Juan Pablo Gamucero Arana

Undergraduate Physics Student

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Education

Universidad Nacional Autónoma de México — Expected Jun 2022
Bachelor of Science in Physics — *GPA: 3.7/4.0*

- **Relevant Coursework:** Probability and Statistics, AI applied to Physics, Computational Physics, Calculus, Linear Algebra, Partial Differential Equations, Quantum Mechanics, Gravitation and Relativity, Advanced Mathematics for Physics.

Experience

Assistant Professor at Physics Laboratory — Jan-Jul 2016
ENMS of Guanajuato University — *Guanajuato, Mexico*

- Extracurricular Physics lectures at Physics laboratory about Mechanics, Thermodynamics, Electromagnetism, Maths. Student training for academic contests.

Content Developer at Animathica Youtube Channel — Jan 2021-current
Animathica, UNAM — *Mexico City, Mexico*

- Collaboration at content development team of Animathica, a group of students of UNAM Science School involved in the animation of mathematical concepts through Manim library in Python.
- Currently developing animations for Linear Algebra Course, covering inner product vector spaces.

Social service — May 2021-current
Instituto de Ciencias Nucleares, UNAM — *Mexico City, Mexico*

- Program: Frontiers in precision cosmology: from alternative theories of gravity to cosmo-statistics with machine learning.

Skills

Programming Languages: Python, SQL, C, C++, Wolfram Mathemtica, Arduino, HTML, CSS,
Libraries: Numpy, SciPy, Pandas, Matplotlib, Seaborn, Scikit-learn, Tkinter, Serial, Manim
Frameworks: Keras, PyTorch, Tensorflow, OpenFrameworks
Tools: Linux, GitHub, Google Colab, VS Code, Overleaf, Inkscape, gnuplot
Languages: Spanish(Native), English (Advanced)

Projects

Pulsar Detection | *PyTorch, Numpy, Pandas, Matplotlib, Seaborn, Scikit-learn* — Jan 2021

- Developed a binary classifier to identify pulsars using HTRU2 dataset with Pytorch.
- Evaluated the model using confunsion matrix and found that performance of this architecture has an 85% sensitivity, whereas its specificity is almost 100%.

DAQ System Developement | *Arduino, App Inventor, Bluetooth and Serial communication* — Jan 2021

- Developed a data acquisition system using Arduino and an Android App.
- It can generate a time series of the values obtained by a sensor, in this example an LM35 sensor was used.
- Time series of the temperature is showed in the app interface and simultaneously is streamed to the cloud.
- Used the DAQ system to test Newton's Law of Cooling in water.

Numerical Solution to Heat Equation in C | *C language, managing values by reference* — Jul 2020

- Implemented Crick-Nicholson algorithm to solve an initial value problem with boundary conditions of the heat equation.
- Improved performance from $\mathcal{O}(n^3)$ using naive solution to $\mathcal{O}(n)$ (with n the grid size).

Achievements

Second Place — 2014
State of Guanajuato Maths Olympiad — *Guanajuato, Mexico*

Second Place — 2014
State of Guanajuato Physics Olympiad — *Guanajuato, Mexico*