

ÁLVARO VEGA-HIDALGO  
AI - HCI - Ecology, Evolution and Behavior

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## EDUCATION

- 2018**      **National University of Costa Rica** | *B.S. Tropical Biology* | Heredia, Costa Rica
- 2024 - 2029**      **University of Michigan** | *Ph.D. Computer Science and Engineering* | Ann Arbor, Michigan, USA
- Advisor:  
Dr. Rada Mihalcea (AI Lab - Language and Information Technologies)

## WORK EXPERIENCE

- 4/2024**      **biometrio.earth** | Senior Scientist | Saarbrücken, Germany (remote work)  
**Supervisor:** Dr. Michael Schmidt (CEO)  
**Tasks:** Design advanced AI-driven data pipelines and software systems dedicated to monitoring natural ecosystems worldwide to enhance the precision and transparency of global carbon offset initiatives and biodiversity conservation efforts through innovative technological solutions.
- 8/2023 - present**      **University of Michigan** | *Computational bioacoustics using deep learning* | Ann Arbor, Michigan (remote work)  
**Supervisors:** Dr. Thore Bergman  
**Project:** Capuchins de Taboga  
**Tasks:** Implement a transfer learning approach to identify individual capuchin vocalizations in focal and passive acoustic recordings
- 12/2019 - present**      **Cornell Lab of Ornithology (Center for Avian Population Studies)** | *Data Management* | Ithaca, New York (hybrid work)  
**Supervisor:** Dr. Viviana Ruiz Gutierrez  
**Project:** Our Coffee, Our Birds  
**Tasks:** Management of big data sets of coffee farm soundscapes to quantify the impact of sustainable agricultural practices using high performance cloud computing. Development of the eBird big data and deep neural network-powered Biodiversity Progress Index using Python, R and AWS cloud infrastructure
- 11/2018 - present**      **Cornell Lab of Ornithology (K. Lisa Yang Center for Conservation Bioacoustics)** | *Software development and data analysis* | Ithaca, New York (hybrid work)  
**Supervisor:** Dr. Laurel Symes  
**Projects:** Develop the Euphonia mobile app for community based conservation using computational bioacoustics for iOS and Android using Unity3D; computational bioacoustics of restoration ecology in Osa Peninsula, Costa Rica

**Tasks:** Bioacoustics data analysis and software design and development using Unity3D Game Engine, Google Firebase, Python, R and Raven

- 6/2018 - 6/2019**     **Smithsonian Tropical Research Institute; George Washington University** | *Research assistant* | Barro Colorado Island, Panama  
**Coordinators:** Dr. Adam Smith  
**Project:** The evolutionary origins of social insect queen pheromones  
**Tasks:** Implementing deep learning powered automated behavioral tracking using deeplabcut (python package), technical assistance and debugging for a raspberry pi-based autonomous camera system deployed in the rainforest, developing GUIs to assist automated behavioral tracking
- 11/2018 - 12/2018**     **Department of Neurobiology and Behavior, Cornell University** | *Visiting researcher* | Ithaca, New York  
**Coordinator:** Dr. Kerry L. Shaw  
**Project:** The origin of Hawaiian cricket species  
**Task:** Led 3D modeling and ligand docking using high-performance bioinformatics to understand the evolution of Hawaiian crickets' song and their speciation process
- 12/2017 - 10/2018**     **Smithsonian Tropical Research Institute; University of California at Davis** | *Research assistant* | Barro Colorado Island, Panama  
**Coordinators:** Dr. Margaret Crofoot  
**Project:** Food for thought  
**Task:** Primatology field work, visual tracking, telemetry. Big data analysis of high resolution GPS data
- 10/2018 - 11/2018**     **Technology Academy of the University of Costa Rica** | *Instructor* | San José, Costa Rica  
**Coordinator:** Alonso Alvarado (Engineer)  
**Task:** Designed and taught statistics and programming workshops to faculty and students
- 5/2018 - 11/2018**     **MetricArts** | *Instructor* | Panama City, Panama  
**Coordinator:** Dr. Gerzo Gallardo  
**Task:** Designed and taught statistics and programming for business intelligence
- 5/2017 - 7/2017**     **Organization for Tropical Studies** | *Teaching Assistant* | Six field stations and different types of forests in Costa Rica  
**Coordinator:** Dr. Jennifer Stynoski  
**Task:** assist the PhD course Tropical Biology: An Ecological Approach
- 5/2017 - 6/2017**     **Brenesii** | *Environmental educator* | Costa Rica  
**Task:** Teach environmental and social awareness to high schoolers

**8/2014 - 6/2016**      **Laboratory of Systematics, Phylogenetics, and Evolution** | *Research assistant* | Costa Rica

**Coordinator:** Dr. Federico Villalobos-Brenes

**Task:** Extracted and sequenced DNA, phylogenetic analysis, programming and statistical analysis to study molecular evolution and phylogenetics of velvet worms

## **PUBLICATIONS**

Molina-Mora, I., Ruíz-Gutierrez, V., Vega-Hidalgo, A., Sandoval, L. (2024). The utility of passive acoustic monitoring for using birds as indicators of sustainable agricultural management practices. (Accepted). *Frontiers in Bird Science*.

Vega-Hidalgo, Á., Kahl, S., Symes, L., Ruiz-Gutiérrez, V., Molina-Mora, I., Cediell, F., Sandoval, L., & Klinck, H. (2023). A collection of fully-annotated soundscape recordings from neotropical coffee farms in Colombia and Costa Rica [Data set]. *Zenodo*.

Vega-Hidalgo, Á., Flatt, E., Whitworth, A., & Symes, L. (2021). Acoustic assessment of experimental reforestation in a Costa Rican rainforest. *Ecological Indicators*, 133, 108413.

Vega-Hidalgo, Á., Añino, Y., Krichilsky, E., Smith, A. R., Santos-Murgas, A., & Gálvez, D. (2020). Decline of native bees (Apidae: Euglossa) in a tropical forest of Panama. *Apidologie*, 1-13.

Krichilsky, E., Vega-Hidalgo, Á., Hunter, K., Kingwell, C., Ritner, C., Weislo, W., & Smith, A. (2020). The first gynandromorph of the Neotropical bee *Megalopta amoena* (Spinola, 1853)(Halictidae) with notes on its circadian rhythm. *Journal of Hymenoptera Research*, 75, 97.

González, J. P. B., Vega-Hidalgo, A., & Monge-Nájera, J. (2019). Feeding behavior of Costa Rican velvet worms: food hiding, parental feeding investment and ontogenetic diet shift (Onychophora: Peripatidae). *UNED Research Journal*, 11(2), 85-88.

## **Media mentions of my research**

Spencer Feingold. "How artificial intelligence is helping us decode animal languages". Jan 5, 2023. *World Economic Forum*. Available at [www.weforum.org](http://www.weforum.org)

Katherine J. Wu. "Meet the Bee With a Body That's Half Male, Half Female" April 2, 2020. *Smithsonian Magazine*. Available at [smithsonianmag.com](http://smithsonianmag.com)

Cover of #1 most read newspaper in Costa Rica:

Irene Rodríguez. "Climate change and urban development drive away birds in Costa Rica." Oct 29, 2023. *La Nación*. Available at [nacion.com](http://nacion.com)

- Original title "Cambio climático y desarrollo urbano ahuyentan las aves de Costa Rica"

## Technical Reports

The Biodiversity Progress Index: a tool for measuring and communicating the impact of regenerative practices on biodiversity. March 2022. *Nespresso AAA Sustainable Quality Program*.

## LANGUAGES

English: Fluent in both spoken and written English

Spanish: Native speaker

## COMPUTER SCIENCE SKILLS

### Tools and frameworks

Machine learning operations in AWS Sagemaker and Google Cloud, high performance computing, signal processing, machine learning, deep learning, bioacoustics analysis, bioinformatics, big data, video game development in Unity3D, GIS analysis, Unix

### Programming languages

- **R:** Proficient with tidyverse, sf, seewave, shiny.
- **Python:**
  - Skilled in Pandas, Numpy, Matplotlib, Librosa.
  - Intermediate proficiency in Pytorch, Tensorflow, Keras.
  - Familiar with domain-specific tools like Deeplabcut and BirdNET.
- **C#:** Experienced in utilizing the Unity3D Game Engine for scientific data visualization and interaction.
- **App development:**
  - Skilled in Dart and Flutter.
  - Intermediate proficiency in Javascript.

## PRIZES, CERTIFICATIONS AND RESEARCH FUNDS

**Research Grant** | \$100,000 | co-leader | Artificial intelligence for natural environments: Applying and generalizing an insect AI pipeline. Artificial Intelligence for Earth Program. Co-sponsored by Microsoft and National Geographic | 2021

**Research Grant** | \$4,000 | Quantifying bee behavior automatically using artificial intelligence and designing open hardware, Department of Biological Sciences, George Washington University | USA | 2019

**National Competition** | 1st place | Hardwarethon (internet of things and innovation competition) | Costa Rica | 2018

**National Competition** | Finalist | Open Data Fellowship for the Open Government | Costa Rica | 2018

**Research Grant** | Vector Prize: \$150 | Fund the establishment of the Heredia R User Group from The Linux Foundation | USA | 2018

**National Competition** | Second place | SynBioThon (Synthetic Biology Competition) | Costa Rica | 2017

**National Scholarship** | Full honor scholarship for demonstrating excellence in the admission test | University of Costa Rica | Costa Rica | 2015

**International Competition** | Bronze for Costa Rica | Ibero-American Biology Olympiad | Argentina | 2013

**National Competition** | Best Experimental Exam | National Chemistry Olympiad | Costa Rica | 2012

## **PRESENTATIONS**

**Invited talk: BirdNET+ workshop** | Open Source Computational Bioacoustics for Community-Based Conservation | Chemnitz, Germany | 2024

**Invited talk: Evolution and Human Adaptation Program Talk Series** | Acoustic identification of white-faced capuchins using deep learning | Michigan, USA | 2023

**Invited talk: Animal Behavior Society conference** | A new mobile audio annotation tool and its use in a tropical agroforestry landscape | Costa Rica | 2022

**Day of Data Panel Discussion** | Meeting challenges for bioacoustics training data sets | Cornell University, Ithaca (online) | 2021

**Animal Behavior Society conference** | Evidence of animal personality in strawberry poison frogs | University of Illinois, Chicago | 2019

- Presented by co-author Carolina Esquivel

**New Frontiers in the Study of Animal Behaviour** | [Behavioral tracking gets real in the wild](#) | Konstanz, Germany | 2019

**Invited talk: Bioinformatics in Action Seminar at National Center for High Technology** | Bioinformatics applied to animal behavior and movement ecology | San José, Costa Rica | 2018

**Capybara Seminar at the Smithsonian Tropical Research Institute** | Revisiting multiple central place foraging in spider monkeys | Barro Colorado Island, Panama | 2018

**XI Latin American Congress of Herpetology** | Personality of *Oophaga pumilio* | Quito, Ecuador | 2017

**Advanced Materials and Nanotechnology Science Symposium, UCR** | Topography and electronic characterization by STM of thin film semiconductors for applications in photovoltaic solar cells | San José, Costa Rica | 2017

**VOLUNTEER WORK**

**SIFAIS** | Guitar instructor for children in social risk | Costa Rica, 2016 (10 months, 4 hours per week)