# Adrián S Román

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## EDUCATION

**University of California, Davis**, Davis CA — Graduating March 2021
**B.S.** Applied Mathematics.
**B.S.** Computer Science.

**Stanford University**, Stanford CA — June - Aug. 2018
Intensive Studies in Data Science Certificate

## ACADEMIC RESEARCH

**Biophysical Modeling** — Mar. 2019 - June 2020
*Stanford University,* Stanford, CA
Principal Investigator: Edward W. Large, Ph.D.
Project Title: "Hebbian learning with elasticity explains how a musician's spontaneous motor tempo affects periodic synchronization."

- Designed a network of non-linear oscillators to simulate temporal dynamics of adaptive human perception and synchronization with musical rhythms.
- Designed and validated model with human behavioral data.
- Presented results at two conferences and wrote full manuscript of study.

## INDUSTRY RESEARCH

**Dynamical Systems Engineering Intern** — June 2020 - Sept. 2020
*Oscilloscape LLC,* remote work

- Optimized algorithm that runs a network with hundreds of oscillators to perform beat tracking in music.
- Designed numerical methods for ODEs and signal processing algorithms.
- Delivered algorithm that will be integrated in system of LED lights that displays synchronizing patterns to the beat of music.

**Part-time Software Engineering Intern** — Sept. 2019 - Feb. 2020
*Oscilloscape LLC,* remote work

- Created user interface of therapy to re-train synchronization in aphasia patients.
- Wrote the back-end for data collection of user information.
- Created algorithms capable of measuring user's synchronization capabilities and improvement.

**Software Engineering Intern** — June 2019 - Sept. 2019
*Oscilloscape LLC,* Farmington, CT

- Lead full-stack developer of the iOS app Adaptive Rhythmic Training (ART) to deliver a rhythmic digital therapy for language pathologies.
- Designed dynamical systems model to adaptively synchronize a metronome with a user's spontaneous tapping rate.
- Delivered a functional prototype planned to go on clinical trials for the rehabilitation of speech in non-fluent aphasia and developmental dyslexia.

## RESEARCH ARTICLES

Roman, I. R., **Roman, A. S.**, Large W. E. (2020). Hebbian tempo learning with elasticity explains how a musician's spontaneous motor tempo affects periodic synchronization in musical performance: a dynamical systems model. *bioRxiv.* https://doi.org/10.1101/2020.10.15.341610.

## CONFERENCE PRESENTATIONS

**Society for Music Perception and Cognition (SMPC)** Aug. 2019
*New York University*, New York, NY
***Oral Presentation***
**Roman, A. S.**, Roman, I. R. (2019). Individual Musician's Spontaneous Performance Rates Affect Interpersonal Synchronization in Joint Musical Performance: A Dynamical Systems Approach. https://doi.org/10.17605/OSF.IO/RZAH4

**UC Davis Undergraduate Research Conference (URC)** Apr. 2019
*UC Davis*, Davis, CA
***Poster Presentation***
**Roman, A. S.**, Roman, I. R. (2019). Individual Musician's Spontaneous Performance Rates Affect Interpersonal Synchronization in Joint Musical Performance: A Dynamical Systems Approach.

## RELEVANT COURSES

**Numerical Methods** Mar. 2020 - June 2020
*UC Davis*, Davis, CA.
Instructor: Niels Grønbech-Jensen, Ph.D.
Final Project: Simple and effective Verlet method for simulating Langevin dynamics.
- Studied the statistical behavior of a novel stochastic Størmer-Verlet method for simulating second order differential equations.
- Analytically demonstrated that for a harmonic oscillator the method yields to correct Maxwell-Boltzmann distribution for any parameter of damping, frequency, and time step.
- Validated the algorithm through comprehensive Langevin simulations, which ultimately reproduce diffusive behavior of a particle in flat potential.

**Introduction to Statistical Learning** June 2018 - Aug. 2018
*Stanford University*, Stanford, CA.
Instructor: Trevor Hastie, Ph.D.
- Designed and implemented supervised and unsupervised algorithms for predictive and descriptive learning.

**Data Mining and Analysis** June 2018 - Aug. 2018
*Stanford University*, Stanford, CA.
Instructor: Rajan Patel, Ph.D.
Final Project: Search Engine to Determine Relevance of Documents
- Implemented AI algorithms that return documents from users' search queries in order of relevance.
- Identified and extracted relevant features from a large data-set to enhance the accuracy of algorithms.

## TEACHING & SERVICE

**Curriculum Creator & Volunteer Trainer** Sept. 2019 - Present
*UC Davis*, Davis, CA
- Member of Computer Science for Kids (CS4K).
- Designed course material on programming concepts, game programming, and debugging using Scratch MIT for kids in underserved schools.
- Taught education ethics and theory to CS4K undergraduate volunteers who teach computer science at elementary schools in the Yolo County.
- Incorporated techniques to create an inclusive classroom for students from diverse backgrounds.

## COMPUTER SKILLS

*Software:* C++, C, Python, Matlab, R, Swift, Objective-C, Core-ML, LaTeX.
*Libraries:* TensorFlow, NumPy, SciPy, POSIX, matplotlib, gnuplot.
*Databases:* Firebase, SQL, MySQL.
*Scripting and Tooling:* Git, Jupyter, awk, grep, zsh.
*Operating Systems:* Arch Linux, Ubuntu Linux, UNIX, Mac OSX.

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| **WORKSHOPS ATTENDED** | **Deep Learning Algorithms.**<br>*Higher Technological Institute of Southern Guanajuato*, Uriangato, Mex. | Jan. 2018 |
| **HONORS & AWARDS** | *Spring 2020 Dean's Honor List*<br>*URC Undergraduate Travel Award* | 2020<br>2019 |
| **LANGUAGES** | *Spanish:* Native<br>*English:* Fluent | |
| **EXTRA-CURRICULAR ACTIVITIES** | Short-film producer ("Viacrucis", "Lost Ceiling", "Phobia").<br>Studied music theory for 8+ years.<br>Musical instruments: Saxophone, Electric Bass, and Piano. | |