

CARLOS LIRA

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EDUCATION

National Autonomous University of Mexico

Expected Jun 2022

Bachelor's degree in Data Science

GPA: 3.7

- **Relevant Coursework:** Probability and Statistics, Discrete Mathematics, Linear Algebra I and II, Relational Databases, Concurrent Programming, Advanced Mathematics for Physics.
- **Clubs:** Competitive Programming Club "Pu++".

EXPERIENCE

High School Intern

Jun-Jul 2016

Joint Research Centre on Sustainable Chemistry UAEMex-UNAM

State of Mexico, Mexico

- Classified nanoparticles using electron microscope images.
- Learned the basics about how an electron microscope works.

PROJECTS

COVID-19 Tracker | Heroku, Flask, HighCharts, pyGitHub, Pandas

Aug 2020

- Launched web app that provides **daily updates** about COVID-19 for over 150 countries.
- **Several charts** available for each country (total cases, daily new cases,...).
- Created **custom API**, data merged from different sources with automatic daily updates.

Boat Detection Using Satellite Images | PyTorch, Scikit Learn, Pandas, Kaggle

Jul 2020

- Trained Convolutional Neural Network for **image classification** using LeNet5 architecture.
- More than **40,000 satellite images** from San Francisco Bay Area.
- Achieved over **97% precision** on validation data.

Magnetic Pendulum Simulation | CUDA, C++ Threads

Jul 2019

A magnetic pendulum is a chaotic system; one way to describe such a system involves solving a differential equation for every point in a $n \times n$ grid.

- Solved problem using **concurrency** by two methods: **CUDA (GPU)** and **C++ Threads (CPU)**.
- Reduced time complexity from $O(n^2)$ in CPU to $O(1)$ in GPU.

Schrödinger Equation Numerical Solution | C++

Nov 2019

The double slit experiment is about trying to predict how particles behave at a subatomic level. In this project Schrödinger equation was used to simulate such experiment in a $n \times n$ grid.

- Implemented **RK4 Algorithm** to solve 2D Schrödinger equation.
- Reduced time complexity from $O(n^6)$ using naive approach to $O(n^3)$.
- Program generated **interference pattern** similar to experimental one.

TECHNICAL SKILLS

Programming Languages: Python, SQL, C++, JavaScript, CSS, HTML

Libraries: Numpy, SciPy, Pandas, Matplotlib, Scikit Learn, Keras, PyTorch, Sellenium, Beautiful Soup, HighCharts

Frameworks: Flask, CUDA, Bootstrap, OpenFrameworks

Tools: GitHub, Google Colab, VS Code, Overleaf, Heroku

Languages: Spanish (Native), English (C1)

ACADEMIC ACHIEVEMENTS

Contestant

Nov 2020

ICPC Gran Premio MX 2020 (Top 20%)

Virtual

First Place

Aug 2016

XXVII State of Mexico Physics Olympiad

State of Mexico, Mexico

Contestant

Jun 2016

XXVI Mexico National Contest of Physics Experiments

Mexico City, Mexico