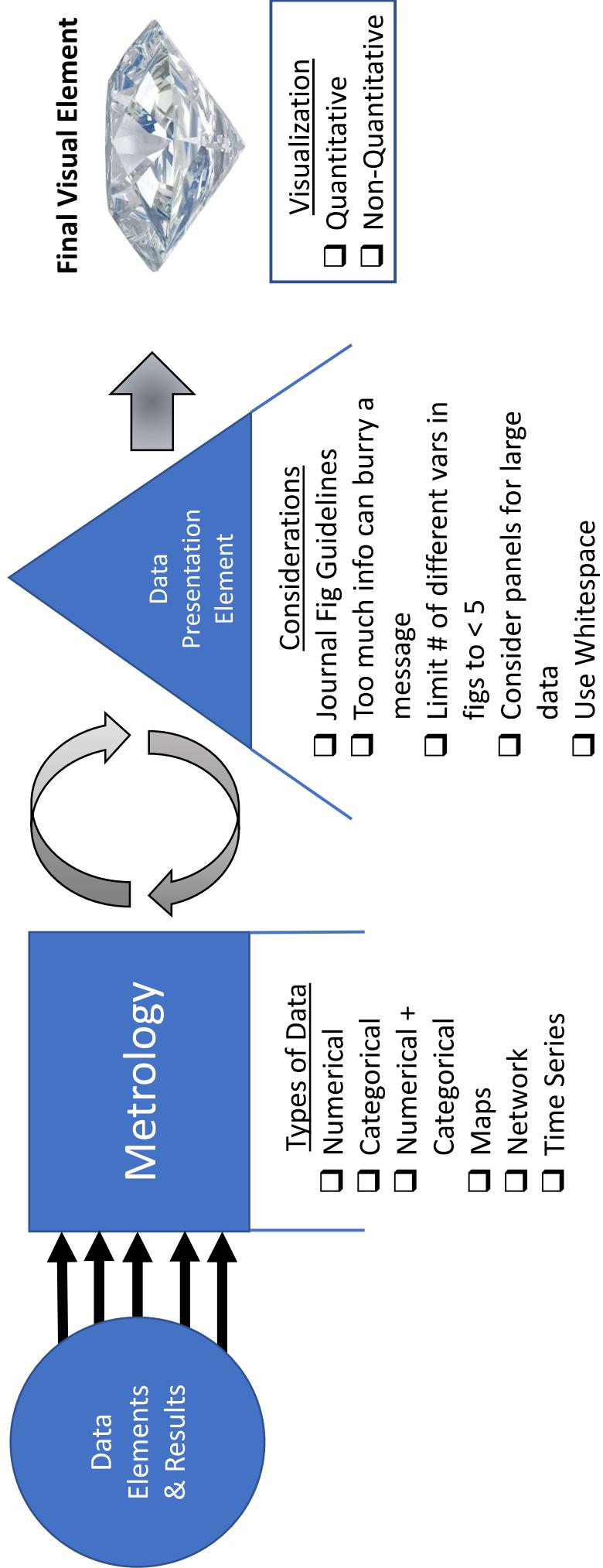
Each major finding should answer the following:

- How do your results fit with what is published in the field?
- Is there already a consensus or is there confusion?
- Do your findings support other published work? If so, how? If not, how are they different?
- What might be some of the reasons for any differences, and what might this tell you? For instance, are there differences in the method, the underlying system, or the analysis that could explain the discrepancy?
- If there are technical constraints that prevent you from performing a direct comparison with published results, then elaborate.

# Visuals Progress: Communicating Data Through Visualization

“When selecting which type of data graphic or chart to use, we consider these **primary factors: type of data, the audience, and the purpose of the visual.**” -Yahriel S.R. (with agency)

# Choosing The Right Type of Data Visualization



## Visualizing Quantitative Data

- Analyze Results
- Use [Data2Viz Tool](#) to select Viz
- Consider the criteria:
  - Type of Data
  - The Audience
  - The Purpose

What kind of data do you have? Pick the main type using the buttons below. Then let the decision tree guide you toward your graphic possibilities.

Numeric

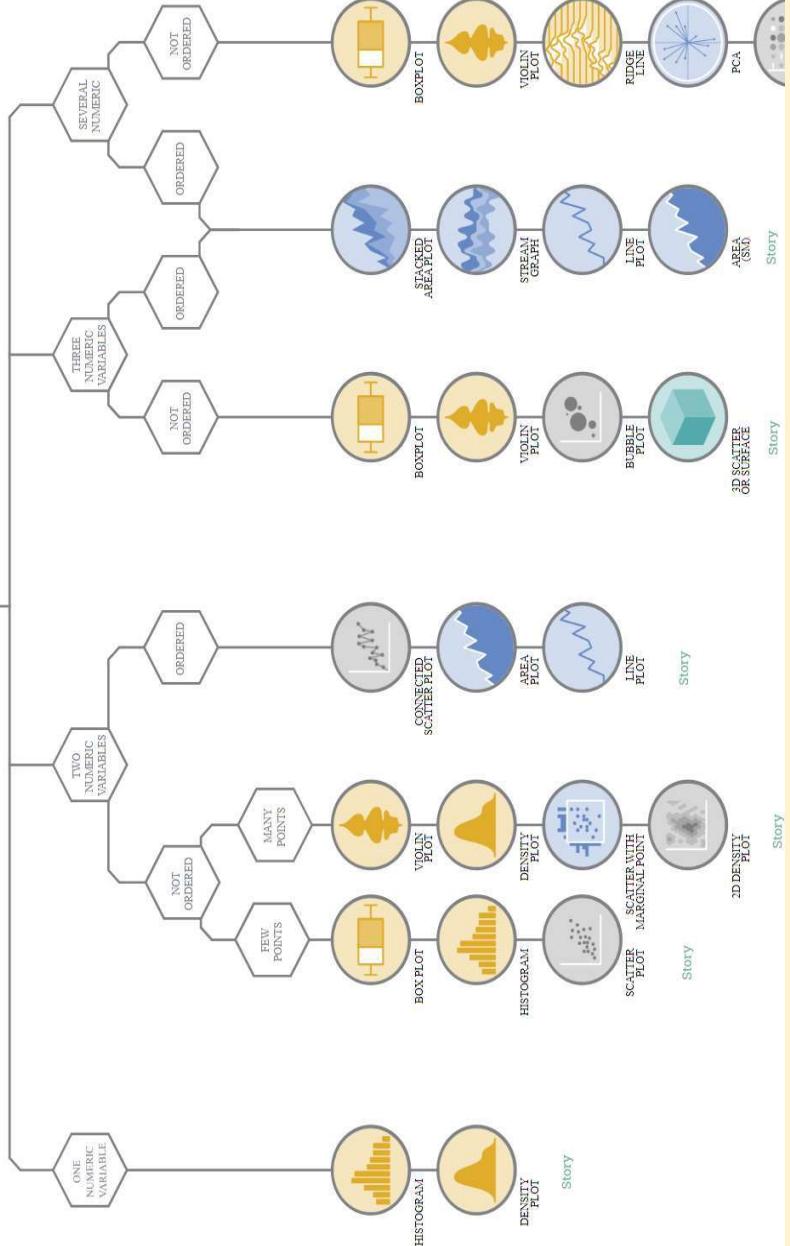
Categorical

Num & Cat

Maps

Network

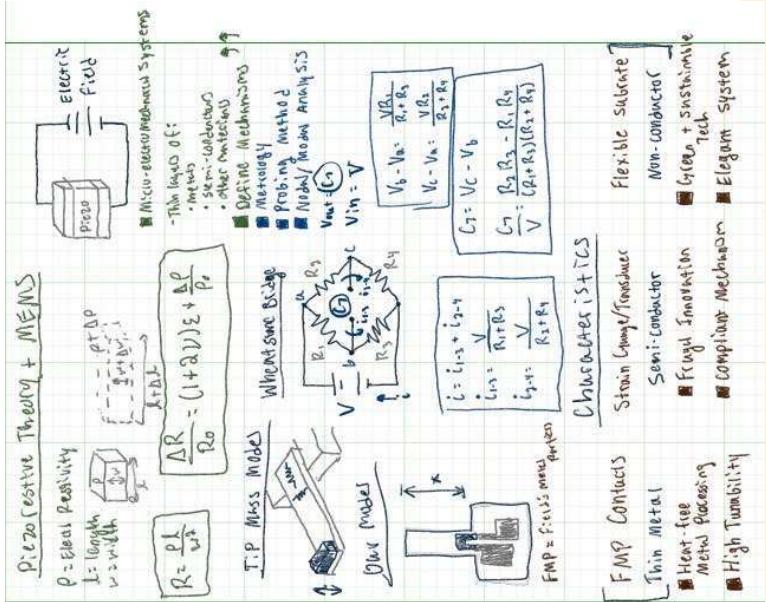
Time series



# Visualizing Non-Quantitative Data \*\*\*Current Step\*\*\*

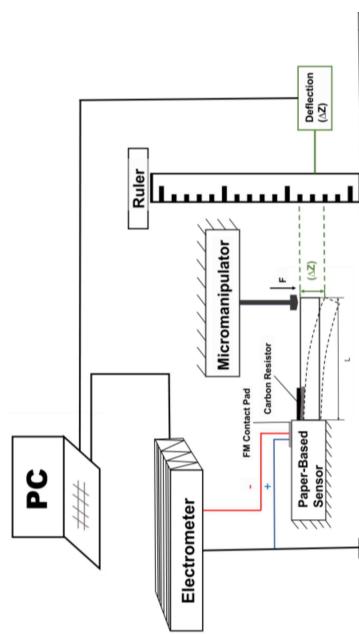
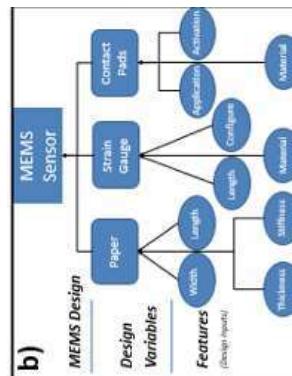
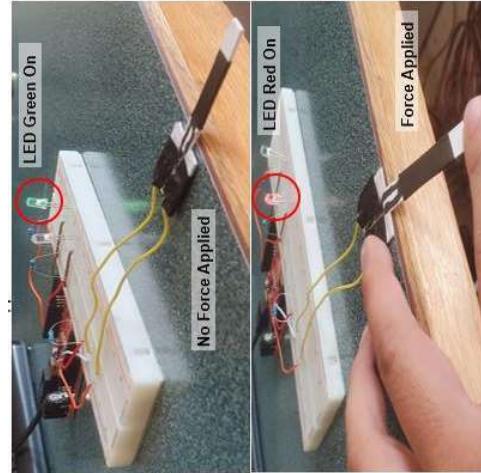
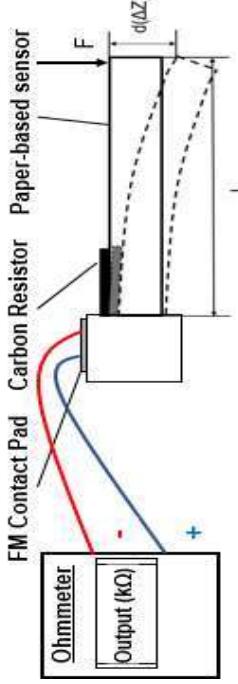
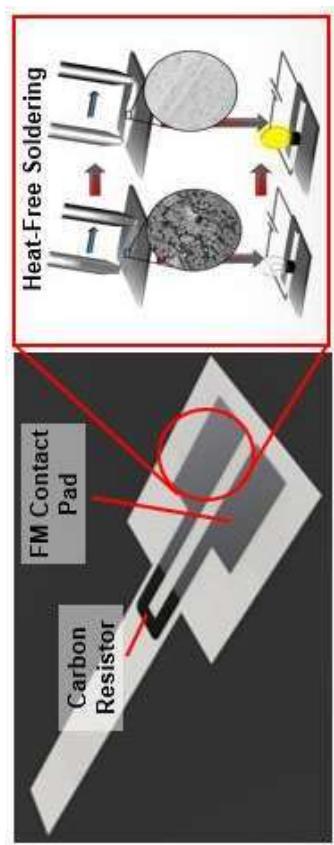
"There are opportunities to use visuals beyond graphs to illustrate a proposed interaction and convey or summarize information effectively."

- MEMS Model
- Key Concepts
- MEMS Characteristics
- Elements of System
- Design of Experiments
- *Themes\** relevant to *Narrative\**



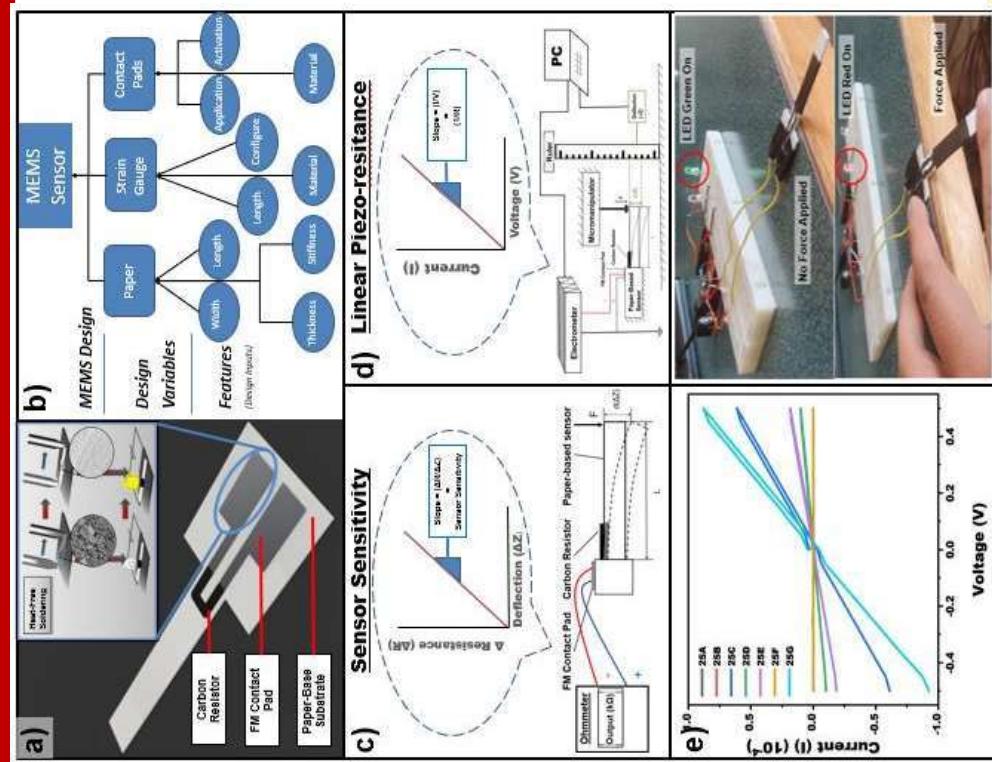
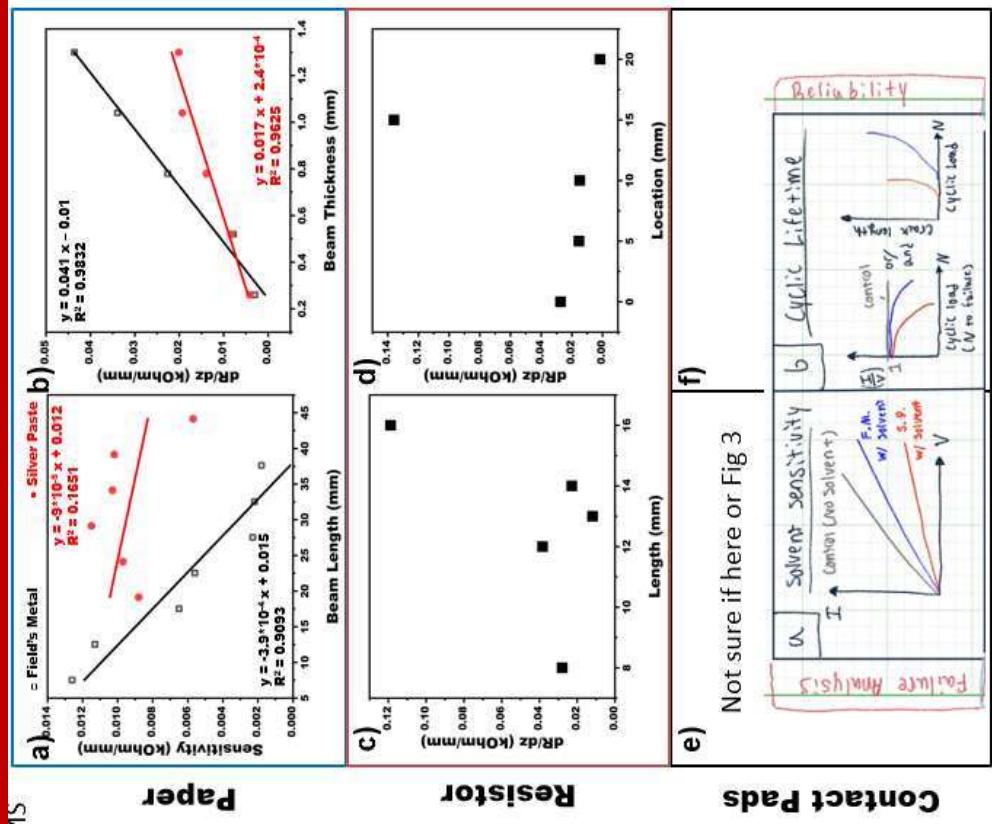
# IOWA STATE UNIVERSITY

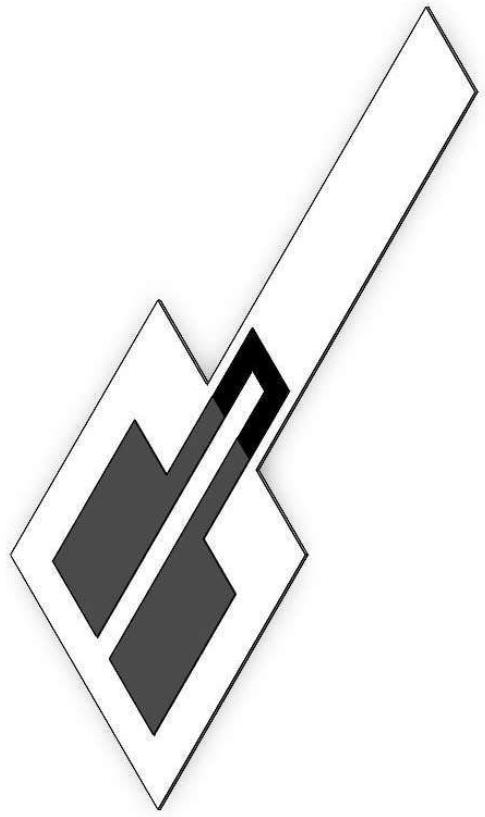
## Early Concepts



**Goal: Distill all data and visual elements to only what is necessary and most effective**

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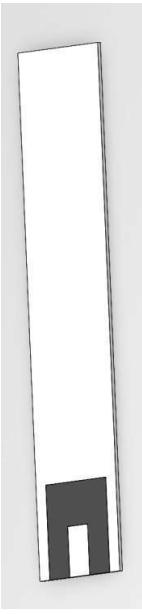




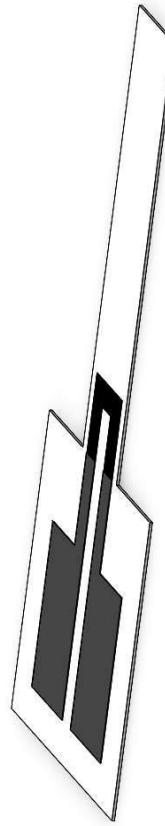
# MEMS CAD Examples

Illustrating Our Model

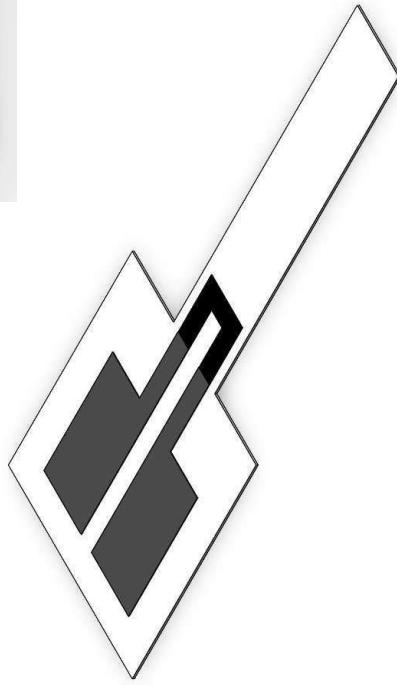
Simple Cantilever & Resistor (Free)



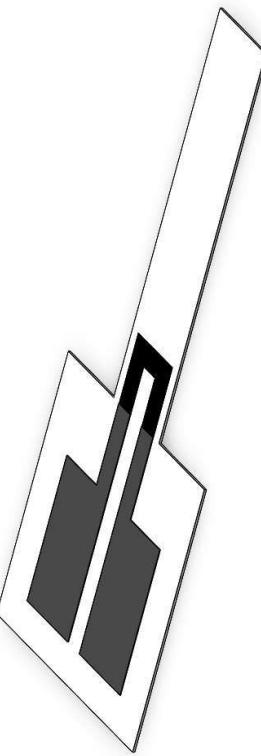
Dimetric View



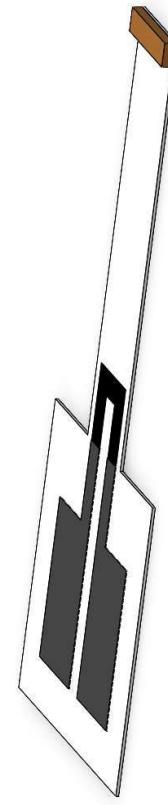
Isometric View



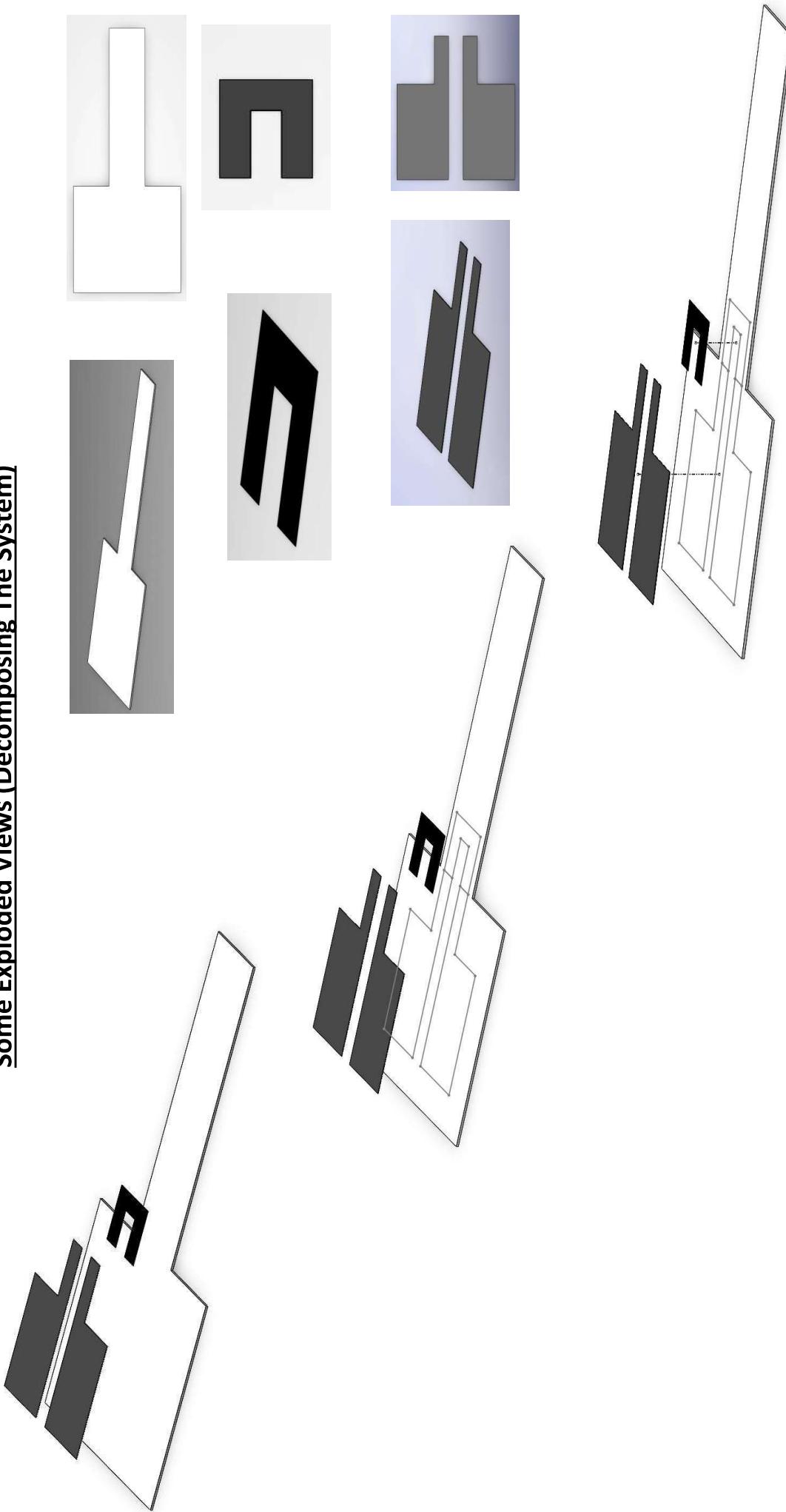
Trimetric View



Tip-Mass Model



Some Exploded Views (Decomposing The System)



# Evaluating Visuals Checklist

## FIGURE DESIGN

- Can someone quickly get the takeaway message by looking at my figure?
- Are data directly labeled where possible?
- Are there fewer than 5 variables in my figure? If not, can I split it into multiple panels or figures?
- Is the weight of lines or points thick enough for good readability?
- Should any gridlines be removed to optimize readability?

## TEXT

- Does the title summarize my takeaway message?
- Does the title accurately reflect the underlying data?
- Do the axes names clearly convey what is being measured?
- Is all text legible for print or presentation?

## COLOR

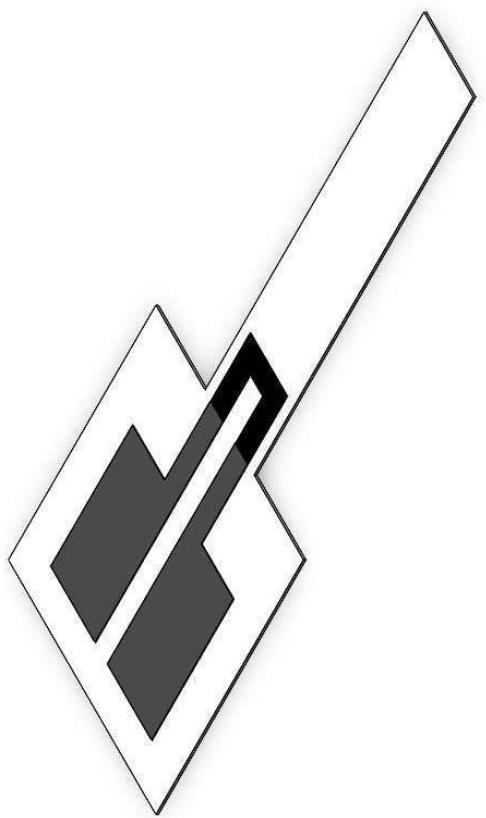
- Do the colors I'm using assist in conveying information?
- Can my visual be interpreted by those with a color deficiency? Use <http://colororacle.org/> to test your image.
- Will my color scheme be effective if displayed across multiple devices and media?
- Is there enough contrast between my visual elements and the background?

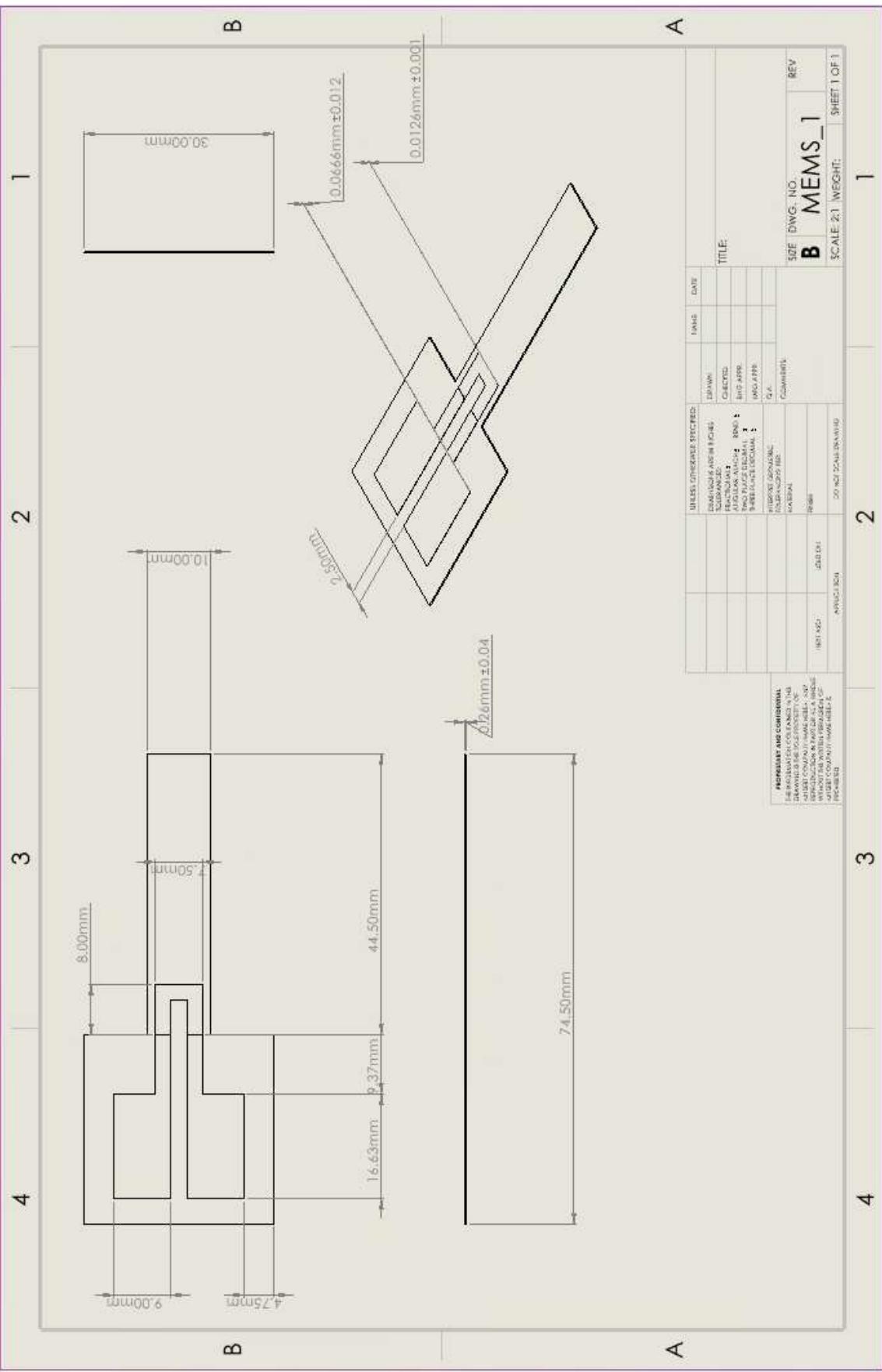
## LEGEND

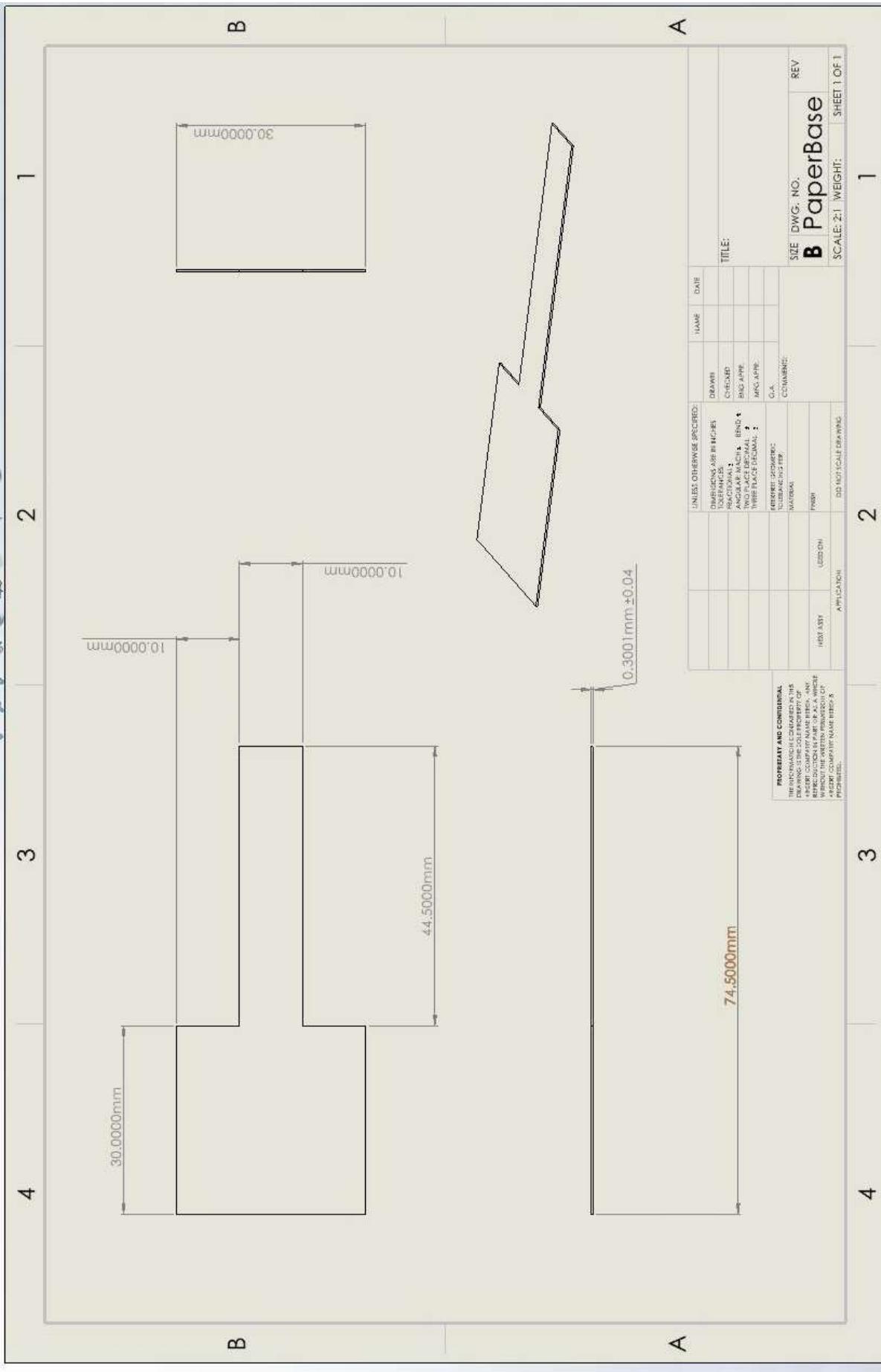
- Does the legend mirror the text & terminology used elsewhere in the work?
- Does the legend include appropriate information on sample sizes and statistical tests?
- Is the legend written in full sentences?
- Does the legend use past tense for method description?

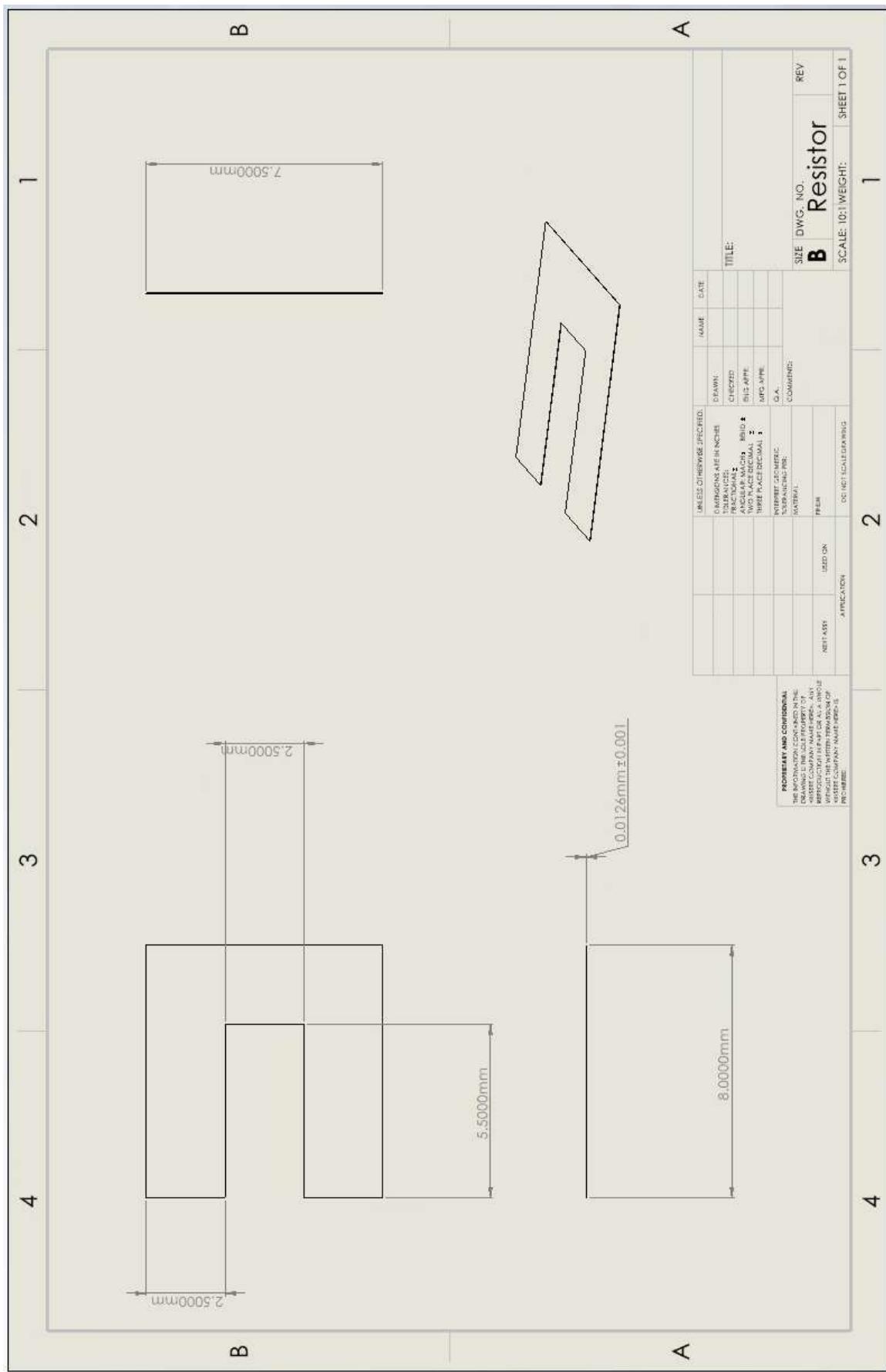
Defining Our Model

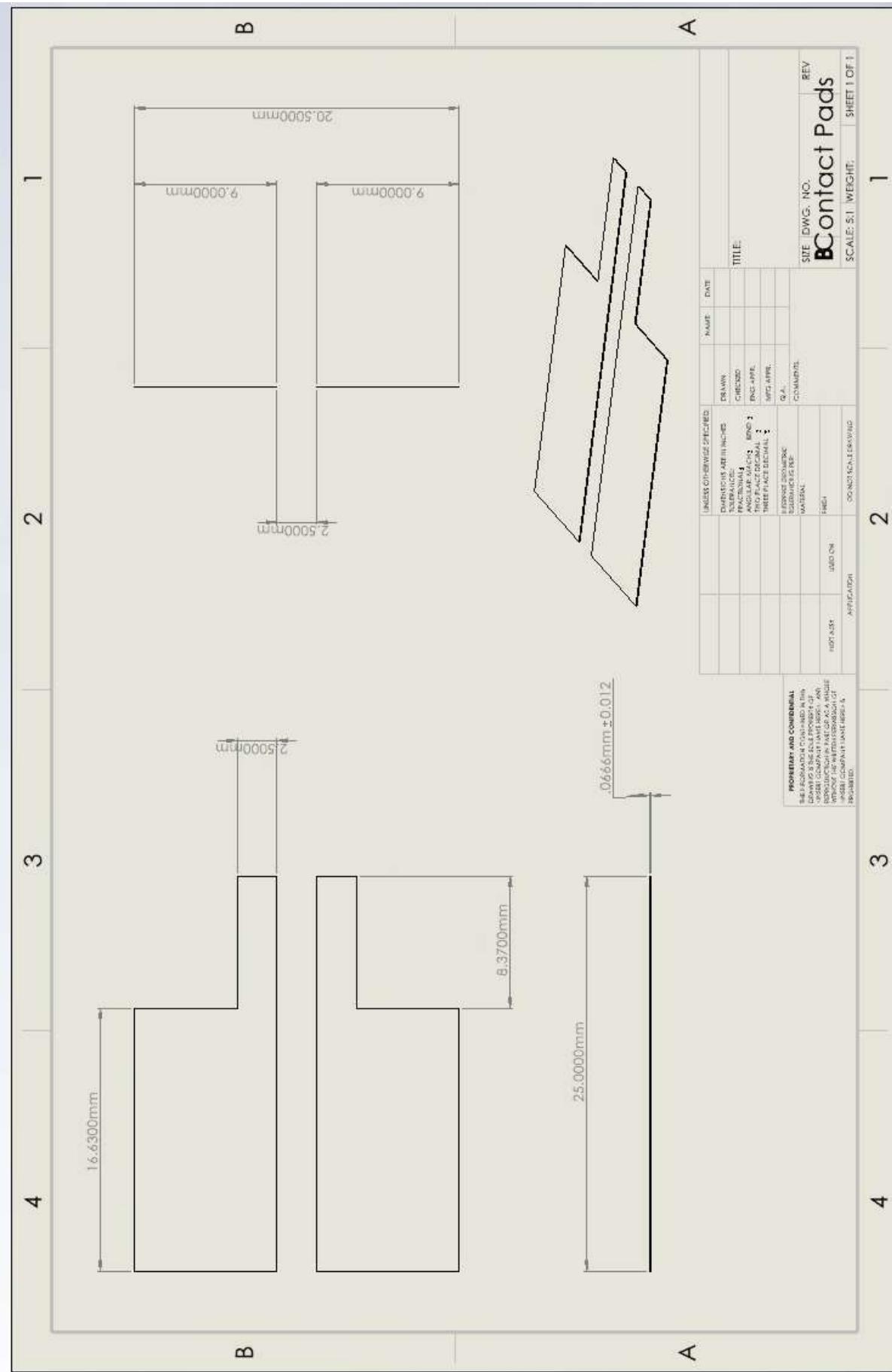
# MEMS Example CAD Drawings











# Open Floor

## **Personal Statement**

### **Yahriel Salinas-Reyes, Fulbright-Garcia Robles Open Study/Research Award Molecular & Systems Bioengineering towards Neuroscience**

In the realm of mathematics, the concept of chaos game originally alluded to a method of generating fractals—intricate geometrical patterns that seem to symbolize the fractured nature of reality itself. The intricate dance of numbers, shapes, and chaos mirrors my own journey through life, marked by a tapestry of neurological and neurodevelopmental challenges.

My story is one of resilience, determination, and an unquenchable thirst for knowledge, and has been anything but conventional. From an early age, I grappled with ADHD, PTSD, anxiety, and autism. These neurological conditions, instead of being impediments, have become the driving force behind my academic pursuits. I realized that within the chaos of my mind, there was an unexplored realm of creativity and analytical thinking. However, life had more challenges in store. Hearing loss and a speech impediment made communication a daily struggle. But rather than let these barriers silence me, I embraced the power of written expression. Writing became my voice, a medium through which I could convey my ideas, emotions, and discoveries. As I embarked on my academic journey, I encountered a myriad of obstacles that tested my resolve. Financial challenges loomed large, threatening to derail my dreams of higher education. Yet, I persevered, seeking scholarships and part-time work to support my studies. I also navigated the language barrier, as English is not my first language, and adapted to the demands of college life in a new world. Physical health issues further complicated matters. Sciatica, a debilitating condition, left me bedridden and unable to attend classes. Still, I did not relent. I leveraged technology to engage with coursework remotely, demonstrating my unwavering commitment to my education. In the midst of these personal challenges, I took on the role of the primary caretaker for my mother, who battled severe health issues. This responsibility, while emotionally taxing, underscored the importance of resilience and compassion. It reinforced my belief in the power of empathy and understanding, qualities I have carried into my academic pursuits. The most recent chapter in my life introduced a new set of challenges—adjusting to mental health medications and diagnoses. While the journey to stability has been arduous, it has deepened my empathy for those facing similar struggles and ignited my interest in the intersection of mathematics and mental health. My experiences have shaped my academic journey and my aspirations. I am driven by a passion for fractal mathematics, drawn to the beauty of patterns that emerge from chaos. I see parallels between the complexity of fractals and the human mind, and I am determined to explore these connections. Through these trials, I discovered a profound truth: our stories are woven into the tapestry of science and art. We tell stories to make sense of the world, to illuminate the unknown, and to connect with others. In Mexico, I hope to immerse myself in the rich mathematical heritage of the country, studying under esteemed mentors who can help me unlock new dimensions of fractal mathematics. I envision collaborative research projects that bridge the gap between mathematics and neurodiversity, shedding light on the intricate patterns of the human mind. My story is one of resilience, determination, and an unshakable belief in the transformative power of education. Amid the chaos of life's challenges, I have emerged as a passionate scholar, ready to contribute to the world of mathematics and advocate for the value of neurodiversity. I am eager to embark on this Fulbright journey, where I can explore the marvel of the human spirit, using mathematics as my compass to navigate the intricate patterns of our world. Together, we will write a new chapter in the wondrous story of human ingenuity, science, and nature itself.

## **Statement of Grant Purpose**

**Yahriel Salinas-Reyes, Host Country: Mexico, Field: Molecular & Systems Bioengineering**

**Project Title: Unraveling the Molecular Code of Natural Antidepressants in Grapes**

In the ever-evolving world of scientific inquiry, certain moments emerge as profound intersections of human ingenuity, scientific inquiry, and the enigmatic wonders of nature. Encapsulated within this project is one such moment. With a central focus on unraveling the molecular code of grapes to find the compounds responsible for its potential natural antidepressant properties, Yahriel Salinas-Reyes aims to foster innovation in treatments for mental health disorders and conditions. Also encompassed in the project is an investigation into the nature of schizophrenia and the complexities of neuroplasticity, in hopes of advancing understanding of the mental illness. The overarching goal is to address the mounting global health crisis presented by mental health disorders, including depression and schizophrenia, which have surged to an unprecedented global health crisis significantly diminishing the quality of life for millions and placing immense pressure on healthcare systems worldwide.

At its core, the project is driven by the ambition to conduct a comprehensive molecular analysis of grapes, with a particular emphasis on understanding the genetic and molecular mechanisms governing the synthesis of antioxidants. Grapes have garnered scientific interest due to their potential health benefits and their recent recognition as potential natural antidepressants.

Yahriel's unique background in aerospace engineering and micro-electro-mechanical systems (MEMS) equips him with the precision and expertise required to delve into the microscopic realm of chromosomes and molecules—an essential prerequisite for unveiling the genetic secrets grapes hold. To fulfill the project's objectives, advanced techniques in molecular biology and biotechnology systems engineering will be employed. The primary goal is to pinpoint the specific compounds within grapes responsible for their potential antidepressant properties, involving their isolation and characterization to illuminate their mechanisms of action within the brain. The aim is to identify practical applications for mental health treatment by comprehending the genetic and molecular foundation of natural antidepressant production in grapes.

Concurrently, this research adopts a multifaceted approach to unravel the complexities of schizophrenia, a debilitating and chronic mental disorder characterized by symptoms such as delusions, hallucinations, disorganized speech, and cognitive deficits. At the heart of schizophrenia's enduring enigma are Bleuler's four A's: Alogia, Autism, Ambivalence, and Affect blunting. Extensive research has explored the etiology of schizophrenia, leading to the emergence of three prominent theories: genetic, neurodevelopmental, and neurobiological. Each theory offers a distinct perspective on the origins of this complex disorder, making it challenging to pinpoint a single causative factor. Nonetheless, neurobiological theory has gained prominence due to its comprehensive approach, explaining schizophrenia as a result of abnormal brain dysfunctions or structural anomalies. This theory stands on solid scientific ground, holds promise in guiding treatment strategies, transcends cultural and demographic boundaries, and raises fewer ethical concerns compared to alternative theories. Structural and functional abnormalities in key brain systems (i.e., the prefrontal & medial temporal lobes) play a pivotal role in the manifestation of schizophrenia symptoms that are integral to working memory and declarative memory processes. The disrupted functioning contributes to cognitive impairments and emotional dysregulation in individuals with schizophrenia. In the quest to understand schizophrenia, neuroplasticity—the brain's remarkable capacity to adapt and reorganize itself in

## **Salinas-Reyes, Statement of Grant Purpose, Page 2**

response to learning, experiences, and environmental changes—emerges as a crucial factor operating at various levels, from synaptic plasticity, where the strength of connections between neurons is modified, to large-scale changes in brain structure and function. In the context of schizophrenia, neuroplasticity offers hope for improving cognitive functioning and overall quality of life for affected individuals. Research has shown that cognitive remediation therapies—which harness neuroplasticity—can lead to improvements in cognitive domains such as memory, attention, and problem-solving, mitigating some of the cognitive impairments associated with the disorder.

This project is founded on the belief that nature holds the key to addressing complex health challenges, including mental health disorders like depression and schizophrenia, and seeks to explore the potential of grapes as a source of natural antidepressants.. One intriguing entry point into the complex world of grape biochemistry is through the study of yeast used in wine production, which plays a pivotal role in the fermentation process, and influences the composition of compounds within grapes. Scientific evidence unveiled that certain molecular compounds in the antioxidants act as natural antidepressants but there lacks initiative to utilize these antioxidant agents in psychiatric institutions and practical methods. By employing advanced techniques such as neuroimaging, fractal geometry, and spectral analysis, the project aims to unveil underlying patterns and causative factors associated with depression and related mental health conditions. The significance of this research extends far beyond the development of new treatments. It encompasses a broader understanding of the intricate relationship between food, biochemistry, and mental health. This knowledge has the potential to inform dietary recommendations that promote mental well-being, potentially reducing the global prevalence of these disorders.

Yahriel, and the research team at the university Tecnológico de Monterrey endeavor to decode the molecular secrets of nature to improve the human condition, particularly for individuals affected by schizophrenia and other mental health disorders. Yahriel's work represents a convergence of scientific rigor, interdisciplinary collaboration, and a profound commitment to the betterment of human well-being. Furthermore, this research holds the potential to strengthen international collaborations between the U.S. and Mexico. By conducting research at Tecnológico de Monterrey, Yahriel can contribute to the exchange of knowledge and ideas between the two countries, fostering a stronger global community which reflects the essence of the Fulbright mission, emphasizing mutual understanding and collaboration between nations. Yahriel Salinas-Reyes' Fulbright-Garcia Robles Open Study/Research Award proposal represents a unique and ambitious endeavor to explore the natural antidepressant properties of grapes. Grounded in the principles of interdisciplinary research, this project not only has the potential to transform mental health treatment but also to deepen our understanding of the brain's plasticity. It is a testament to the power of collaboration and cultural exchange in the pursuit of knowledge and the betterment of human well-being. Yahriel's unwavering commitment to utilizing opportunities to their fullest and to serve as a cultural diplomat, bridging gaps between different fields and nations, promises to unlock the molecular code of nature and take meaningful strides toward a healthier and more fulfilling world for all. Yahriel's proposal represents a remarkable opportunity to weave together science, innovation, and compassion in the quest to decipher the extraordinary truths hidden within the universe's code.

Monterrey, Nuevo León, México  
September 28, 2023

Dear Fulbright Program and National Geographic Society,

I am writing to you today with the distinct privilege of welcoming Yahriel Salinas-Reyes as a visiting fellow and proudly assume the role of his research advisor at Tecnológico de Monterrey, in the Molecular and Systems Bioengineering Research Group and the FEMSA Biotechnology Center. This opportunity represents a watershed moment in the pursuit of knowledge and global collaboration. Allow me to express my unwavering confidence in Yahriel's ability to not only excel in this role but to make a transformative impact on the fields of neuroscience, molecular sciences, and systems biotechnology.

In case he's accepted into your programs, Tecnológico de Monterrey stands ready to provide Yahriel with the resources, mentorship, and collaborative environment he deserves to excel in his chosen path. We are unwavering in our conviction that Yahriel's transdisciplinary approach, his unwavering analytical mindset, and his ceaseless thirst for knowledge will not only elevate our research community but also harmonize seamlessly with the mission of the Fulbright Program and National Geographic Society. Together, we shall forge connections, advance knowledge, and safeguard the wonders of our world. Thank you for considering Yahriel's application, and please do not hesitate to reach out to us if you require any additional information or should any questions arise.

Sincerely,



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Dr. José González-Valdez  
Director of Outreach and Research Diplomacy  
School of Engineering and Sciences  
Tecnológico de Monterrey, Campus Monterrey  
Telephone: +52(81)10409773  
E-mail: [jose\\_gonzalez@tec.mx](mailto:jose_gonzalez@tec.mx)

**Copy****FULBRIGHT****Fulbright U.S. Student Program**Applicant Name: Mr. Yahriel Salinas-ReyesPronouns: He/himAward Cycle: 2024-2025Permanent Residence: Des Moines, IA, United States

U.S. Armed Forces: \_\_\_\_\_

**Award Information**Award Country/Countries: MexicoAward Name: Fulbright-Garcia Robles All Disciplines - Open Study/Research AwardAward Type: Study/Research Award Creative/Performing Arts: NoDegree Level: Master's Field: Interdisciplinary Studies**Program Information**Project Title: Unraveling the Molecular Code of Natural Antidepressants in Grapes

Abstract/Summary of Proposal:

This innovative research endeavor seeks to decode the genetic and molecular pathways behind grape antioxidants, potentially revealing natural antidepressant qualities. Led by Yahriel Salinas-Reyes, an aerospace engineer with a growing interest in neuroscience and molecular sciences, this project embodies the fusion of human ingenuity and nature's enigma.

**What:** The project seeks to conduct an exhaustive molecular analysis of grapes, focusing on chromosomes and molecules, to identify specific compounds responsible for potential antidepressant properties. It aims to comprehend the genetic and molecular foundation of natural antidepressant production in grapes.

**Where:** The research will take place at a prestigious institution specializing in neuroscience and biomedical data science, supplemented by a Fulbright-National Geographic Award for international study, broadening the global perspective of the research.

**Why:** This project addresses the escalating global health crisis posed by mental health disorders, including depression and schizophrenia. These conditions significantly diminish millions' quality of life and strain healthcare systems worldwide. Unlocking the potential of grapes as natural antidepressants offers innovative treatments and a deeper understanding of genetic factors contributing to mental health disorders. Yahriel's unique aerospace engineering background equips him with precision and expertise essential for microscopic research.

In summary, this research project bridges diverse fields to unravel nature's mysteries, contributing to global mental health solutions. Yahriel's interdisciplinary approach promises groundbreaking insights into the brain's complexities, fostering a healthier world for all.

Host Region: Tecnológico de Monterrey, MexicoAffiliation 1: Tecnológico de Monterrey, Dr. José Valdez, Center of Molecular and Systems Bioengineering

Affiliation 2: \_\_\_\_\_

Affiliation 3: \_\_\_\_\_

The proposal includes graduate degree enrollment: Yes Grant Length (Months): \_\_\_\_\_The proposal involves activities that may require a medical license to practice: No \_\_\_\_\_The proposal may involve clinical training and/or patient care/contact: No \_\_\_\_\_

**Copy****FULBRIGHT****Fulbright U.S. Student Program**

**Host Country Engagement:** *How the applicant plans to engage with the host community and share their own culture and values while abroad.*

As a Fulbright-National Geographic Award recipient, cultural exchange is paramount. My commitment to being a cultural ambassador and sharing my culture and values is deeply rooted in my diverse background. Here are my plans:

**Language Exchange:** Actively engage in language anthropology and exchange, fostering communication and respect for the local culture.

**Cultural Workshops:** Organize workshops on the rich cultural gems of the U.S., Mexico, and El Salvador, covering cuisine, music, art, and history.

**Collaborative Research:** Seek interdisciplinary research opportunities with local scholars to promote cultural exchange.

**Community Outreach:** Volunteer in initiatives like environmental conservation, education, and healthcare, benefiting the host community.

**Cultural Celebrations:** Participate in and organize cultural festivals, sharing traditional dances, music, and customs.

**Artistic Expression:** Create art reflecting the fusion of cultures, conveying messages of unity and diversity.

**Plans Upon Return to the U.S.:** *The applicant's career and/or educational plans after completing the Fulbright grant.*

Upon my return, I plan to:

Pursue PhD plans in Neuroscience and Biomedical Data-Science, advancing my research odyssey.

Aim for academic and research leadership in neuroscience, pioneering treatments for mental health disorders.

Foster interdisciplinary collaboration, merging engineering precision with neuroscience to unravel the human brain's mysteries.

Dedicate myself to mentoring emerging & engaging scholars and scientists in STEM.

Engage in global research collaborations, promoting cross-cultural exchanges and contributing to the global scientific community.

Advocate for mental health awareness, reducing stigma, and enhancing access to services globally.

In summary, my return to the U.S. marks the start of an impactful journey, applying my Fulbright experiences to advance neuroscience, mental health, and global well-being.

**Copy****FULBRIGHT****Fulbright U.S. Student Program****Applicant Information**Applicant Date of Birth: 11/11/2000 Former Name: \_\_\_\_\_Sex: M City of Birth: Des Moines Country of Birth: United StatesRace/Ethnicity: Hispanic**Permanent Address**Street: 1709 E Walnut StCity: Des Moines State: IA Postal Code: 50316-3655Country: United States of America Mailing same as Permanent? Yes**Current Mailing Address**

Street: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Postal Code: \_\_\_\_\_

Country: \_\_\_\_\_

**Telephone Numbers**Cell: +1 515-314-4160 Home: \_\_\_\_\_ Work: \_\_\_\_\_**Email**Primary: yahrielsreyes@gmail.com Alternate: yahriels@iastate.edu**Emergency Contact**First Name: Sonia Last Name: ReyesStreet: 1709 East Walnut Street,City: Des Moines State: IA Postal Code: 50316Phone Number: +1 515-313-3934 Email: soniareyes@y7mail.comRelationship to Applicant: Mother

Marital Status: \_\_\_\_\_ Number of Dependents: \_\_\_\_\_

**Dependent Information**

First Name	Last Name	Age	Sex	Relationship to Applicant

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FULBRIGHT

## Fulbright U.S. Student Program

**Academic Information**U.S. Institution Applying Through: At LargeThe applicant began their baccalaureate degree at a community college: YesThe applicant identifies as a first-generation college student: Yes**Institution 1**

Name: Iowa State University  
 Location: Ames, IA, United States  
 Type of Degree: BS  
 Major: Aerospace & Aeronautical Engineering  
 Minor: U.S. Latinx Studies

Attended From: Aug 2019  
 Attended To: Dec 2023  
 Received/Expected: Dec 2023

**Institution 2**

Name: Iowa State University  
 Location: Ames, (no region), United States  
 Type of Degree: Master's, Not specified  
 Major: \*Concurrent Master's of Engineering & Science with Aerospace  
 Minor: Micro-electro-mechanical-systems (MEMS)

Attended From: Jan 2021  
 Attended To: Dec 2023  
 Received/Expected: Dec 2023

**Institution 3**

Name: Des Moines Area Community College  
 Location: Des Moines, IA, United States  
 Type of Degree: Transfer Credit  
 Major: Liberal Arts (Undecided)  
 Minor: U.S. Latin American Studies

Attended From: Aug 2017  
 Attended To: May 2019  
 Received/Expected: May 2019

**Institution 4**

Name:  
 Location:  
 Type of Degree:  
 Major:  
 Minor:

Attended From:  
 Attended To:  
 Received/Expected:

**Institution 5**

Name:  
 Location:  
 Type of Degree:  
 Major:  
 Minor:

Attended From:  
 Attended To:  
 Received/Expected:

**Previous Fulbright Grant**Has the applicant previously participated in a Fulbright U.S. Student Grant? No

Year: \_\_\_\_\_ Grant Category: \_\_\_\_\_

Country or Countries: \_\_\_\_\_

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Fulbright U.S. Student Program

## Current and Prior Scholarships, Grants or Fellowships

Grant 1:	
Country:	Year:
Grant 2:	
Country:	Year:
Grant 3:	
Country:	Year:
Grant 4:	
Country:	Year:

## Partnership Organization Participation

Org 1:	
Engagement:	
Org 2:	
Engagement:	

## Extracurricular Activities & Achievements

### Honors, Fellowships, Scholarships, Awards

1	NASA Micro-G Neutral Buoyancy Experiment Design Teams Challenge, 2022
2	Ronald E. McNair Post-Baccalaureate Achievement Program Fellowship, 2021-2022
3	SURF Scholar at Stanford University & California Institute of Technology, 2021-2022
4	The Barry Goldwater Scholarship and Excellence in Education Foundation Finalist, 2021-2022
5	State of Iowa Youth Advisory Council Community Leadership Award, 2020, 250 Service Hours
6	CBS News Interviewee of Global Latino Leaders: Hispanic Heritage Month, 2020
7	Undergraduate Research Certificate, 2019-2020, IINSPIRE-LSAMP National Science Foundation
8	CIRT National Design & Construction Competition Back-to-Back Champion, 2019-2020,

### Extracurricular/Community Engagement Activities

1	Multi-lingual Storyteller & Multi-cultural Educator, 2022-2023, Educational Non-Profit
2	Association of Iowa Latinx Professionals (AILP), 2019-2022, STEM Outreach Chair
3	Community Advisor & Multi-cultural Ambassador, 2019-2023, Equity & Inclusion Non-Profits
4	Co-founder, STEM Outreach Program for Underprivileged Youth, 2018-2023
5	Dept. of Human Rights:State of Iowa Youth Advisory Council, 2017-2021, Youth-Lobbyist
6	Co-Founder and Science Education Advocate, Latinx Student Association, 2019-2023
7	Outreach and Education Coordinator, 2019-2023, STEM Outreach & Mentorship Program,
8	Student Representative, College of Engineering Council, 2020-2021

### Publications, Exhibitions, Performances, Presentations

1	"Exploring Bio-Processing & Devices in Micro & Nanoscience," 2023, NCUR STEM Conference
2	"Bioprocessing in Wine Yeast for Mental Health Treatments," 2023, STEM Symposium
3	"Modern Design Methodology & Design of Aerospace Systems," 2023, Senior Capstone Project
4	"Quantum Tunnelling Composites: Analytical Monte Carlo Model & Navier-Stokes," 2023
5	"Understanding the Mathematical Language -The Code- of the Universe," 2021, TEDx Talk
6	"Characterizing Damping Mechanisms in Piezoelectric Wind-Energy Harvesters," 2023
7	"Kirigami-Inspired Design of Paper-Based MEMS Devices for Aeronautical Applications," 2022
8	"Synthesizing Meta-Stable Particles & High-Efficiency MEMS Sensors and Nanodevices," 2021

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FULBRIGHT

## Fulbright U.S. Student Program

## Professional Experience

## Employer 1

Employer Name: Microscale &amp; Interfacial Fluid Physics Laboratory

Location: Ames, IA, United States

Job Title: Aerospace Undergraduate Researcher

Type of Work: Experimental Aerospace Research

Employed From: Aug 2021

Employed To: Current

Employment Type: Full time

## Employer 2

Employer Name: California Institute of Technology

Location: Pasadena, CA, United States

Job Title: Undergraduate Research Assistant

Type of Work: Interdisciplinary Research

Employed From: May 2021

Employed To: Aug 2022

Employment Type: Full time

## Employer 3

Employer Name: Stanford University

Location: Stanford, CA, United States

Job Title: Undergraduate Research Assistant

Type of Work: Interdisciplinary Research

Employed From: May 2021

Employed To: Aug 2021

Employment Type: Full time

## Employer 4

Employer Name: Boeing Aerospace

Location: Ames, IA, United States

Job Title: Research Excellence in Engineering Fellow

Type of Work: Aerospace Engineering Research

Employed From: Aug 2021

Employed To: Aug 2022

Employment Type: Full time

## Employer 5

Employer Name: Soft Materials &amp; Matter Transport Research Group

Location: Ames, IA, United States

Job Title: Undergraduate Researcher, Systems Engineer

Type of Work: Interdisciplinary Research

Employed From: Aug 2019

Employed To: May 2022

Employment Type: Full time

## Employer 6

Employer Name: Iowa State University of Science &amp; Technology

Location: Ames, IA, United States

Job Title: Information Technology Specialist &amp; Data Scientist

Type of Work: Information &amp; Computer Systems

Employed From: Aug 2019

Employed To: May 2023

Employment Type: Part time

## Employer 7

Employer Name: Iowa State University Dept of Residence

Location: Ames, IA, United States

Job Title: Residential Advisor &amp; Honors Community Leader

Type of Work: Residential Advisor

Employed From: Aug 2020

Employed To: May 2022

Employment Type: Full time

## Employer 8

Employer Name: DARPA: Recycling at the Point of Disposal (RPOD)

Location: Ames, IA, United States

Job Title: Researcher &amp; Experimental Systems Engineer

Type of Work: Research DARPA Funded

Employed From: Aug 2022

Employed To: Aug 2023

Employment Type: Full time

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Fulbright U.S. Student Program

## Experience Abroad

### Host Country Experience

Has the applicant ever been to the host country? Yes

Experience 1:	Will be visiting Mexico upon Graduation from Undergraduate Degree in December 2023.
Experience 2:	Will be visiting Mexico upon Graduation from Undergraduate Degree in December 2023.
Experience 3:	Will be visiting Mexico upon Graduation from Undergraduate Degree in December 2023.
Experience 4:	Will be visiting Mexico upon Graduation from Undergraduate Degree in December 2023.

Applicant plans to live or complete an extended visit (4 weeks or more) in the host country prior to the grant start date: No

Explanation of why the applicant will be in the host country:

### Other Experience Abroad

Has the applicant ever been outside the U.S. other than the host country? Yes

Experience 1:	Duration (Weeks): 2	Purpose Abroad: Family Visit
Dates Visited:	12/2022-12/2022	
Country/Countries:	El Salvador	
Experience 2:	Duration (Weeks):	Purpose Abroad:
Dates Visited:		
Country/Countries:		
Experience 3:	Duration (Weeks):	Purpose Abroad:
Dates Visited:		
Country/Countries:		
Experience 4:	Duration (Weeks):	Purpose Abroad:
Dates Visited:		
Country/Countries:		
Experience 5:	Duration (Weeks):	Purpose Abroad:
Dates Visited:		
Country/Countries:		

Additional Comments Regarding Experience Abroad:

As a triple citizen of the USA, Mexico, and El Salvador, Yahriel embodies internationalism and cross-cultural sensitivity. His diverse background & experiences abroad shape his research interests and commitment to global collaboration positions him as a bridge-builder between cultures, valuable in anthropology and interdisciplinary research. His pursuit of universal truths, "The Code." Yahriel's triple citizenship showcases his global outlook, making him a valuable asset for global society.

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## Language Self-Evaluation

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**Language 1:** Spanish      Self-assessed level: Superior/Distinguished (native or near native)Is this language relevant to the proposed grant? YesIs a Foreign Language Evaluation being submitted for this language? Yes

The applicant has learned or plans to learn this language through:

Spoken at Home, Formal Study, Mother Tongue, Self-Study,

Amount of time the applicant has spent in formal study and/or studying or living in a country where the language is spoken:

I am a native Spanish speaker and have spent 4 years of formal study of the Spanish Language in high school. Spanish is spoken in the home.

What the applicant is doing now and plans to do to bring their language facility to an acceptable level by the time a grant would begin:

N/A

**Language 2:** \_\_\_\_\_ Self-assessed level: \_\_\_\_\_

Is this language relevant to the proposed grant? \_\_\_\_\_

Is a Foreign Language Evaluation being submitted for this language? \_\_\_\_\_

The applicant has learned or plans to learn this language through:

Amount of time the applicant has spent in formal study and/or studying or living in a country where the language is spoken:

What the applicant is doing now and plans to do to bring their language facility to an acceptable level by the time a grant would begin:

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**Language 3:** \_\_\_\_\_ Self-assessed level: \_\_\_\_\_

**Language 4:** \_\_\_\_\_ Self-assessed level: \_\_\_\_\_

### **Critical Language Enhancement Award (optional)**

Applicant is applying for a Critical Language Enhancement Award: \_\_\_\_\_

Critical Language to Study: \_\_\_\_\_

Number of years of formal college-level study: \_\_\_\_\_

Applicant intends to complete their Critical Language Enhancement Award through:

\_\_\_\_\_  
Applicant's Language Study Plan:

Expected impact of additional language study on the applicant's Fulbright project and future career or academic goals:

**Copy****FULBRIGHT****Fulbright U.S. Student Program****Signature**

By signing below, the applicant agrees to the following:

1. I have read and understood all instructions accompanying this application, including the section on Eligibility on the Fulbright U.S. Student website;
2. To the best of my knowledge, the information provided in my application is true, correct, and complete;
3. I understand that any misrepresentation or omission may be cause for withdrawing a recommended status or grant award, in the event I am awarded a grant;
4. I understand that this application and supporting materials will be shared with persons involved in the National Screening Committee review process and with the staff at the U.S. Department of State, Fulbright Commission, and U.S. Embassy in the country(s) to which I am applying, and others who are responsible for administering the Fulbright Program or involved in the selection process;
5. I agree to accept, as a condition of my award, such placement as is made for me in an educational institution abroad;
6. I agree to keep my supervisory agency informed of my whereabouts and academic progress, and to prepare such reports, both progress and terminal, covering my experience while under the grant as may be requested by my supervisory agency;
7. I understand that in case I fail to maintain a satisfactory record, or in case my conduct is considered prejudicial to the best interest of the international educational exchange program, my award may be withdrawn and payments terminated;
8. I understand that all Fulbright program grants are subject to the Policies of the Fulbright Foreign Scholarship Board;
9. Once submitted, I will no longer have access to any part of the application or supporting materials, including Recommendations/Evaluations.

Signature: Yahriel Salinas-Reyes

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## Statement of Grant Purpose

**Yahriel Salinas-Reyes, Host Country: Mexico, Field: Molecular & Systems Bioengineering**

**Project Title: Unraveling the Molecular Code of Natural Antidepressants in Grapes**

In the ever-evolving world of scientific inquiry, certain moments emerge as profound intersections of human ingenuity, scientific inquiry, and the enigmatic wonders of nature. Encapsulated within this project is one such moment. With a central focus on unraveling the molecular code of grapes to find the compounds responsible for its potential natural antidepressant properties, Yahriel Salinas-Reyes aims to foster innovation in treatments for mental health disorders and conditions. Also encompassed in the project is an investigation into the nature of schizophrenia and the complexities of neuroplasticity, in hopes of advancing understanding of the mental illness. The overarching goal is to address the mounting global health crisis presented by mental health disorders, including depression and schizophrenia, which have surged to an unprecedented global health crisis significantly diminishing the quality of life for millions and placing immense pressure on healthcare systems worldwide.

At its core, the project is driven by the ambition to conduct a comprehensive molecular analysis of grapes, with a particular emphasis on understanding the genetic and molecular mechanisms governing the synthesis of antioxidants. Grapes have garnered scientific interest due to their potential health benefits and their recent recognition as potential natural antidepressants.

Yahriel's unique background in aerospace engineering and micro-electro-mechanical systems (MEMS) equips him with the precision and expertise required to delve into the microscopic realm of chromosomes and molecules—an essential prerequisite for unveiling the genetic secrets grapes hold. To fulfill the project's objectives, advanced techniques in molecular biology and biotechnology systems engineering will be employed. The primary goal is to pinpoint the specific compounds within grapes responsible for their potential antidepressant properties, involving their isolation and characterization to illuminate their mechanisms of action within the brain. The aim is to identify practical applications for mental health treatment by comprehending the genetic and molecular foundation of natural antidepressant production in grapes.

Concurrently, this research adopts a multifaceted approach to unravel the complexities of schizophrenia, a debilitating and chronic mental disorder characterized by symptoms such as delusions, hallucinations, disorganized speech, and cognitive deficits. At the heart of schizophrenia's enduring enigma are Bleuler's four A's: Alogia, Autism, Ambivalence, and Affect blunting. Extensive research has explored the etiology of schizophrenia, leading to the emergence of three prominent theories: genetic, neurodevelopmental, and neurobiological. Each theory offers a distinct perspective on the origins of this complex disorder, making it challenging to pinpoint a single causative factor. Nonetheless, neurobiological theory has gained prominence due to its comprehensive approach, explaining schizophrenia as a result of abnormal brain dysfunctions or structural anomalies. This theory stands on solid scientific ground, holds promise in guiding treatment strategies, transcends cultural and demographic boundaries, and raises fewer ethical concerns compared to alternative theories. Structural and functional abnormalities in key brain systems (i.e., the prefrontal & medial temporal lobes) play a pivotal role in the manifestation of schizophrenia symptoms that are integral to working memory and declarative memory processes. The disrupted functioning contributes to cognitive impairments and emotional dysregulation in individuals with schizophrenia. In the quest to understand schizophrenia, neuroplasticity—the brain's remarkable capacity to adapt and reorganize itself in

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## Salinas-Reyes, Statement of Grant Purpose, Page 2

response to learning, experiences, and environmental changes—emerges as a crucial factor operating at various levels, from synaptic plasticity, where the strength of connections between neurons is modified, to large-scale changes in brain structure and function. In the context of schizophrenia, neuroplasticity offers hope for improving cognitive functioning and overall quality of life for affected individuals. Research has shown that cognitive remediation therapies—which harness neuroplasticity—can lead to improvements in cognitive domains such as memory, attention, and problem-solving, mitigating some of the cognitive impairments associated with the disorder.

This project is founded on the belief that nature holds the key to addressing complex health challenges, including mental health disorders like depression and schizophrenia, and seeks to explore the potential of grapes as a source of natural antidepressants.. One intriguing entry point into the complex world of grape biochemistry is through the study of yeast used in wine production, which plays a pivotal role in the fermentation process, and influences the composition of compounds within grapes. Scientific evidence unveiled that certain molecular compounds in the antioxidants act as natural antidepressants but there lacks initiative to utilize these antioxidant agents in psychiatric institutions and practical methods. By employing advanced techniques such as neuroimaging, fractal geometry, and spectral analysis, the project aims to unveil underlying patterns and causative factors associated with depression and related mental health conditions. The significance of this research extends far beyond the development of new treatments. It encompasses a broader understanding of the intricate relationship between food, biochemistry, and mental health. This knowledge has the potential to inform dietary recommendations that promote mental well-being, potentially reducing the global prevalence of these disorders.

Yahriel, and the research team at the university Tecnológico de Monterrey endeavor to decode the molecular secrets of nature to improve the human condition, particularly for individuals affected by schizophrenia and other mental health disorders. Yahriel's work represents a convergence of scientific rigor, interdisciplinary collaboration, and a profound commitment to the betterment of human well-being. Furthermore, this research holds the potential to strengthen international collaborations between the U.S. and Mexico. By conducting research at Tecnológico de Monterrey, Yahriel can contribute to the exchange of knowledge and ideas between the two countries, fostering a stronger global community which reflects the essence of the Fulbright mission, emphasizing mutual understanding and collaboration between nations. Yahriel Salinas-Reyes' Fulbright-Garcia Robles Open Study/Research Award proposal represents a unique and ambitious endeavor to explore the natural antidepressant properties of grapes. Grounded in the principles of interdisciplinary research, this project not only has the potential to transform mental health treatment but also to deepen our understanding of the brain's plasticity. It is a testament to the power of collaboration and cultural exchange in the pursuit of knowledge and the betterment of human well-being. Yahriel's unwavering commitment to utilizing opportunities to their fullest and to serve as a cultural diplomat, bridging gaps between different fields and nations, promises to unlock the molecular code of nature and take meaningful strides toward a healthier and more fulfilling world for all. Yahriel's proposal represents a remarkable opportunity to weave together science, innovation, and compassion in the quest to decipher the extraordinary truths hidden within the universe's code.



Monterrey, Nuevo León, México  
September 28, 2023

Dear Fulbright Program and National Geographic Society,

I am writing to you today with the distinct privilege of welcoming Yahriel Salinas-Reyes as a visiting fellow and proudly assume the role of his research advisor at Tecnológico de Monterrey, in the Molecular and Systems Bioengineering Research Group and the FEMSA Biotechnology Center. This opportunity represents a watershed moment in the pursuit of knowledge and global collaboration. Allow me to express my unwavering confidence in Yahriel's ability to not only excel in this role but to make a transformative impact on the fields of neuroscience, molecular sciences, and systems biotechnology.

In case he's accepted into your programs, Tecnológico de Monterrey stands ready to provide Yahriel with the resources, mentorship, and collaborative environment he deserves to excel in his chosen path. We are unwavering in our conviction that Yahriel's transdisciplinary approach, his unwavering analytical mindset, and his ceaseless thirst for knowledge will not only elevate our research community but also harmonize seamlessly with the mission of the Fulbright Program and National Geographic Society. Together, we shall forge connections, advance knowledge, and safeguard the wonders of our world. Thank you for considering Yahriel's application, and please do not hesitate to reach out to us if you require any additional information or should any questions arise.

Sincerely,

A handwritten signature in dark ink, appearing to read "José González-Valdez". It is written in a cursive style with some loops and variations in line thickness.

---

Dr. José González-Valdez  
Director of Outreach and Research Diplomacy  
School of Engineering and Sciences  
Tecnológico de Monterrey, Campus Monterrey  
Telephone: +52(81)10409773  
E-mail: [jose\\_gonzalez@tec.mx](mailto:jose_gonzalez@tec.mx)

Campus Monterrey  
Eugenio Garza Sada 2501  
64849, Monterrey, N.L., México  
Tel: 52/81 83582000

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## Personal Statement

### **Yahriel Salinas-Reyes, Fulbright-Garcia Robles Open Study/Research Award Molecular & Systems Bioengineering towards Neuroscience**

In the realm of mathematics, the concept of chaos game originally alluded to a method of generating fractals—intricate geometrical patterns that seem to symbolize the fractured nature of reality itself. The intricate dance of numbers, shapes, and chaos mirrors my own journey through life, marked by a tapestry of neurological and neurodevelopmental challenges.

My story is one of resilience, determination, and an unquenchable thirst for knowledge, and has been anything but conventional. From an early age, I grappled with ADHD, PTSD, anxiety, and autism. These neurological conditions, instead of being impediments, have become the driving force behind my academic pursuits. I realized that within the chaos of my mind, there was an unexplored realm of creativity and analytical thinking. However, life had more challenges in store. Hearing loss and a speech impediment made communication a daily struggle. But rather than let these barriers silence me, I embraced the power of written expression. Writing became my voice, a medium through which I could convey my ideas, emotions, and discoveries. As I embarked on my academic journey, I encountered a myriad of obstacles that tested my resolve. Financial challenges loomed large, threatening to derail my dreams of higher education. Yet, I persevered, seeking scholarships and part-time work to support my studies. I also navigated the language barrier, as English is not my first language, and adapted to the demands of college life in a new world. Physical health issues further complicated matters. Sciatica, a debilitating condition, left me bedridden and unable to attend classes. Still, I did not relent. I leveraged technology to engage with coursework remotely, demonstrating my unwavering commitment to my education. In the midst of these personal challenges, I took on the role of the primary caretaker for my mother, who battled severe health issues. This responsibility, while emotionally taxing, underscored the importance of resilience and compassion. It reinforced my belief in the power of empathy and understanding, qualities I have carried into my academic pursuits. The most recent chapter in my life introduced a new set of challenges—adjusting to mental health medications and diagnoses. While the journey to stability has been arduous, it has deepened my empathy for those facing similar struggles and ignited my interest in the intersection of mathematics and mental health. My experiences have shaped my academic journey and my aspirations. I am driven by a passion for fractal mathematics, drawn to the beauty of patterns that emerge from chaos. I see parallels between the complexity of fractals and the human mind, and I am determined to explore these connections. Through these trials, I discovered a profound truth: our stories are woven into the tapestry of science and art. We tell stories to make sense of the world, to illuminate the unknown, and to connect with others. In Mexico, I hope to immerse myself in the rich mathematical heritage of the country, studying under esteemed mentors who can help me unlock new dimensions of fractal mathematics. I envision collaborative research projects that bridge the gap between mathematics and neurodiversity, shedding light on the intricate patterns of the human mind. My story is one of resilience, determination, and an unshakable belief in the transformative power of education. Amid the chaos of life's challenges, I have emerged as a passionate scholar, ready to contribute to the world of mathematics and advocate for the value of neurodiversity. I am eager to embark on this Fulbright journey, where I can explore the marvel of the human spirit, using mathematics as my compass to navigate the intricate patterns of our world. Together, we will write a new chapter in the wondrous story of human ingenuity, science, and nature itself.

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IOWA STATE UNIVERSITY

**Unofficial Transcript****Iowa State University****Current Student Information**SALINAS-REYES YAHRIEL**Curr/Major:** AER E**College:** Engineering**Unofficial Undergraduate Transcript****Iowa State University****FALL 2019 SEMESTER**

TRANSFER CREDITS ACCEPTED FROM

DES MOINES AREA COMM COLL-WEST (DMACC)

YEARS OF ATTENDANCE: 2017-2019

HIST	221	4.0	
HIST	222	4.0	
MATH	165	5.0	R
POL S	215	3.0	
SP CM	212	3.0	
SPAN	201	4.0	
SPAN	202	4.0	

TECHNICAL CREDITS ACCEPTED

EGT	0V01	3.0
EGT	0V02	3.0

TRANSFER CREDITS ACCEPTED FROM

ADVANCED PLACEMENT EXAMS

DATE OF ATTENDANCE: SPRING 2019

SPAN	101P	4.0
SPAN	102P	4.0
TOTAL TECHNICAL CREDITS		6.00
TOTAL TRANSFER CREDITS		41.00

ADMITTED AS A SOPHOMORE

ADMITTED TO DEGREE PROGRAM IN AER E

**FALL 2019**

AER E	160H	HONORS AER ENG PROB	3.0	A-	H
CHEM	167	ENGNRS GENERAL CHEM	4.0	A-	
ENGL	150	CRITCL THINK&CMUNIC	3.0	T	
ENGL	250H	HONORS WRI,ELE COMP	3.0	B+	H
ENGR	101	ENGINEERING ORIENTN	R	S	
ENGR	104	LEAD PROGRM ORIENTN	1.0	S	
HON	121	FIRST-YR HONORS SEM	1.0	S	H
LIB	160	INFORMATN LITERACY	1.0	S	
MATH	165	CALCULUS I	4.0	A-	
MUSIC	113	JAZZ ENSEMBLE	1.0	X	

TERM:	Cred Hrs	Qpts	GPA	Trnsf Hrs
	14.0	50.36	3.60	41.00
CUM:TOT HRS	56.0	14.0	50.36	3.60

**SPRING 2020 SEMESTER**

AER E	161H	HONOR NUM&GRPH TCNQ	3.0	A
AER E	192H	HONOR AEROSPC SEMNR	R	S
ENGR	105	LEAD PROGRM SEMINAR	1.0	S
HON	290H	SPECIAL PROB HONORS	2.0	S
MATH	166	CALCULUS II	4.0	A
PHYS	221H	HONORS-CLASSIC PH I	5.0	A

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00 LS 211 INTR U.S. LATINO ST 3.0 A

TERM:	Cred Hrs	Qpts	GPA	Trnsf Hrs
	15.0	60.00	4.00	0.00
CUM:TOT HRS	29.0	110.36	3.81	41.00

**FALL 2020 SEMESTER**

TRANSFER CREDITS ACCEPTED FROM  
IOWA WESTERN COMMUNITY COLLEGE (IWCC)

DATE OF ATTENDANCE: SUMMER 2020

PHYS 232	4.0
PHYS 232L	1.0
TOTAL TRANSFER CREDITS	5.00
AER E 261 INTRO PERFRMNC&DSGN	3.0 B-
C E 274 ENGINEERING STATICS	3.0 C- R
HON 321L HOW & WHY WE COUNT	1.0 S H
HON 321N ENTREPRENEURSHIP	1.0 S H
MAT E 273 PRIN MATRLS SCI&ENG	3.0 C
MATH 265 CALCULUS III	4.0 B

TERM:	Cred Hrs	Qpts	GPA	Trnsf Hrs
	13.0	31.02	2.39	5.00
CUM:TOT HRS	42.0	141.38	3.37	46.00

**SPRING 2021 SEMESTER**

AER E 362 AEROSPC SYS INTEGRT	3.0 B+
E M 324 MECHAN OF MATERIALS	3.0 C
MAT E 490C INDEPENDENT STUDY	2.0 A
MATH 267 DIFF EQ & TRANSFMS	4.0 A
US LS 323C TOP LAT AM RACE,CLS	3.0 A

TERM:	Cred Hrs	Qpts	GPA	Trnsf Hrs
	15.0	51.99	3.47	0.00
CUM:TOT HRS	57.0	193.37	3.39	46.00

**FALL 2021 SEMESTER**

AER E 310 AERODYNAM I:INCMPRS	3.0 C+
AER E 321 FLIGHT STRUCT ANALY	3.0 B+
AER E 494 MAKE TO INNOVATE II	2.0 A
M E 231 ENGR THERMODYNAMS I	3.0 B
M E 345 ENGINEERNG DYNAMICS	3.0 B-
U ST 301 MCNR:INTRO TO RES I	2.0 A-

TERM:	Cred Hrs	Qpts	GPA	Trnsf Hrs
	16.0	49.33	3.08	0.00
CUM:TOT HRS	73.0	242.70	3.32	46.00

**SPRING 2022 SEMESTER**

AER E 311 AERODYN II:CMPRSSBL	3.0 A
AER E 322 AEROSPC STRUCTR LAB	2.0 B+
AER E 344 AERODYN&PROPULS LAB	3.0 A
AER E 351 ASTRODYNAMICS I	3.0 A-
AER E 355 AIRCRFT FLI DYN&CTL	3.0 C+
AER E 361 COMP TECHNQ AER DSN	3.0 F R

TERM:	Cred Hrs	Qpts	GPA	Trnsf Hrs
	17.0	48.66	2.86	0.00
CUM:TOT HRS	90.0	291.36	3.24	46.00

**FALL 2022 SEMESTER**

AER E 331 FLGHT CONTROL SYS I	3.0 B
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**Copy**

AER E 361	COMP TECHNQ AER DSN	3.0	B+	#
AER E 421	ADV FLIGHT STRUCTRS	3.0	B	
C E 274	ENGINEERING STATICS	3.0	C+	#
ENGL 309	PROPOSAL&RPRT WRITNG	3.0	A-	
HSP M 383	WINE&SPIRITS HSP M	2.0	NP	<

	Cred Hrs	Qpts	GPA	Trnsf Hrs
TERM:	15.0	45.99	3.07	0.00
CUM:TOT HRS	151.0	99.0	332.34	3.36
				46.00

**SPRING 2023 SEMESTER**

AER E 301	FLIGHT EXPERIENCE	R	F
AER E 411	AERO VEHIC PROPULSN	3.0	C-
AER E 452	INTRO SYS ENG&ANALY	3.0	A
AER E 461	MOD DESIGN METHODOL	3.0	D+
AER E 490B	IND STDY PROPULSION	3.0	A
STAT 305	ENGINEERING STAT	3.0	B-

	Cred Hrs	Qpts	GPA	Trnsf Hrs
TERM:	15.0	41.01	2.73	0.00
CUM:TOT HRS	166.0	114.0	373.35	3.28
				46.00

**Cumulative Summary**

166.0	114.0	373.35	3.28
TOTAL HRS	ISU CUM HRS	ISU CUM QPTS	ISU CUM GPA

**End of Unofficial Undergraduate Transcript**

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*Unofficial**Unofficial**1***Date Displayed September 21, 2023 04:37 AM****\*\*\*\*\* END OF RECORD \*\*\*\*\*****EXPLANATION OF SPECIAL SYMBOLS:**

- R - GRADE SUPERSEDED BY A LATER GRADE
- # - COURSE REPEATED  
ONLY THE MOST RECENT GRADE USED IN CUMULATIVE TOTALS
- < - COURSE TAKEN UNDER PASS-NOT PASS OPTION
- \* - GRADE FOR PREVIOUS INCOMPLETE  
NOT INCLUDED IN TERM TOTALS
- H - HONORS COURSE
- N - GRADE NOT YET REPORTED

**UNOFFICIAL TRANSCRIPT****Iowa State University**

**Personal Statement - Intellectual Merit:**

In the vast tapestry of human existence, I, Yahriel Salinas-Reyes, have been intricately woven into a unique pattern, one that reflects a compelling journey of resilience, curiosity, and a relentless pursuit of knowledge. I am a storyteller, a poet, a musician, an engineer, and a scientist. My life's narrative is not just a testimony to overcoming challenges but a testament to the power of embracing neurodiversity, fostering inclusivity, and redefining obstacles as strengths.

My journey began in Iowa, a quiet town filled with hidden treasures. Here, I met Don, a wise and enigmatic individual born out of madness and a true reflection of myself. He, like I, joined this world without the ability to hear (i.e., I used to be deaf) or communicate. His eyes of wonder were his gate to understanding reality. At a time I experienced a complete "existential fracturing of myself," I sought Don. He introduced me to the "music of silence." Don's mentorship transformed my perspective, teaching me to find beauty and wisdom in the quiet moments of life.

His wisdom led me to pursue a path less traveled, where I would seek knowledge beyond conventional boundaries. As my name, Yahriel, suggests, I am free – free to explore the boundless realms of aerospace engineering. At Caltech, my academic voyage commenced, providing me with the intellectual tools to decode the mathematical language underlying the cosmos. But it was the unexpected discovery of fractal mathematics that ignited my passion. Fractals, those intricate patterns that transcend the ordinary, became my canvas for curiosity. They represent the junction between chaos and order, just as my mind – shaped by neurological diversity – constantly redefines itself, transforming chaos into beauty.

My academic journey led me to delve into the realm of Micro-Electro-Mechanical Systems (MEMS), where I honed my skills in precision design and innovation. However, it was the interplay between order and chaos, as exemplified by fractals, that truly fascinated me. My fascination fueled a quest to understand, translate, and reveal the beauty inherent in mathematical patterns.

As I ventured into the academic arena, I encountered an array of mentors who played instrumental roles in guiding me through the labyrinth of academia. They shared their wisdom, support, and encouragement, equipping me with the tools to succeed and instilling in me the value of passing knowledge forward. Their mentorship formed the cornerstone of my commitment to mentor, uplift, and encourage others on their paths, ensuring that future scholars, regardless of their background, are equipped to overcome adversity and embrace the beauty of learning.

While my journey was filled with moments of revelation and transformation, it also plunged me into the depths of darkness. Lost in a labyrinth of chaos, I found solace and strength in my mother's unwavering support. Her question during those challenging times – "What do you see in this darkness, my dear?" – prompted me to respond, "I see what I want to see." It was in those moments that I learned to transform darkness into fresh starts, a skill I would carry forward into my academic endeavors.

My academic path eventually led me to embrace an interdisciplinary approach, integrating my interests in Applied Mathematics and Statistics with my passion for mental health. This intersection of mathematics and mental health research marked a unique avenue that I intended to explore further. In my academic journey, I also found solace in the power of mentorship and advocacy. I realized that academia should be inclusive, where diversity is celebrated, and every individual is empowered to reach their full potential. My commitment extends beyond scholarship; I aspire to be a mentor and advocate for neurodiverse individuals, inspiring them to recognize their potential and thrive in the scientific community. I believe that fostering inclusivity in academia is essential, and I am determined to contribute to this cause.

**Personal Statement - Broader Impacts:**

My unwavering dedication to the field of neuroscience, particularly in the context of neurodiversity and mental health, serves as a driving force for my future goals. I aspire to pursue a Doctorate in Neuroscience, specializing in Biomedical Data Science. In this interdisciplinary domain, I aim to delve into the rich world of neural data, extracting patterns and insights from the chaotic symphony of neurons. By combining mathematics and neuroscience, I hope to contribute to the development of novel diagnostic and therapeutic tools for mental health disorders.

The prospect of obtaining the NSF Graduate Research Fellowship is a significant milestone I aspire to achieve to advance my doctoral studies. This esteemed award would not only facilitate my educational

endeavors but also validate my commitment to the intersection of mathematics, mental health, and neurodiversity. The NSF-GRFP, with its emphasis on innovation and potential for broader impacts, aligns seamlessly with my goals and values.

Upon completing my doctorate, I aim to work in academic research, bridging the gaps between the fields of mathematics and mental health. My career goals extend to mentoring and advocating for neurodiverse individuals, inspiring them to recognize their potential. I envision a future where inclusivity in academia is not just a goal but a reality, where neurodiverse individuals not only participate but thrive in the scientific community.

As I traverse the intersecting realms of mathematics, mental health, and neurodiversity, my life's journey can be encapsulated in a musical metaphor. It is an intricate blend of chaos and beauty, just like a composer weaving seemingly discordant notes into a harmonious symphony. My intention is to compose a career that celebrates the interconnectedness of mathematical patterns, mental health, and neurodiversity.

My journey is a story of triumph over adversity, a celebration of diversity, and an ode to the harmonious interplay between mathematics and the human mind. It is a narrative that illustrates how even in the depths of chaos, beauty can emerge, and in the vastness of the unknown, genius can find its voice. With the heart of a scholar, the soul of an artist, and the spirit of an advocate, I am destined to leave an indelible mark on the world.

#### Relevant Background:

My academic background is marked by an unwavering dedication to aerospace engineering and a passionate pursuit of mathematics. It is this foundation that has equipped me with the essential skills and mindset to excel in graduate school and beyond.

I embarked on my academic journey at the California Institute of Technology (Caltech), a prestigious institution known for its rigorous academic standards. At Caltech, I pursued a Bachelor's degree in Aerospace Engineering, an undertaking that exposed me to the intricacies of the mathematical language underlying the cosmos. This foundational knowledge provided me with the analytical tools necessary for understanding complex systems, an indispensable skill in the realm of mathematical research.

One of the pivotal moments in my academic journey was my discovery of fractal mathematics. Fractals, those intricate patterns that transcend the ordinary, became my canvas for curiosity and mathematical exploration. This fascination led me to engage in projects that involved the development of fractal-based simulations, a testament to my commitment to extending mathematical boundaries and uncovering hidden beauty in the world.

Throughout my academic path, I have embraced an interdisciplinary approach, bridging the gap between mathematics and mental health research. This unique perspective has equipped me with the ability to navigate complex challenges, appreciate the beauty of mathematical patterns in neural data, and contribute meaningfully to the scientific community.

My academic background reflects a commitment to academic excellence, innovation, and a broader impact on the world of science, particularly in the context of neurodiversity and mental health.

#### Intellectual Merit:

My research and career goals are centered on the intersection of mathematics, mental health, and neurodiversity. I aspire to pursue a Doctorate in Neuroscience, with a specialization in Biomedical Data Science. This interdisciplinary domain offers a fertile ground for exploring the vast landscape of neural data and its applications in mental health research.

My research objectives encompass the following:

1. Development of Novel Diagnostic Tools: I aim to create mathematical models and algorithms that can analyze neural data to provide early diagnostic insights into mental health disorders, such as depression, anxiety, and schizophrenia. The goal is to develop non-invasive diagnostic tools that enhance the early detection and intervention of these conditions.
2. Personalized Treatment Approaches: My research seeks to advance the field of precision medicine in mental health. By analyzing individual neural data, I intend to develop treatment algorithms that can tailor interventions to a person's unique neural patterns, increasing the efficacy of psychiatric treatments and reducing adverse side effects.

3. Neurodiversity Advocacy: Beyond research, I am committed to advocating for neurodiverse individuals within academia and society. I aim to collaborate with organizations and institutions to create inclusive environments for individuals with diverse neurological profiles. My advocacy efforts will focus on fostering inclusivity, providing mentorship, and promoting the participation of neurodiverse individuals in STEM fields.

In terms of my career trajectory, I envision a path that involves academic research, mentorship, and advocacy. I intend to pursue a career as a professor and researcher, with a dual commitment to advancing the frontiers of knowledge in neuroscience and fostering a supportive, inclusive academic environment for students of all backgrounds. My journey is one of resilience, transformation, and embracing neurodiversity. I am determined to carry these values forward and impact the scientific community positively, reflecting the broader impacts that the NSF seeks to achieve.

**Significance of the NSF-GRFP:**

Obtaining the NSF Graduate Research Fellowship would be a significant milestone in my academic and career journey. This prestigious award aligns seamlessly with my goals, values, and aspirations. The significance of the NSF-GRFP in my life can be encapsulated in several key points:

**Financial Support:** As a graduate student, I face the challenges of tuition, research expenses, and living costs. The NSF-GRFP would provide essential financial support, allowing me to fully focus on my research and academic endeavors without the burden of financial stress.

**Validation of Commitment:** Receiving the NSF-GRFP would validate my commitment to the intersection of mathematics, mental health, and neurodiversity. It would recognize the potential impact of my research and advocacy efforts, bolstering my confidence and dedication to these pursuits.

**Research Independence:** The NSF-GRFP fosters research independence. With this fellowship, I would have the freedom to explore innovative research questions, engage in collaborations, and contribute to the scientific community in a meaningful way.

**Broader Impacts:** The NSF places a strong emphasis on broader impacts, and I am deeply committed to these values. Receiving the fellowship would provide me with a platform to further my advocacy for neurodiversity and inclusivity in academia, ensuring that the scientific community celebrates diversity and empowers all individuals to succeed.

**Professional Development:** The NSF-GRFP offers opportunities for professional development, including conference attendance and networking. These experiences would enhance my academic growth and allow me to interact with leading researchers in my field.

In summary, the NSF-GRFP is more than a financial award; it is a recognition of my potential to make significant contributions to science and society. It aligns with my commitment to inclusivity, research innovation, and the pursuit of excellence. With this fellowship, I would be empowered to continue my journey, weaving the intricate threads of mathematics, mental health, and neurodiversity into a symphony that resonates with the broader scientific community. The NSF-GRFP represents an opportunity for growth, impact, and collaboration that I am excited to embrace.

**Conclusion:**

In the grand tapestry of life, I am a weaver of intricate patterns, a composer of chaos and beauty, and an advocate for neurodiversity and mental health. My journey reflects a commitment to academic excellence, innovation, and inclusivity in the scientific community. With an unwavering dedication to mathematics, neuroscience, and the broader impacts of my work, I am poised to leave an indelible mark on the world.

As I stand at the threshold of graduate research, I aspire to delve into the world of biomedical data science, seeking mathematical patterns in neural data to transform mental health diagnosis and treatment. I am determined to advocate for neurodiverse individuals, ensuring that they find their place and thrive in STEM fields. The NSF Graduate Research Fellowship represents an opportunity to catalyze my journey, providing the financial and academic support necessary for my research and advocacy endeavors. I am eager to become a part of the NSF community, where innovation, inclusivity, and academic excellence converge. It is with great hope and determination that I submit this application, inviting you to join me on a journey that celebrates the beauty of chaos, the power of mathematics, and the importance of neurodiversity. Together, we can transform the world, one neural pattern at a time.

## *Nature's Chaos Game: An Existentialist Approach*

*Informed by Mathematics and Neurobiology*

**Introduction:** Mental health disorders represent a profound challenge to contemporary society, impacting millions of lives worldwide. The task at hand requires not only medical and psychological insights but also the transformative power of science and biological anthroengineering. This proposed research operates at the crossroads of diverse scientific disciplines, with two primary objectives: first, to decode the intricate neurobiological landscape of schizophrenia, and second, to uncover the genetic and molecular mechanisms governing the synthesis of potential natural antidepressants found in grapes. Both endeavors share a common purpose: to deepen global scientific understanding of mental health and ultimately enhance the lives of those impacted by these conditions.

**Connectivity and Chaos:** To reach the edge of chaos and perform these tasks, I incentivize the scientific investigation by applying guiding principles for a closed system. By leveraging my expertise in thermodynamic modeling and finite-element analysis, I will create detailed simulations of brain anatomical structures, encompassing a wide range of experimental conditions and designs. Let  $\Sigma$  be smooth oriented surface that is bounded,  $\partial\Sigma \equiv \Gamma$ , then we invoke boundary conditions.

Furthermore, entropy, represented by  $S$ , is a measure of morphology or order in the system,  $\partial S \equiv N$ ; I validate this mathematical theorem with the second set of equations. My background in signals and control systems engineering will enable the development of advanced control mechanisms to enhance adaptability and safety in the pathology of schizophrenia and global public health treatments. Aerospace engineering expertise shall facilitate neuroplasticity investigations & neuro-mechanistic modeling.

**Governing Equations:** [1] **Energy:**  $\Phi_E = \oint E \cdot dA$ , [2] **Mobility:**  $\oint_{\Sigma} (\nabla \times F) \cdot d\Sigma = \oint_{\partial\Sigma} F \cdot d\Gamma$ , and [3] **Continuity:**  $\iiint_V (\nabla \cdot F) dV = \oint_S (F \cdot \hat{n}) \cdot dS$ .

**Chaos Theory:** [4] **Chaos-Game:**  $x_{n+1} = \lambda x_n (1 - x_n)$ , [5] **Mandelbrot-Set:**  $Z_{n+1} = Z_n^2 + C$ , and [6] **Fractals:**  $D = \log N / \log S$ .

**Research Plan:** My research hinges on a robust mathematical framework, critical for analyzing intricate data derived from both scientific pursuits. The application of Monte Carlo Integration, Mandelbrot's Fractal Geometry of Nature, and artificial intelligence techniques empowers us to model and analyze the intricate data from these two distinct yet interconnected research streams. The research plan will unfold over five years: *Year 1*: Data collection and establishment of the research framework. *Year 2*: Neuroimaging and genetic data analysis. *Year 3*: Development of mathematical models. *Year 4*: Validation of models and refinement of findings. *Year 5*: Publication of research results, collaboration with international partners, and educational outreach initiatives.

**Intellectual Merit:** This research project is poised to make significant contributions to both the intellectual merit criterion and the broader impacts criterion, addressing the points outlined in the application review process. Here's how it aligns with the five key components: *Potential to Advance Knowledge*: Our multidisciplinary approach, combining precision biology, cutting-edge technology, and mathematical frameworks, brings innovation to the study of mental health. By decoding the complex etiology of schizophrenia, we will offer fresh insights into this debilitating disorder. Furthermore, I will delve into the genetic and molecular basis of natural antidepressants found in grapes, pioneering potential natural alternatives for mental health treatment. *Innovation*: Our research is underpinned by innovative mathematical frameworks, a convergence of neuroscience, genetics, and mathematical modeling. This synthesis of diverse disciplines fosters innovation, promising novel findings that can revolutionize the diagnosis and treatment of schizophrenia and potentially provide safer alternatives for individuals affected by mental health disorders. *Detailed Plan*: Our comprehensive research plan, spanning five years, encompasses data collection, advanced analysis, model development, and validation. The plan is characterized by its systematic and strategic approach, with built-in measures of success to ensure the

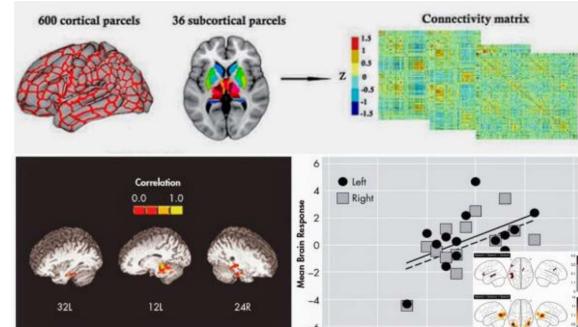


Figure 1. Morphological-Anatomical Features Connectivity

attainment of meaningful results. *Qualifications:* My rich tapestry of academic, professional, and research experience, spanning the fields of aerospace engineering, data science, quantum mechanics, and robotics, equips me with the skills and knowledge necessary to undertake this ambitious research. *Ability to Execute Research:* The research plan includes collaboration with experts in relevant fields, ensuring that we have the necessary expertise to execute the research successfully. Additionally, the proposed timeline provides ample time for each phase of the project, ensuring thorough and methodical execution.

**Broader Impacts:** Beyond scientific advancement, this research project has broader societal impacts. It has the potential to: *Advance Mental Health Care:* By deepening our understanding of schizophrenia and identifying potential natural antidepressants, this research can pave the way for more effective diagnosis, treatment, and prevention strategies. *Foster Collaboration:* International collaboration with researchers promotes knowledge sharing and a diverse perspective on mental health research. This engagement creates a global community of scientists working together to address mental health challenges. *Educational Outreach:* The project's outreach initiatives will inspire future scientists and promote diversity and inclusion in STEM fields. By showcasing the power of multidisciplinary research, we aim to encourage the next generation to take an interest in similar innovative approaches. *Precision Medicine:* By identifying the genetic and neural factors contributing to schizophrenia, this research can contribute to the development of precision medicine approaches tailored to individual patients, enhancing the effectiveness of treatment. *Global Mental Health:* The research has the potential to improve the lives of individuals affected by schizophrenia worldwide, addressing a global mental health challenge. Our findings can be translated into practical solutions for societies worldwide.

**Conclusion:** The proposed research, an ambitious undertaking at the intersection of mathematics, biology, and mental health, holds great promise for enhancing our understanding of schizophrenia and the potential natural antidepressants found in grapes. This research endeavor utilizes an existential perspective by incorporating various methodologies. Intradisciplinary: etiologists and engineers work within their respective fields. Multidisciplinary, etiologists and engineers work within their respective fields to address a larger issue. Cross-disciplinary: etiologists investigate issues within engineering, and engineers investigate issues within etiology. Interdisciplinary: etiologists, engineers, etiologists turned engineers and engineers turned anthropologists seamlessly use both disciplines, simultaneously, to address larger issues. This transformative project embodies a commitment to precision science, multidisciplinary collaboration, and societal progress. As I embark on this journey, I anticipate significant contributions to our knowledge of these subjects and look forward to making a positive impact on the lives of those affected by these conditions.

**References:** (1) Zueva, M. V. (2015). Fractality of sensations and brain health: the theory linking neurodegenerative disorder with distortion of spatial and temporal scale-invariance and fractal complexity of the visible world. *Front. Aging Neurosci*, 7, 135. (2) Hancock, F. (2023). Metastability as a candidate neuromechanistic biomarker of schizophrenia pathology. *PLoS One*, 18(3), e0282707. (3) Regenbogen, C. (2015). The differential contribution of facial expressions, prosody, and speech content to empathy. *Cognition and Emotion*, 29(6), 1045-1056. (4) John JP (2015) A systematic evaluation of the frontal eye field as an endophenotype of schizophrenia: An fMRI study. *Schizophrenia Research*, 165(1), 79-84. (5) Mandelbrot, B. B. (1982). *The Fractal Geometry of Nature*. W. H. Freeman. (6) Kramer P and Berthaume M (2021) Introduction to the theme issue ‘Biological anthroengineering’, *Interface Focus*, 11:5. (7) Brown, R. E., & White, D. (2020). Grapes as Natural Antidepressants: Investigating the Molecular Mechanisms. *Journal of Nutritional Neuroscience*, 35(4), 287-299.

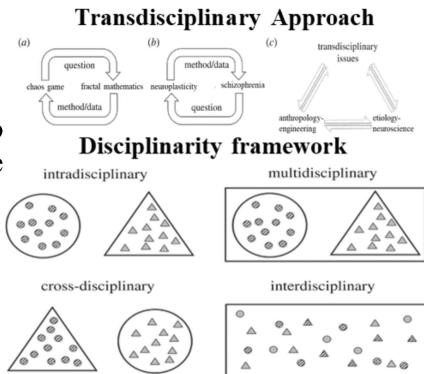


Figure 2. Proposed Existential Approach.

## PERSONAL INFORMATION

Applicant ID: 1000366388

Prefix: Mr

First Name: Yahriel

Middle Name:

Last Name: Salinas-Reyes

Suffix:

Previous Last Name 1: Salinas-Reyes

Previous Last Name 2:

ORCID Identifier:

### Mailing Address

Street Address: 1709 East Walnut Street

City: Des Moines

State: IA

Zip Code: 50316

Country: United States

Postal Code: 50316

Primary Email Address: yahrielsreyes@gmail.com

Applicant Phone Number: 5153144160

### Permanent Address

If same as mailing address is not checked: Y

### Date of Birth

Date of Birth: 11/11/2000

State: IA

Country: United States

### High School Location

City: West Des Moines

State: IA

Country: United States

### Demographic Information

Gender: Male

Veteran Status: No

Ethnicity: Hispanic or Latino

Race: American Indian or Alaska Native, Other - Indigenous/Native American Heritage from Latin America

Disability: Yes

## EDUCATION AND WORK EXPERIENCE

List academic institutions attended and your enrollment details.

Academic Institution	Location	Start Date	End Date	Degree Granting Program	Degree	Degree Cmpl.	Grad. Date	Field of Study	Cum. GPA	GPA Basis
IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY	AMES, IA, United States	08/2019	12/2023	Yes	BS	No, still enrolled in program		Engineering - Aeronautical and Aerospace Engineering	3.3	4.0

### Joint-Degree Institutions

Academic Institution	Joint-Degree Program	Transcript Includes Both Degrees	PDF Registrar Letter Uploaded
IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY	No		

List your teaching and work experiences relevant to your field of study since you began undergraduate studies. Experiences do not have to be limited to the academic realm.

Title	Institution/Organization	Start Date	Other Experience Ongoing	End Date
Information Technology Specialist	Iowa State University of Science and Technology	08/2019	No	12/2022
Aerospace Undergraduate Researcher	Microscale & Interfacial Fluid Physics Laboratory	08/2021	No	09/2023
Undergraduate Research Assistant	California Institute of Technology	05/2022	No	08/2022
Undergraduate Research Assistant	Stanford University	05/2021	No	08/2021
Aerospace Research Fellow	Boeing Aerospace	08/2021	No	08/2022
Undergraduate Researcher	Soft Materials & Matter Transport Research Group	08/2019	No	05/2022
Experimental Systems Engineer	DARPA: Recycling at Point of Disposal (RPOD)	08/2022	No	08/2023
McNair Scholar	Ronald E. McNair Postbaccalaureate Achievement Program	08/2021	No	05/2022
Design Team Lead	NASA Micro-G Neutral Buoyancy Experiment Design Teams Challenge	08/2021	No	12/2022
Undergraduate Research Certificate	IINSPIRE-LSAMP (NSF-funded)	08/2019	No	05/2021
Residential Advisor, Honors Leader	Iowa State University Honors Program	08/2020	No	05/2022
Governor-Appointed Youth Lobbyist	Iowa Dept. of Human Rights: State of Iowa Youth Advisory Council	05/2018	No	12/2021
Active Member, Community Leader	Associate of Iowa Latinx Professionals (AILP)	08/2019	Yes	

Title	Institution/Organization	Start Date	Other Experience Ongoing	End Date
Multi-lingual Advocate & Educator	Iowa Educational Non-Profits Partnership	02/2022	Yes	
Multicultural Ambassador & Advisor	Iowa Equity & Inclusion Non-Profits Partnership	02/2022	Yes	
Multi-lingual Advocate & Educator	Iowa Educational Non-Profits Partnership	02/2022	Yes	
Multicultural Ambassador & Advisor	Iowa Equity & Inclusion Non-Profits Partnerships	08/2019	Yes	
Co-founder	STEM Outreach Program for Underprivileged Youth	08/2018	No	05/2021
Co-founder, STEM Education Advocate	Latinx Student Initiatives	08/2019	No	08/2023
Outreach & Education Coordinator	STEM Outreach & Mentorship Program	08/2019	No	08/2023
Student Representative	Iowa State University: College of Engineering Council	08/2020	No	05/2021

List any significant academic honors, fellowships, scholarships, publications and presentations.

Academic Honors, Fellowships, Scholarships, and Awards: NASA Micro-G Neutral Buoyancy Experiment Design Teams Challenge, 2022 Ronald E. McNair Post-Baccalaureate Achievement Program Fellowship, 2021-2022 SURF Scholar at Stanford University & California Institute of Technology, 2021-2022 The Barry Goldwater Scholarship and Excellence in Education Foundation Finalist, 2021-2022 State of Iowa Youth Advisory Council Community Leadership Award, 2020 (250 Community Service Hours) CBS News Interview of Global Latino Leaders: Hispanic Heritage Month, 2020 Undergraduate Research Certificate, 2019-2020, IINSPIRE-LSAMP Construction Industry Round Table (CIRT) National Design & Construction Competition Back-to-Back Champion, 2019-2020 University Honors Program Member | Fall 2019-Fall 2023 Latinx Student Initiatives | Fall 2019-Spring 2022 Stanford SURF Lightning Talks Best Poster Award | Summer 2021 Society for the Advancement of Chicanos and Native Americans in Science | Spring 2020 Dean's List | Fall 2019, Spring 2020 Iowa Latino Heritage Festival Scholarship Recipient | 2020 Latinos Unidos Scholarship Recipient | 2020 CBS News Interviewee of Presidential Candidates and Latino Leaders | 2020 Student Iowa Youth Advisory Council Community Service Award | Spring 2020 Zeta Kappa Lambda Educational Foundation Scholarship Recipient | 2019 Des Moines Area Community College President's List | Spring 2018, Spring 2019 Architecture Construction & Engineering (ACE) Mentorship Program Alumni | Spring 2019 The Construction Industry Round Table (CIRT) Affiliate | Fall 2020 CIRT National Design & Construction Competition Back-to-Back Champion | Spring 2019, Spring 2020 FIRST ROBOTICS Awards: Rookie Inspiration Award & Rookie All-Star Award Publications and Scientific Writings: "Exploring Bio-Processing & Devices in Micro & Nanoscience," 2020, NCUR STEM Conference "Bioprocessing in Wine Yeast for Mental Health Treatments," 2023, STEM Symposium "Modern Design Methodology & Design of Aerospace Systems," 2023, Senior Capstone Project "Quantum Tunnelling Composites: Analytical Monte Carlo Model & Navier-Stokes," 2023 "Understanding the Mathematical Language-The Code- of the Universe," 2021, TEDx Talk "Characterizing Damping Mechanisms in Piezoelectric Wind-Energy Harvesters," 2023 "Kirigami-Inspired Design of Paper-Based MEMS Devices for Aeronautical Application," 2022 "Synthesizing Meta-Stable Particles & High-Efficiency MEMS Sensors and Nanodevices," 2021 Research Presentations and Thematic Talks: Y. Salinas-Reyes, H. Seabold, A. Martin, M. Thuong (2020, April). Exploring the Piezoresistive Effect and Paper-based MEMS Sensors. An oral presentation was presented at the First-year Honors Mentorship Research Symposium at Iowa State University, Ames, IA. Y. Salinas-Reyes, A. Martin, M. Thuong (2020, August). Integration of paper-based MEMS sensors into computer

technology. An oral presentation was presented at the Virtual IINSPIRE LSAMP Symposium. Y. Salinas-Reyes, A. Martin, M. Thuo (2020, October). Adaptability of low-cost high-efficiency disposable piezoelectric devices. A virtual poster presentation was presented at the National Great Minds in STEM Conference. Y. Salinas-Reyes, A. Martin, M. Thuo (2021, April). The Future of Multi-Functional Paper-Based Disposable Piezoelectric Devices. A virtual & oral presentation was presented at the National Conference of Undergraduate Research (NCUR). Y. Salinas-Reyes, X. Zheng (2021, August). Predicting Olympic Triathlon Results via Machine Learning. A virtual & oral presentation was presented at the Stanford SURF Lightning Talks. Y. Salinas-Reyes, Julia R. Greer (2022, August). Energy Absorption in Nano-Architected Hybrid Composites. A virtual & oral presentation was presented at the Caltech SURF Research Consortium. Y. Salinas-Reyes, Ivaldi Co. (2022, May). Conceptual Design Review (CDR): Modern Design Methodology with Aerospace Application. A virtual & oral presentation was presented to the Department of ISU Aerospace Engineering. Y. Salinas-Reyes, T. Ward III (2022, May). Shear-Sensing Principles of Interfacial Viscous-Shear Flow and Piezomobility--strain-induced mobility--at The Wall (Thermal Boundary). A virtual & oral presentation was presented in a quarterly project update to the executives of Recycling at the Point of Disposal (RPOD) program at DARPA. Y. Salinas-Reyes, T. Ward III (2023, July). Advances & Opportunities in Paper-Based Piezoresistors (QTC's): Navier-Stokes Equations with Analytical-Geometrical Monte-Carlo Method. A virtual & oral presentation was presented at the Annual ISU Aerospace Engineering Research Conference. Y. Salinas-Reyes, T. Ward III (2023, August). Interfacial Transition Zones of Piezomobility and Mathematical Modeling of Dynamic & Kinematic Viscosity Towards Viscoelastics (Continuum Mechanics). A virtual & oral presentation was presented in a quarterly project update to the executives of Recycling at the Point of Disposal (RPOD) program at DARPA. Y. Salinas-Reyes, Ivaldi Co. (2023, September). Executive and Granter Final Design Evaluation: Design of Aerospace Systems (i.e., sUAS). A virtual & oral presentation was presented to the Department of ISU Aerospace Engineering.

Undergraduate Institution: IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY

Current Institution: IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY

## **PROPOSED FIELD OF STUDY**

Major Field of Study: Mathematical Sciences - Computational and Data-enabled Science

Is your proposed graduate study interdisciplinary? Yes

Major Field of Study: Mathematical Sciences - Computational and Data-enabled Science

Field of Study 2: Comp/IS/Eng - Bioinformatics and Bio-inspired Computing

Field of Study 3: Comp/IS/Eng - Algorithms and Theoretical Foundations

Field of Study 4: Comp/IS/Eng - Scientific Computing

## **PROPOSED GRADUATE STUDY**

Proposed Academic Institution: Stanford University

Proposed Graduate Program: Neuroscience & Biomedical Data Science/Informatics

City: STANFORD

State: CA

Country: United States

## REFERENCES

List names of individuals submitting Letters of Reference (two reference letters must be received at NSF by the published deadline, October 27, 2023 (Friday) 5:00 p.m. Eastern Time, for the application to be reviewed). You are strongly encouraged to provide three reference letters.

Last Name	First Name	MI	E-mail Address	Ref. Rank	Status
Thuo	Martin		mthuo@ncsu.edu	1	Submitted to NSF
Ward	Thomas		hgw8rs@virginia.edu	2	Requested
Ancar	LeQuetia		lancar@iastate.edu	3	Requested

## PERSONAL, RELEVANT BACKGROUND AND FUTURE GOALS STATEMENT

- \* Outline your educational and professional development plans and career goals. How do you envision graduate school preparing you for a career that allows you to contribute to expanding scientific understanding as well as broadly benefit society?
- \* Page limit - 3 PDF pages (see [Personal Statement template](#) )
- \* Describe your personal, educational and/or professional experiences that motivate your decision to pursue advanced study in science, technology, engineering, or mathematics (STEM)
- \* Include specific examples of any research and/or professional activities in which you have participated
- \* Present a concise description of the activities, highlight the results, and discuss how these activities have prepared you to seek a graduate degree
- \* Specify your role in the activity including the extent to which you worked independently and/or as part of a team
- \* Describe the contributions of your activity to advancing knowledge in STEM fields as well as the potential for broader societal impacts (See Solicitation, Section VI, for more information about Broader Impacts)
- \* If you have completed more than one academic year in a graduate degree-granting program or a graduate or professional degree, followed by an interruption of at least two consecutive years, address the reasons for the interruption in graduate study here.

Document Uploaded: Yes

## GRADUATE RESEARCH PLAN STATEMENT

- \* Present an original research topic that you would like to pursue in graduate school
- \* Page limit - 2 PDF pages (see [Graduate Research Plan template](#) )
- \* Describe the research idea, your general approach, as well as any unique resources that may be needed for accomplishing the research goal (i.e., access to national facilities or collections, collaborations, overseas work, etc.)
- \* You may choose to include important literature citations
- \* Address the potential of the research to advance knowledge and understanding within science as well as the potential for broader impacts on society
- \* The research discussed must be in a field listed in the Solicitation (Section X, Fields of Study).

Document Uploaded: Yes

## Proposed Research Title

- \* The title should be brief, informative, scientifically or technically valid, intelligible to a scientifically or technically literate reader, and suitable for use in the public press
- \* Describe in succinct terms your proposed research, reflecting the contents of your Graduate Research Plan Statement
- \* Include a list of key words, and do not use abbreviations and chemical formulas (in 255 characters or less)
- \* This title will be used for searching research topics using the key words you supply
- \* Do not use curly brackets, {}, in your Proposed Research Title or Key Words.

Proposed Research Title: Nature's Chaos Game: An Existentialist Approach Informed by Mathematics and Neurobiology

Key Words: Neuro-mechanistic Biomarker, Global Mental Health

## NSF GRFP PROGRAM INFORMATION

Select the level that most appropriately describes your stage of study at the GRFP application deadline.

**All enrollment in graduate or professional degree-granting programs must be included.**

**Current undergraduate in final year of Bachelor's degree program or Individual who previously completed a Bachelor's degree**

- \* Not enrolled in graduate degree-granting program
- \* Not enrolled in a joint Bachelor's-Master's degree program
- \* Ready to enroll in a graduate degree-granting program full-time by Fall 2023
- \* NOTE: Students who previously completed a Bachelor's degree and are not currently enrolled must apply as returning graduate students (Level 4) if they have completed more than one year of study in a graduate degree-granting program
- \* NOTE: Students who previously completed a joint Bachelor's-Master's degree must progress to a doctoral program the semester following award of joint degree (summer break acceptable).

## Advisor

If you are currently enrolled in graduate school (Levels 2 or 3), provide the name(s) of your current or potential graduate research advisor(s). If you do not have a current or potential graduate research advisor, provide the contact information of your graduate program director.

**Entry of at least one advisor is required with a maximum of three.**

First Name	MI	Last Name	E-mail Address
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NSF publishes the names, the undergraduate and current institutions, and the fields of study of Fellowship recipients and Honorable Mention List on NSF GRFP site.

Do you wish your name to be published on the Honorable Mention List, posted at <https://www.research.gov/grfp/>:  
Yes