**Project Proposal:** *Euclidean Distance Project with Web Server*

**Project Description:**

A Euclidean Distance Problem, euclidean distance is an abstract mathematical problem that takes into account the shortest path between all combinations of points. Example, a collection of points will be placed on a Cartesian plane and the computer must algorithmically solve the question: "What is the shortest path between all points"? This question will be explored using python and it's multitude of libraries for numerical and scientific computing. This task takes huge amounts of time and will require improvements. Python can be parallelized for faster computation speeds and algorithms as well can help simplify complexity.

**Thesis:**

The environment containing all programs and source material can be found in the “Project” folder. Inside the folder we can see several folder that can help us do computational sciences with different approaches. The environment contains all libraries to make every user for the notebook able to follow along with the examples. It also contains a web-page folder to use a dashboard to display the results locally on the server or through the cloud using Heroku. You can also use Docker !

**Intellectual Merit and Broader Impacts**

- Why are you doing this?

Interest in applying computer programming to other STEM fields (ie. Space exploration)

- What is the impact that this project has in real-life scenarios

Project be applied to outer-space scenarios such as:

* Traveling Distance for future space exploration
* Distances of Dangerous objects from Earth in outer-space
* Projectiles in space (as space tech evolves) , if possible, we wish to incorporate analysis on moving objects to further enhance the usefulness of the project.

- What are the players in industry, society, and academia that can use your project

Industry: U.S Air-Force, NASA(and other affiliated agencies), Private Agencies (ie Space X)

Society:

Academia

- Where do you thing the project can be applied and under what context will you need it?

The project can be applied in present and future space exploration. The possible contexts where you will need this project can be in:

* Future space travel
* Projectile motion in space
* Distances of dangerous objects in outer space

**Alignments**

ψ Cybersecurity Curricula (CSEC)

* + Introduction
* Limits and types of tools (open source / closed source).
  + Cryptography
    - Basic Concepts
* Encryption/Decryption
* Asymmetric/Symmetric
* Computational Security
* Information-theoretic security
* Secret key (symmetric), cryptography and public-key (asymmetric) cryptography.
* Symmetric (private key) Ciphers
* Asymmetric (public-key) Ciphers
  + - Mathematical Background
* Modular Arithmetic
* Elliptic curves, lattices and hard lattice problems
* Fermat, Euler theorems
* Information Theory
* Data Integrity & Authentication
* Authentication Strength
* Cryptographic Tokens
* Knowledge Based Authentication
* Password Storage
* SHA1 & MD5
* Password-Key
* Salting
* Data
* Hash Trees
* Digital Signatures
* Authentication of evidence
* Hashing algorithms (MD5, SHA-1, etc.)
* Hashing entire media vs individual files
* Pre-exam and post-exam verification hashing
* Presentation of results
* Timeline analysis
* Attribution
* Lay versus technical explanations
* Executive summaries
* Detailed reports
* Limitations
* Authentication Strength
* Cryptographic tokens
* Cryptographic devices
* Multi-factor authentication
* Knowledge-based authentication.
* One-time passwords
* Password Storage Techniques
* Cryptographic hash functions (SHA-256, SHA-3,collision resistance)
* Salting
* Iteration count
* Access Control Protocol
* Logical Data Access Control
* Secure Architecture Design
* Data Leak & Protection
* Secure Command Protocol
* Application & Transport Layers
* HTTPS & HTTP
* Abstraction
* Hide the internals of each layer, making only the

interfaces available; this enables you to change how

a layer carries out its tasks without affecting

components at other layers.

* Modularity
* Design and implement the software as a collection of

co-operating components (modules); indeed, each

module interface is an abstraction.

* Programming Languages and Type-Safe Languages
* Discuss the problems that programming languages

introduce, what type-safety does, and why it is

important.

* Using APIs correctly
* Ensure parameters and environments are validated and controlled so that the API enforces the security policy properly.
* Check the results of using the API for problems.
* Using security features
* Use cryptographic randomness.
* Properly restrict process privileges
* Programming robustly
* Only deallocate allocated memory.
* Initialize variables before use.
* Don't rely on undefined behavior
* DevOps
* This topic combines development and operation, and

the automation and monitoring of both.

* User guides and manuals
* This topic includes tutorials and cheat sheets (brief

guides); these should emphasize any potential

security problems the users can cause.

* Assurance documentation
* This topic focuses on how correctness was

established, and what correctness means here.

* Security documentation
* This topic focuses on potential security problems,

how to avoid them, and if they occur, what the

effects might be and how to deal with them.

ψ Cybersecurity Workforce Framework(NICE)

* Task-ID: **T0882**
* Conduct on-going privacy training and awareness activities
* Task-ID: **T0887**
* Provide leadership for the organization’s privacy program
* Task-ID: **T0891**
* Resolve allegations of noncompliance with the corporate privacy policies or notice of information practices
* Task-ID: **T0892**
* Develop and coordinate a risk management and compliance framework for privacy
* Task-ID: **T0888**
* Direct and oversee privacy specialists and coordinate privacy and data security programs with senior executives globally to ensure consistency across the organization.
* Task-ID: **T0897**
* Provide leadership in the planning, design and evaluation of privacy and security related projects
* Task-ID: **T0898**
* Establish an internal privacy audit program.
* Task-ID: **T0910**
* Act as, or work with, counsel relating to business partner contracts.
* Task-ID: **T0930**
* Establish a risk management strategy for the organization that includes a determination of risk tolerance.
* Task-ID: **T0944**
* Describe the characteristics of a system.
* Task-ID: **T0985**
* Establish scoring and grading metrics to measure effectiveness of continuous monitoring program.
* Task-ID: **T0986**
* Work with security managers to establish appropriate continuous monitoring reporting requirements at the system level.
* Task-ID: **T0987**
* Use the continuous monitoring tools and technologies to assess risk on an ongoing basis.
* Task-ID: **T0988**
* Establish appropriate reporting requirements in adherence to the criteria identified in the continuous monitoring program for use in automated control assessment.
* Task-ID: **T0989**
* Use non-automated assessment methods where the data from the continuous monitoring tools and technologies is not yet of adequate sufficiency or quality.
* Task-ID: **T0990**
* Develop processes with the external audit group on how to share information regarding the continuous monitoring program and its impact on security control assessment.
* Task-ID: **T0991**
* Identify reporting requirements for use in automated control assessment to support continuous monitoring.
* Task-ID: **T1002**
* Using scores and grades to motivate and assess performance while addressing concerns to support continuous monitoring.

**Technology Stack**

* Python
* Jupyter Notebook
* Linux
* Docker