Henry R. Moncada

500 Rubin, Apt 1403
El Paso, TX 79912
(915) 730-2550
hrmoncadalopez@utep.edu/hrmoncada@gmail.com

OBJECTIVE Resume 2022

EDUCATION

Ph.D in Computational Science,
University of Texas at El Paso (UTEP), El Paso, TX, US, May 14, 2018, (GPA: 3.9)
"Parallelization and Scalability Analysis of the 3D Spatially Variant Lattice Algorithm"

Master of Science in Computational Science,
University of Texas at El Paso, El Paso, TX, US, May 14, 2016, (GPA: 3.9)
"Towards the Scalability and Hybrid Parallelization of a Spatially Variant Lattice Algorithm"

Master of Science in Applied Mathematics
University of New Mexico (UNM), Albuquerque, NM, US, Aug 1, 2009 (GPA: 3.83)
"Paratransgenic Vectors and their Potential Influence on the Dynamics of Chagas Disease"

Bachelor of Science, Physics
Universidad Nacional Mayor de San Marcos (UNMSM), Lima, Peru, 1998
"Study of Structural Property for Reflectivity Modeling System Superlattices"

COMPUTER SKILLS

Operating Systems: Linux, Windows

Programming Languages and Libraries:

- Proficient in C/C++, FORTRAN 77/90, and Matlab/Octave
- Proficient in Python 3/2.7
- Familiar using Pytorch, TensorFlow, and Keras
- Familiar with R and Maple/Maxima
- Familiar with MPI - CPU multicore clusters
- Familiar with CUDA/HIP - Graphical processing units (GPUs)
- Familiar with OpenMP/OpenACC - Directives for heterogeneous platforms (CPUs & GPUs)
- Familiar with Trilinos-Kokkos - Framework for heterogeneous platforms (CPUs & GPUs)

Version Control Software :

- GIT and Subversion (SVN)

Debugging Tools:

- Valgrind
- Arm Forge
- Totalview

Parallel Profiling and Tracing for Performance Analysis:

- Lightweight Profiling Library for MPI (mpiP)
- Cray Perftools
- Tuning Analysis Utilities (TAU)

- Score-P, Scalasca, Vampir
- HPCToolkit
- Intel Advisor and VTune Amplifier

Computational Scientific Libraries :

- BLAS/LAPACK - Basic Linear Algebra Subprograms & Linear Algebra PACKage
- FFTW - Fastest Fourier Transform in the West
- CSPARSE - SuiteSparse, A Concise Sparse Matrix Package in C
- KOKKOS - Trilinos Core Kernels Package.
- METIS & PARMETIS - Serial and parallel Graph Partitioning and Fill-reducing Matrix Ordering
- PETSc - Portable, Extensible Toolkit for Scientific Computation

Package Manager :

- SPACK - Package manager tool for supercomputers. Designed to support multiple versions and configurations of software on a wide variety of platforms and environments.

WORK EXPERIENCE

University of Texas at El Paso
500 W University Ave, El Paso, TX 79902
Dr. Shirley V. Moore
Professor, Computer Science,
`svmoore@utep.edu`

- Research Scientist Assistant (from Mar 2021 until now)

Los Alamos National Laboratory
Fluid Dynamics and Solid Mechanics (T-3) and Computational Physics and Methods (CCS-2) Groups.
Los Alamos, NM 87545
Dr. Kim Orskov Rasmussen, (505)-6653851 `kor@lanl.gov`

- Postdoctoral Research Associate (from Jan 2019 to Jan 2021)

University of Texas at El Paso
500 W University Ave, El Paso, TX 79902
Dr. Ming-Ying Leung
Professor, Mathematical Sciences,
Director, Bioinformatics and Computational Science Programs,
Director, BBRC Bioinformatics Core,
(915) 747-6836
`mleung@utep.edu`

- Postdoc Volunteer (from Sep 2018 to Jan 2019)

El Paso Community College, Valle Verde
919 Hunter, El Paso, TX 79915
Mrs. Olga Thurman
Manager, Academic Resources
(915) 831-2740
`othurman@epcc.edu`

- Math Tutor (from Nov to Dec 2018)

Focus Logistics Inc
1011-B Burgundy El Paso, TX 79907
Mrs. Lisa Garcia,

General Manager- El Paso Office
(915) 778-1301
lisa@focuslogisticsinc.com
- Data Analyst (Sep 2018)

University of Texas at El Paso
500 W University Ave, El Paso, TX 79968
Dr. Shirley V. Moore
Associate Professor, Computational Science,
(915) 747-6836
svmoore@utep.edu
- Research Assistant (Aug 2012 - May 2018)

LANGUAGES

Spanish, native language
English, speak fluently, read and write with high proficiency

RESEARCH EXPERIENCE

Mar 2021 until Today - Research Scientist Assistant, University of Texas at El Paso

- GAMESS ECP project, GAMESS stand for General Atomic and Molecular Electronic Structure System. The main focus will be on combined CPU+GPU performance and scalability analysis for the ECP exascale machines. A preliminary assessment of the performance analysis requirements will be fleshed out in more detail through surveying GAMESS ECP developers for their requirements. The framework will be constructed from selected features from the available vendor and ECP Software Technology performance analysis tools, with the addition of project-specific tools, scripts, and benchmark data.

Jan 2019 to Jan 2021 - Postdoc Research Associate, Los Alamos National Laboratory

- E3SM ECP project, MPAS stands for Model for Prediction Across Scales. It is a collaborative project for developing atmosphere, ocean, and other earth-system simulation components for climate, regional climate, and weather studies. It uses a hexagonal mesh resembling a honeycomb that can be stretched wide in some regions and compressed for higher resolution in others. The MPAS framework code is written in Fortran and usesthe Message Passing Interface (MPI) standardized library (not a language) for the collection of processes communicating via message passing. Shared memory parallelization through OpenMP (an API) is also supported, but the implementation is left up to each core component.

Doctoral Research Topic, Computational Science Department - UTEP

- The purpose of this research is to design a faster implementation of the spatially variant that improves its performance when it is running on a parallel computer system. The spatially variant is used to synthesize a spatially variant lattice for a periodic electromagnetic structure. The spatially variant has the ability to spatially vary the unit cell orientation and exploit its directional dependencies. The spatially variant produces a lattice that is smooth, continuous and free of defects. The lattice spacing remains strikingly uniform when the unit cell orientation, lattice spacing, fill fraction and more are spatially varied. This is important for maintaining consistent properties throughout the lattice. Periodic structures like a photonic crystal or metamaterial devices can be enhanced using the spatially variant to unlock new physics applications. Our current effort is to write a portable spatially variant code for parallel architectures. To develop and write the code, we pick a general-purpose programming language that supports structured programming. For the parallel code, we use FFTW for handling the Fourier Transform of the unit cell device and PETSc (Portable, Extensible Toolkit for Scientific Computation)

for handling the numerical linear algebra operations. Using Message Passing Interface (MPI) for distributed memory helps us to improve the performance of the spatially variant code when it is executed on a parallel system.

Fall 2018 - Postdoc Volunteer, Bioinformatics Department - UTEP

- Systemic Bioinformatic analysis requires shepherding files through a series of transformations, called a pipeline or a workflow. These workflow data products are used to extract data and highlight relevant information that biologists examine which then validate targeted experiments and support a hypothesis or help to formulate a new one. These new custom bioinformatic analysis tools require programmers to implement new methods and/or put together existing ones to build new data analysis frameworks (data flows commonly known as bioinformatic pipelines). These transformations are done by executable command-line third-party software written for Unix/Linux-compatible operating systems. The increasing amount of DNA sequences has intensified the need for robust workflows for interpreting a range of biological phenomena.

Fall 2017 and Spring 2018 - Oak Ridge National Laboratory & University of Texas at El Paso

- Computer code implementation of the 3D Spatially Variant Lattice (SVL) algorithm. The SVL written program codes were implemented on the TACC Stampede 2 supercomputer using C in conjunction with the PETSC and FFTW libraries. We studied the scalability and performance of the SVL algorithm on the Stampede 2 architecture (Intel KNL and Skylake).

Summer Internship 2017, Oak Ridge National Laboratory - Computational Science Institute - Future Technologies Group

- Benchmarked the the High-Performance Geometric Multigrid (HPGMG) and PETSC 2D Spatially Variant Lattice (SVL) algorithm. Used PIN for the instrumentation framework. Studied performance on ORNL ExCL HPC systems.

Summer Internship 2015, Border Biomedical Research Center Bioinformatics Department-UTEP

- Developed PYTHON and WEB-PYTHON application for DNA (Genomics and Sequence Analysis). Evaluated performance using HTCondor job scheduler for workload management and multiple submission jobs.

Summer Internship 2014, Electronic Structure Group - Physics Department - UTEP

- Performance evaluation and analysis of the Naval Research Laboratory Molecular Orbital Library (NRLMOL) code, Poisson subroutines in Fortran. The NRLMOL code is a set of parallel programs developed by Mark Pederson and collaborators written in FORTRAN 77 with updated subroutines written in FORTRAN 90 and C. A performance evaluation was done with the help of PERFTOOLS, which is a performance evaluation library available at NERSC.

Math Department, UNM, Albuquerque-NM

- Bacterial Symbiosis and its influence on the Dynamics of Chagas Disease. Developed a numerical approach to simulate the introduction of genetically modified bacterial symbiont into natural populations of Chagas disease vectors. This approach utilizes the coprophagic behavior of these insects, which is the way in which the symbiont is transmitted among bug populations in Kissing Bugs nature. The numerical simulation was Implement edusing MATLAB.

Physics Department,UNMSM, Lima-Peru

- Study of Structural Property for Reflectivity Modeling System Superlattices.
  - Implemented a numerical model in FORTRAN based on the dynamical diffraction theory to model the experimental reflectivity.
  - Numerical model includes material mixing at the interface, interface roughness and random variation of component thickness.
  - The numerical model reveals the structural parameters of the device, such as the multilayer period, the individual layer thickness, the width of the interface and the optical constants.
  - The numerical model is used to study superlattices devices composed of hydrogenated amorphous silicon/silicon carbide (a-Si:H/a- Si1 xCx:H) and silicon/germanium (a-Si:H/a-Ge:H), deposited by the plasma-enhanced chemical vapor deposition (PECVD) technique, were analyzed using small-angle X-ray diffraction.

Geophysical Institute of Peru (IGP), Lima-Peru

- Department of Emergency-Training program and earthquake data management and earthquake effect in real time.
  - Record daily earthquake data collection, earthquake wave propagation gives information about the earthquake location of earthquake effect in real time.
  - Estimation of earthquakes location by measuring of the wave ground response of the compressive P wave, the shearing S wave.
  - Rolling surface wave motions recorded by seismographs stations.

HONORS

- *(ATPESC) Argonne Training Program in Extreme-Scale Computing (2020)*
- *SC Conference Student Volunteer (2014, 2015, 2016 (SciNet), 2017)*
- *Kappa Mu Epsilon (Math Honor Society)*
- *SIAM Student Chapter vice-president 2013*
- *SIAM Student Chapter president 2014*
- *UTEP SIAM Seminar coordinator (2015, 2016)*
- *Member of Student Advisory Committee for the International Student Fellowship at the First Baptist Church El Paso (2014)*
- *Recipient of Good Neighbor Scholarship during the years 2012-2016*

PUBLICATIONS

Reflectivity modeling of Si-based amorphous superlattices; Superlattices and Microstructures. E. L. Zevallos Velásquez, **H. Moncada L.**, UNMSM-Perú, M. C. A. Fantini USP-Brazil, Reflectivity modeling of Si-based amorphous superlattices; Superlattices and Microstructures, Vol 28, No 3, 2000.

REFERENCES

Dr. Philip Wiley Jones
(505) 667 6387
pwjones@lanl.gov
Los Alamos National Laboratory

Dr. Paul Delgado
(915)588-0876
dr.paul.m.delgado@gmail.com
Computational Thermal Engineer, Ball Aerospace Inc.

Dr. Shirley V Moore
(865)719-0701
svmoore@utep.edu
Associate Professor, Computer Science
University of Texas at El Paso