Scientific Caribbean Foundation

PARTNERS of the AMERICAS
Connect • Serve • Change Lives

FULBRIGHT

Virtual 2024 Saturday Research Academy

Dr. Juan F. Arratia, Lead and Researcher, Dr. Angel Arcelay, Nailha Acacia, Yiria Muniz, Puerto Rico Associate Chapter
Dr. Kevin Morales, UNICA Chapter, Nicaragua
Prof. Exequiel Antunez, Didier Chavez, Oscar Caceres, Susy Meza Honduras Chapter

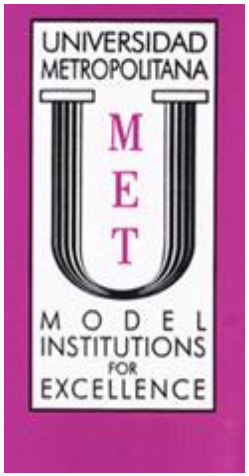
June 11-14, 2024, XIX Congreso Internacional de I
Científica, Santo Domingo, Dominican Republic.
nvestigación

Research Abstract for the Virtual 2024 Saturday Research Academy

The Virtual 2024 Saturday Research Academy is a research project funded by the US Department of State with a partnership between Scientific Caribbean Foundation, Inc. and Partners of the Americas, Inc. The idea of the project is to continue impacting disadvantaged K-14 students with research experiences in science technology, engineering, mathematics (STEM) fields in Puerto Rico and the Americas (Haiti, Honduras, and Nicaragua-Colombia). The Virtual 2024 Saturday Research Academy is a Model Institutions for Excellence (MIE), National Science Foundation (NSF) best practice. During the research process the participants will work in individual research projects, learn search techniques, read scientific papers, as well as how to design abstracts and professional poster or oral presentations. All the participants received research mentoring advice in the steps of the research cycle, developing competitive research posters in English. All the research posters must have the following segments: title, abstract, introduction, material/methods, results, references, acknowledgments, and further information. The participants will be present their research projects at the Virtual Research Symposia, and evaluated online by scientists who will judge them accordingly. A Symposium Proceedings will be edited by the project staff and disseminated in the project webpage ……
…….
……..
…….

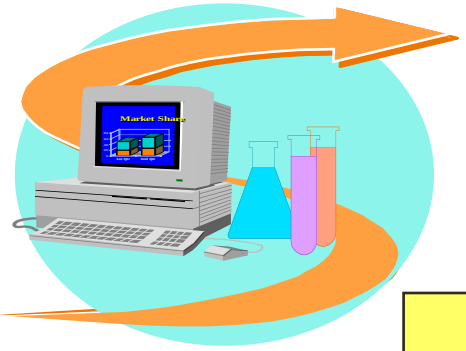
What is MIE?

Model Institutions for Excellence



- An initiative of the National Science Foundation (NSF) and the National Aeronautic and Space Administration (NASA) to upgrade the science, technology, engineering and mathematics (STEM) curriculum at six higher education institutions with successful track records of educating students currently underrepresented in STEM fields.

UMET/MIE Goals



Graduate Studies & Science Careers

Pre-college

MIE Undergraduate Science Programs

Our aim is to create a*n effective pathway* for STEM students from pre-college through the undergraduate –to- graduate transition.

Educational and Cultural Subaward

- Funding Organizations (Partners of the Americas and US Department of State).
- Implementation Team (Scientific Caribbean Foundation, Inc., Lead Organization).
- Partners of the Americas Chapters (Honduras, Nicaragua and Puerto Rico).

CENTRAL AMERICA AND THE CARIBBEAN

Produced by the Cartographic Research Lab
University of Alabama

Team Members and Research Mentors

Dr. Juan F. Arratia, Scientific Caribbean Foundation, Inc. San Juan, Puerto Rico. Team Leader

Dr. Kevin ***Morales Chamorro,*** *UNICA, Managua, Nicaragua, Director for Nicaragua-Colombia*

Dr. Angel Arcelay, *Scientific Caribbean Foundation, Inc. San Juan, Puerto Rico, Evaluator*

Professor, Exequiel Antunez, *President of Honduras Chapter*

Science Teacher, Yiria Muniz, *Puerto Rico Chapter*

Research Mentor, Nailha Acacia, *Autonomous University of Santo Domingo, Dominican Republic*

Team Members and Research Mentors

Dr. Juan F. Arratia, Team Leader and Research Professor and Mentor

Dr. Kavin Morales, Director of Nicaragua Group and Research Mentor

Yiria Muniz, Science Teacher and Research Mentor

Nailha Acacia, Graduate Student, Research Mentor

Dr. Angel Arcelay, Evaluator and Research Mentor

Visit of Dr. Juan F. Arratia to La Paz, Honduras, and Meeting with Honduras' Team directors and staff (Exequiel Antunez, Didier Chavez, Oscar Caceres, Susy Meza) and Students.

Students Participants

Group From Nicaragua.

Natalia Guevara
Sofia Palma
Milan Guzman
Marcela Bonilla
Christina Lucas
Maria Fargas
Nathally Cardenal
Hanna Nayelli
Amarelis Bracamontes
Gustavo Apolinar
Ana Sofia Pena
Nadia Zamora
Edwin Rodriguez
Marisol Maldonado
Jorelis Amador
Sharith Prada
Paula Mojica
Angie Leguizamon

Group From Puerto Rico

Paula Rivera
Ana Pizarro
Mariana Roman
Mia Ufred
Maria Gutierrez
Ann Corrie Rene
Lorinda Hannah
Izadora Fresnelle
Lacticia Fayette
Lynn Duverneaue

Group from Honduras

Anjie Mejia
Fernando Rodas
Ambar Castillo
Sayli Rodriguez
Maitre Caceres
Genesis Figueroa
Maydaris Lanza
Danllely Carrasco
Valery Galeas
Seleste Acosta
Julia Lanza
Daniel Santos
Natalie Vazquez

Scientific Caribbean Foundation

SCIENTIFIC CARIBBEAN FOUNDATION, INC.
Partners of the Americas Puerto Rico Chapter
Partners of the Americas Honduras Chapter
Partners of the Americas UNICA Chapter

VITUAL 2024 SATURDAY RESEARCH ACADEMY PROGRAM

Introduction. The concept of research experiences for pre-college students was initiated by Dr. Juan F. Arratia, during his tenure as Director and Principal Investigator of the Model Institution for Excellence (MIE), a project funded by the National Science Foundation (NSF) at Universidad Metropolitana (UMET), San Juan, Puerto Rico from 1998 until 2018. After more than twenty years of funding by NSF Dr. Arratia impacted and mentored more than 4,000 high school students from public and private school, across Puerto Rico. The Saturday Research Academy was really successful in producing a pipeline from pre-college-undergraduate to graduate school using research as the tool to motivate thousands of pre-college students in science, technology, engineering, and mathematics (STEM) fields.

The Virtual 2024 Saturday Research Academy Program. The virtual program will be a semester long program (16 weeks), starting on March 16, 2024 with virtual meetings on Saturdays at 9:00 AM, Puerto Rico Time Dr. Arratia, and research assistants, with research experience in Honduras, Nicaragua, Puerto Rico, and US research institutions will help the participants to explore and implement the steps of the research cycle (state the problem, research information, produce a hypothesis, test the hypothesis, analyze data and draw conclusions) within specific STEM projects. During the research process the participants will work in individual research projects, learn search techniques, read scientific papers, as well as how to design abstracts and professional poster or oral presentations. Dr. Arratia and research assistants will be responsible for guiding the students on how to conduct research in an ethical way. Orientation sessions in career in STEM fields and critical thinking training will be given to students during the semester long program. All the participants will report to Dr. Arratia by e-mail, in English, on a weekly basis, reporting their progress in their weekly meetings and advances in their research projects. The design of a competitive poster must include the following segments: title, abstract, introduction, material/methods, results, references, acknowledgments and further information. A Virtual Pre-College Undergraduate Research Symposium will be held virtually on July 20, 2024, where the participants will present the projects worked during the sixteen weeks to the high school university communities. A Symposium Proceeding will be edited by Dr. Arratia's staff, containing all the posters of the participants. The Symposium Proceedings will be available at the Foundation webpage.

Scientific Caribbean Foundation

SCIENTIFIC CARIBBEAN FOUNDATION, INC.

Partners of the Americas Puerto Rico Chapter
Partners of the Americas Honduras Chapter
Partners of the Americas UNICA Chapter

VIRTUAL SATURDAY RESEARCH ACADEMY PROGRAM

A G E N D A

March 16 to July 20, 2024
Research Meetings on Saturdays

Week- 1	Welcome, Pre-Test. Introduction to scientific methodology and Search Techniques.
Week- 2	Research and papers-reading materials.
Week- 3	Research and selection of scientific references.
Week- 4	Research and turn in title of the research project.
Week- 5	Research and draft project abstract.
Week- 6	Research and draft of introduction.
Week- 7	Research and draft of methodology.
Week- 8	Research and Virtual poster presentation of student progress. to Mentors and Director
Week- 9	Research and draft of further work and acknowledgements.
Week- 10	Research and draft of format of poster or oral presentation.
Week- 11	Research and symposium registration.
Week- 12	Research and submit final abstract to Director.
Week- 13	**Research and turn in final version of scientific poster.**
Week- 14.	Research and digital poster and oral practices of presentations.
Week- 15.	Research and digital poster and oral practices of presentations. and Post-Test
July 20, 2024,	**Virtual Pre-College-Undergraduate Research Symposium.**

For more information please contact:

Dr. Juan F. Arratia, Research Professor and Mentor juan.arratia@gmail.com
Prof. Exequiel Antunez, Comayagua, Honduras exequielantunez05@yahoo.com
Dr. Kevin Morales, UNICA, Nicaragua kevin.chamorro8@gmail.com

Research Areas: Computer Science, Biological Sciences, Biomathematics, AI, Astronomy, Game Design and Development, Robotics, Neurocircuits, Bioinformatics, Engineering, and Genomics.

Virtual Meetings of the Saturday Research Academy

- Set the Zoom link for the meeting at https://us02web.zoom.us/meeting/register/tZIvd-iqrDkqE9EVPPP0CJ7oHA3s6nvbdH2N

Starting on Saturday, March 16, 2024, at11:00 AM, Puerto Rico Time, and finishing on Saturday, July 20, 2024, with a the Research Symposia

- Pre-Test administration to all participants
- Presentation of Senior Team and Research Assistants
- Presentation by Dr. Juan F. Arratia (objectives of the SRA, research cycle, scientific method, search techniques, design of scientific abstract and scientific poster, self-. learning, weekly reports in English)
- Implementation of the Fulbright Visiting Scholars Series
- Virtual SRA Research Symposium
- Evaluation of SRA activities
- Dissemination of Project Outcomes

Pre-Test and Post-Test Evaluation

SCIENTIFIC CARIBBEAN FOUNDATION
STUDENT RESEARCH DEVELOPMENT CENTER

The Scientific Method

Pre-Test **Post-Test**

Research Site:					Date:				
Student Name:					Mentor:				
Age:	**Sex:**	**F**	**M**		**Grade:**	**9**	**10**	**11**	**12**

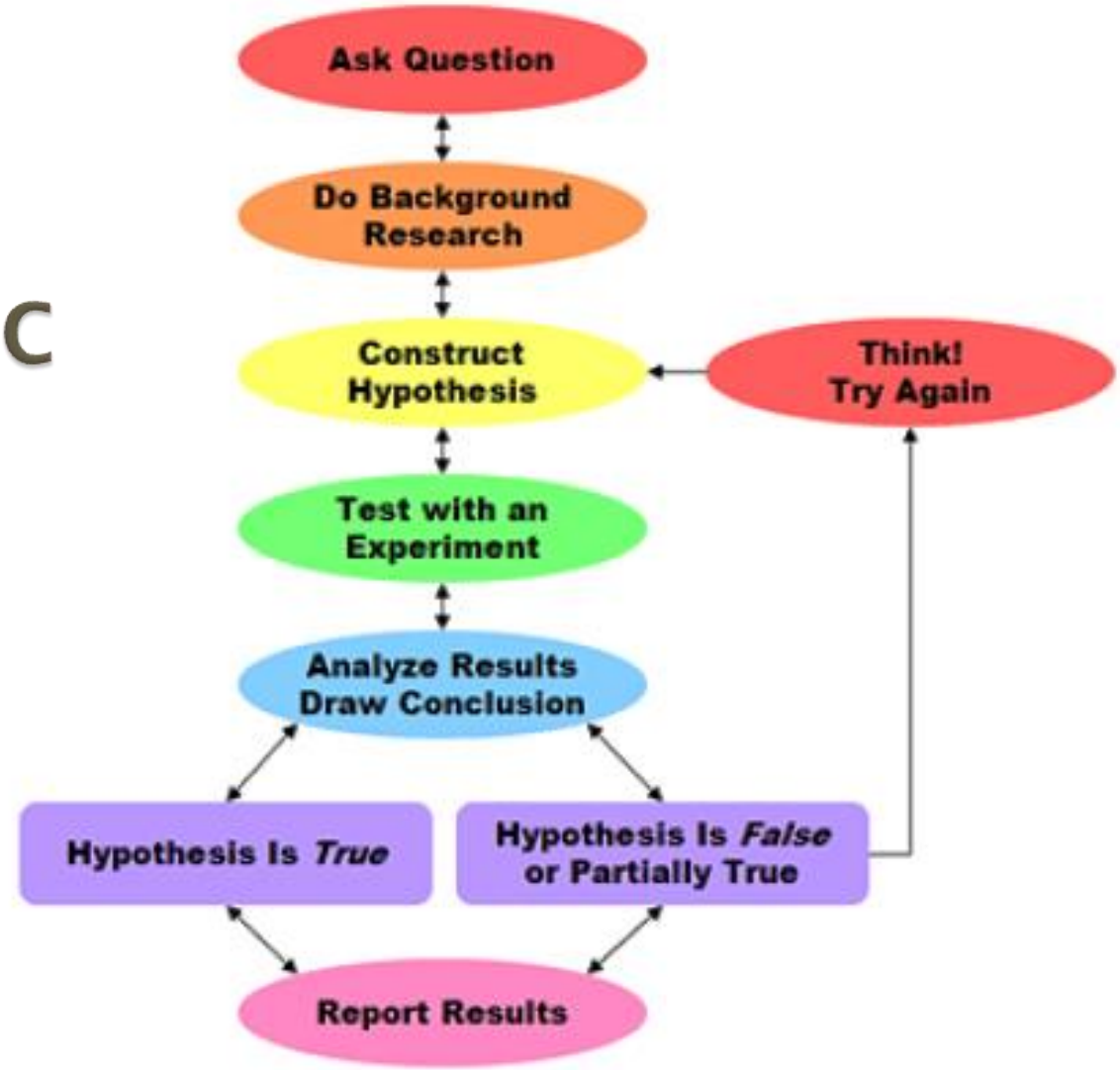
1. The following are information searching methods:
   - **A:** Library, Online library database, Scientific Journals
   - **B:** Library, Friends, Newspapers
   - **C:** Online library database, Internet, My Teacher
   - **D:** Friends, Scientific Journals, Discovery Channel
2. A good research abstract has the following parts:
   - **A:** Why the research was done, Collaborative partners
   - **B:** Why the research was done, Research results
   - **C:** Collaborative partners, Conclusions
   - **D:** Detailed project description, Research results
3. In a research process, previous work searching is:
   - **A:** a good practice
   - **B:** not recommended
   - **C:** not necessary
   - **C:** too much work
4. Which of the following is correct?
   - **A:** A research paper is like a report.
   - **B:** A research paper is a thesis.
   - **C:** A research paper is a scientific document.
   - **D:** None of the above
5. What is the first step in completing the scientific method:

Scientific Caribbean Foundation

Scientific Method, Scientific Abstract & Scientific Poster

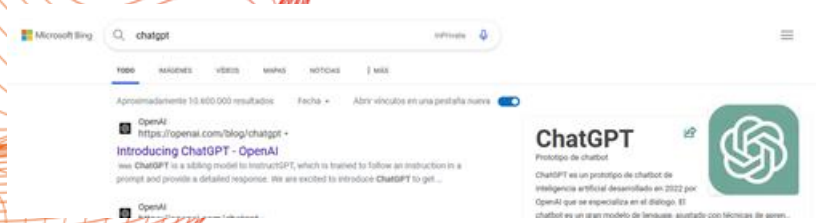
Juan F. Arratia, PhD
Research Professor and Mentor
Scientific Caribbean Foundation, Inc.
San Juan, Puerto Rico

The Scientific Method



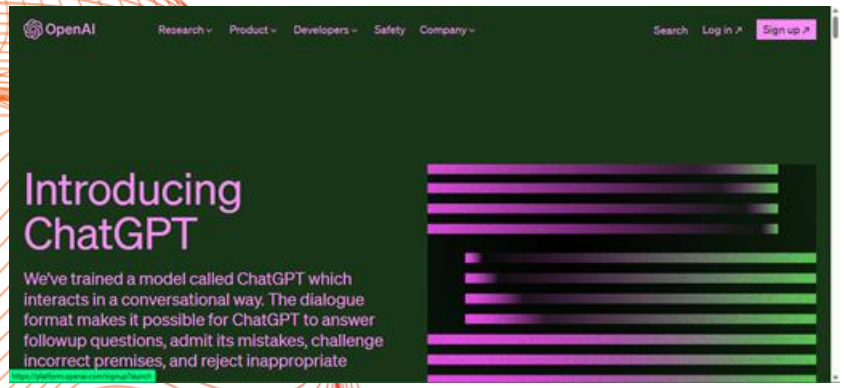
Search Techniques

Create an Account on ChatGPT



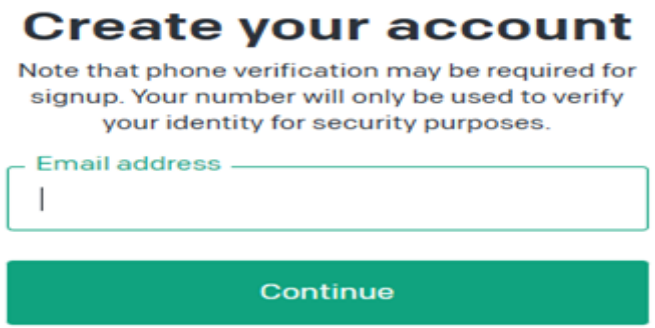
01

Search for ChatGPT in Google



02

Enter and create an account with email and password



Writing an Effective Abstract

Produce a Competitive Research Poster and Presentation in English

Sequence

- When creating a poster think of it as a story.
- Every story needs a logical sequence.
- Try going in columns from left to right and up to down.

The Abstract is an exception that goes in line with the title.

Main Parts of a Poster

- Title
- Abstract
- Introduction
- Materials/Methods
- Results
- References
- Acknowledgments
- Further information

Weekly Reports from Participants

SAMPLE OF ONE OF THE PARTICIPANS

Week 2: March17-23

This week, I conducted research online regarding which topic I would like to follow for my research program. Using ChatGPT, I explored research ideas regarding engineering in general, chemical engineering, pharmaceutical engineering, cosmetic engineering, and applied mathematics. I concluded that I would like to conduct my project on applied mathematics. I believe it would be more fulfilling, useful, and impressive to conduct research related to this branch, but I do still need to find the exact topic I would like to explore in relation to it. The following week I will seek to find a specific area of interest; I thought of maybe algorithms or artificial intelligence itself.

Weekly Reports from Participants

SAMPLE OF ONE OF THE PARTICIPANS

Weekly 10, June 5, 2024

During this week my mentor and I finalized my poster. We completed the “Results” and “Future experiments” sections. We also added some finishing touches and reviewed our work to make sure everything was good according to our expectations. Since I have now finished my poster, for the remaining weeks, we will be focusing on getting ready for my final presentation. I plan on gathering all the information I've acquired throughout this project and mastering them as well as my poster in order to have a well structured and understandable presentation ready.

Research Project Titles for Puerto Rico Group

Phylogenetic analysis of Phosphorus Solubilizing Bacteria (PSB).
Antimicrobial potential of *Nepeta cataria* strains from Haiti.
Advances of Soft-Prosthetics Finger green technology.
Practical approach and considerations in the development of a quiz game for blind people.
Utilization of Natural Pesticides for Enhanced *Colocasia esculenta* (Taro) protection in Haiti. Isolation and characterization of *Tardigrades* specimen in Port-au-Prince
Haitian educational environment and its limitation for students with dyslexia.
Causes of Primary Intracerebral Hemorrhages in Haitian teenagers.
The Impact of Tik Tok on Theoretical Astronomy Education.
The Development of Improved Environmental techniques for relieving Ocean Acidification through Capture of Carbon Dioxide Emissions.
Apprise and explore the negative Impact of AI on High School Students.
Enduring long-COVID and coronamic in Low-Income Minorities in Puerto Rico

Research Project Titles for Honduras Group

Automatic Response Bots in Purchasing.
Brain Plasticity and Memory at Risk: The Impact of Early Stress on Pre School-Children.
Mathematical Modeling of Dengue Transmission: Analysis of Control Strategies in la Paz, Honduras.
Environmental Engineering: Recycling in Honduras compared to European Countries.
Urban Development for Economically Disadvantage Citizen in Honduras.
Ancestral Maya Cuisine as a Tourist Attraction in Honduras.

Research Project Titles for Nicaragua Group

Intelligent Virtual Assistants for the Management of Chronic Patients using Artificial Intelligence AI-Based System for Detecting Infections in Open Wounds.
Skin Cancer Diagnosis through Image Analysis using Artificial Intelligence.

Breast Cancer Diagnosis through Mammograms Assisted by Artificial Intelligence Facial Vital Signs Recognition using Artificial Intelligence Algorithms.
Disease Diagnosis through Facial Analysis using Artificial Intelligence.
AI Assistants for the Diagnosis and Treatment of Heart Diseases in Children Detection of Harmful and Carcinogenic Ingredients in Product Labels using AI Diagnostic Tool for Child Psychiatry using Artificial Intelligence.

Intelligent Virtual Assistants for Home Management of Alzheimer's Patients.
Mathematical Learning Based on the Singapore Method Guided by Artificial Intelligence AI-Based Chatbot for Solving Everyday Problems.
Personalized Psychological Assistance for Low-Income Children using Artificial. Intelligence
Intelligent Tool for the Diagnosis and Treatment of Dermatological Diseases with AI AI-Assisted Collaboration Platform for Developers.
Educational Chatbot for Teaching Mathematics and Learning Techniques using AI.
Diagnosis and Prognosis of Veterinary Diseases and Emergencies using Artificial Intelligence.

Design of Educational Video Games for Children using Artificial Intelligence.
Application of Artificial Intelligence for Assistance in Plastic Surgery Procedures.
Artificial Intelligence for Identifying and Improving Energy Sources in Space Rovers.

Samples of Research Abstracts of Participants

The Impact of TikTok on the Education of Theoretical Astronomy

In the dynamic landscape of modern education, digital platforms like TikTok are emerging as influential tools. This study embarks on an intriguing journey into the education of Theoretical Astronomy, meticulously examining the potential merits and pitfalls of employing TikTok as an educational medium. While Theoretical Astronomy crafts theories to interpret observational data and forecast cosmic phenomena, the reliability of TikTok as an information source remains contentious, given its open-access nature where misinformation can proliferate. This study explores the transformative effects of utilizing TikTok to enhance understanding of Theoretical Astronomy, highlighting the engagement and cognitive enrichment fostered by short, entertaining videos. By exploring topics such as Dark Matter, the 'Self-interacting Dark Matter Theory,' and future Galaxy Formations, the study strives to reveal the impact of these videos on viewers' attention, productivity, and interest. It affirms TikTok's potential as a conduit for fostering engagement and comprehension in Theoretical Astronomy, advocating for its integration into formal educational frameworks.

Samples of Research Abstracts of Participants

Apprise and explore the negative Impact of AI on High School Students

In recent years, the advent of open artificial intelligence platforms, notably Chat GPT-3.5, has introduced new learning tools for students. While these innovations have significantly benefited students, teachers, and the education system, their adverse effects are often overlooked. According to Forbes, 89% of survey respondents reported using AI to assist with homework assignments. The widespread application of OpenAI's platform in education highlights the urgent need to understand its implications fully. This study addresses a gap in the literature by investigating the rise of plagiarism in high schools because of AI use. It explores the negative impacts on students, particularly the erosion of critical thinking skills, and examines how algorithms may promote or mitigate these issues. Employing mixed methods, including statistical comparisons and archival research, this study aims to analyze AI's influence on academic integrity comprehensively. The findings will inform schools on strategies to promote or limit AI use based on its identified adverse effects, such as increased plagiarism. This research seeks to equip educational institutions with the knowledge necessary to navigate the integration of AI in a manner that upholds academic integrity and fosters genuine learning.

Samples of Research Abstracts of Participants

Experimental test on the recognition of facial vital signs with artificial intelligence.

The goal of this research is to develop an advanced artificial intelligence system using ChatGPT-4, capable of conversing with users and providing them with their vital signs after requiring a facial photo. These vital signs include oxygen saturation, blood pressure, heart rate, respiratory rate, and body temperature. This approach was chosen because of the limitations in access to medical care faced by society, especially in remote or resource-limited areas. The development of this system has the potential to revolutionize medical care by providing an accessible and accurate tool for vital sign assessment through artificial intelligence. By learning and recognizing facial patterns associated with these diseases, the GPT will be able to provide detailed descriptions of facial features, enabling faster and more accurate diagnosis. In addition, by operating in Spanish, its accessibility to Spanish-speaking healthcare professionals and users around the world is expanded. When a user requests their vital signs, GPT will always provide an approximation, even if it cannot provide a complete estimate. This will be achieved by requesting a clear photo of the user's face and a detailed physical description. Through analysis of the data and image provided, the GPT will use reliable medical information to approximate the user's vital signs. If any vital signs are missing for a clear diagnosis, the system will request more information instead of referring the user elsewhere. The potential advantages of this system are significant. It could improve the accessibility and quality of basic medical care, allowing users to monitor their health quickly and easily. In addition, it would provide healthcare professionals with an innovative tool for remote diagnosis, which could reduce health disparities and improve outcomes for patients around the world

Samples of Research Abstracts of Participants

Phylogenetic Analysis of Phosphorus Solubilizing Bacteria (PSB)

Phosphorus Solubilizing Bacterias are microorganisms primarily present in soils with the function of promoting phosphorus availability to plants. The process of P solubilization is performed through the release of acids and enzymes encoded by different genes, and for this particular case: gcd and the phosphate regulon. Despite the numerous studies on the diversity of these bacterias, few researchers explored their phylogeny regarding the previous genes.The aim of this study was to establish possible phylogenetic relations among this group by comparing conserved structural genes and function related genes. Sequences for the genes phoA, phoD, phoB and ARN16s were obtained from either NCBI and COG. Different phylogenetic trees were generated using MEGA and Phylogeny.fr as software. Only branches with support above 70 were considered for further phylogenetics analysis. Obtained trees for phoA and phoD showed similar results for Azotobacter and Xanthomonas. While either in Mega and Phylogeny.fr, for 16S rRNA and phoU we had in all algorithms solid clades for: (Phyllobacterium, Xanthobacter), [(Rhodococcus, Gordonia) Arthrobacter]. Surprisingly, in Mega, the genes for Halobiforma and Halobacterium which are archaea, were located in bacterial clades supporting previous hypotheses about the acquisition of the phosphorus solubilization capacity through horizontal gene transmission (HGT) in early life episodes. However, results from Phylogeny.fr seemed to be more reliable as they are supported by other papers related to Bacterial and Archaeal relationship.

Fulbright Visiting Scholars Series

- The following Fulbright Visiting Scholars Series Conferences were implemented during the First Quarterly of the Educational and Cultural Subaward:

- 1.- **The History of Artificial Intelligence** by Dr. Moez Ben Haj Hmida, Fulbright Visiting Scholar (2023), National Engineering School of Tunis, Tunisia, on April 6, 2024.
- 2.- **A Journey throughout Our Solar System** by Dr. Damya Souami, Fulbright Visiting Scholar (2023), Observatoire de Paris, France, on April 20, 2024.
- 3.- **Culture and History of Nepal** by Bharat Dhungana, The Small Earth Nepal, Kathmandu, Nepal on April 27, 2024.
- 4.- **Space Based Sensors for Earth Observations** by Aaron Pereira, PhD Fulbright Visiting Scholar *Adelaide, Australia (2023), on May 4, 2024.*
- *5.- **Human Activity Recognition Using Synthetic Data** by Dr. Stanislav Panev, Fulbright Visiting Scholar-Bulgaria (2015), Carnegie Mellon University, on May 18, 2024.*

Dissemination of the Fulbright Conferences

Fulbright Visiting Scholar Serie

SCIENTIFIC CARIBBEAN FOUNDATION, INC.
Partners of the Americas Puerto Rico Chapter
Partners of the Americas Honduras Chapter
Partners of the Americas UNICA Chapter

Invite you to attend the Virtual Conference:

A Journey throughout Our Solar System

Presented by:

Dr. Damya Souami
Fulbright Visiting Scholar (2023)
Observatoire de Paris
Paris, France

Saturday, April 20, 2024
11:00 AM EST
Meet Link:

https://meet.google.com/uqp-epgc-wbd

Scientific Caribbean Foundation

ExchangeAlumni
CONNECT EMPOWER INSPIRE

FULBRIGHT

Prof Dr. Arratia at International XIX Research Congress at Santo Domingo, Dominican Republic on June 13, 2024

VIRTUAL 2024 RESEARCH SYMPOSIA

POSTER-ORAL PRESENTATION EVALUATION FORM

Student Presenter Name: _____

Presenter Institution: _____

Research Mentor Name: _____

Abstract Title Keywords: _____

Please use the following scale for your evaluation of the Poster Presentation

Outstanding	Excellent	Good	Fair	Poor
5	4	3	2	1

	VISUAL RESOURCES AND ORGANIZATION (Max. Points: 20)
	The poster configuration was easy to follow and was well organized.
	The poster has an adequate combination of colors, text fonts and sizes. The use of graphics, and or images shows quality and are labeled clearly.
	The information was well written, has a minimum or does not have any grammatical errors.
	The poster includes all the necessary information like: introduction, methods, results/discu conclusions, references, etc.
	PRESENTATION AND DELIVERY (Max. Points: 25)
	The presenter has a good voice tone, speed, make eye contact, shows professionalisr enthusiasm.
	The presenter was able to communicate answers to questions generated from judges in an eff matter.
	The presenter demonstrated an in-depth understanding of the information contained in h presentation.
	The presenter shows knowledge about the research topic
	The presenter explained in a clear way what and how the research was done.
	RESEARCH TOPIC (Max. Points: 10)
	The presentation topic addresses a valid scientific question
	The research topic is relevant and represents an important contribution to the scientific comn
	Total Points Judge Last Name: _____ Judge Sign _____

Final Evaluation & Comments:

Did the Student give his/her presentation in English? ____Yes ____ No

Overall Presentation Evaluation (Mark with ☑)	**Comments:**
Outstanding	
Good	
Fair	
Poor	

Aknowledgments

- International XIX Congress of Scientific Research, Dominican Republic
- Partners of the Americas and US Department of State
- Fulbright Visiting Scholars
- Scientific Caribbean Foundation, Inc., (SCF)
- Project Staff and Research Mentors from Puerto Rico, Nicaragua, Honduras, Dominican Republic
- Students from institutions in Puerto Rico, Honduras, Nicaragua, Haiti and Colombia.