# Juan Huerta


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## Education

**2020-2022** M.S in Computer Science - **The University of Texas at Austin**

*Research focus: - VaryCHarm: Automatically Vary the Complexity of Harmonies in Music*

Selected courses:

*Machine Learning - Deep Learning – Online Learning & Optimization – Reinforcement Learning*

**2016-2018** B.S in Applied Mathematics - **Columbia University in the city of New York**

*Senior research: - Generating Music by Continuous Neural Network Predictions of Binary Arrays*

Selected courses:

*Evolutionary algorithms - Statistical Inference - Quantum Mechanics - Advanced Topics in Music*

**2013-2016** B.S in Physics, Music (Double Major) - **St. Lawrence University**

*Sigma Pi Sigma Honor Society - Pi Mu Epsilon Honor Society - Quantitative Club*

## Employment History

**July 2019 - Present** **GE Appliances, a Haier Company,** GE Appliance Park, Louisville, KY, 40229, United States
*Artificial Intelligence Engineer*

Part of the Emerging Technologies and Innovation Group, focused on researching and implementing artificial intelligence technologies to be used in product areas including refrigeration, washer systems, cooking products, service, and small appliances.
Other responsibilities include discovering and patenting novel ML systems; developing and validating ML models; leverage cloud-based architectures and technologies to deliver optimized ML models at-scale; construct optimized data pipelines to feed ML models; continuous integration and continuous deployment best practices, including automation and monitoring, to ensure successful deployment of ML models and application code

**Mar 2019 - July 2019** **Modis,** Otis St, CA 94025, United States
*Contractor - Software Engineer / Machine Learning*

Design and build hardware, software and networking technologies for appliance prototypes relating to machine learning systems, mobile applications, and IoT solutions. Other responsibilities included translating design thinking into functional technologies; collaborating daily with product managers, product designers, and user researchers in order to understand business goals.

**Aug 2018 - Dec 2018** **Applied Underwriters,** San Ramon,CA, 905542, United States
*Technical Analyst*

Responsible for analyzing, designing, building, maintaining and continuously improving the company's core applications and databases. Also perform complex data migration, data interchange, reporting and analysis. In addition, set and maintain database standards, and performance tuning of database systems.

**Mar 2019 - July 2019** **St.Lawrence U, Physics Dept,** 23 Romoda Dr, Canton, NY 13002, United States
*Teaching Assistant*

In charge of leading weekly physics problem sessions available to introductory physics students. Responded to homework questions and reviewed the classroom material.

## Research Experience

**Sep 2021 - Present** **VaryCHarm: A Method to Automatically Vary the Complexity of Harmonies in Music**
*Univeristy of Texas at Austin, LARG*

Project supervised by Professor Peter Stone as part of the Learning Agents Research Group (LARG) group. This work is focused on building a method that allows us to arbitrarily vary the number of notes in a piano roll while preserving the general harmonic structure and melody of the original music. We first formulate the problem of varying music complexity mathematically and propose a method to solve the problem without direct supervision. To do this, we find a compressed representation of pitch while simultaneously training on symbolic chord predictions.

**Sep 2017 - May 2018** **Generating Music by Continuous Neural Network Predictions of Binary Piano Roll Arrays**
*Columbia University, Creative Machine Labs*

Senior research Project (2 semesters) supervised by Professor Hod Lipson part of the Creative Machines Lab. This project uses existing piano MIDI to train a Neural Network similar to The Continuous Bag of Words Model combined with a predictive scheme to generate new music, or complete an unfinished piece.

**Jul 2017 - Sep 2017** **Automated Composition of Popular Music (ACPM)**
*Carnegie Mellon University (remote)*

Collaborated with Professor Roger Dannenberg. The project uses a collection of algorithms derived from music theory analysis and probability to alter music while maintaining similar musical structure.

**June 2017 - Aug 2017** **REU: Angle Control and Electronic Transport Properties of Twisted Bilayer Graphene**
*Columbia Univeristy, MRS*

Project supervised by Professor Cory Dean as part of the Material Research Science and Engineering Center. Contributed to the development of a technique to precisely control the relative angle of two single layer graphene stacked on h-BN.

## Patents

- **502119US01 – AutoWash/Dry (Automatically Selecting Optimum Cycle for a Given Load)**

  This invention describes a washer with a camera installed pointed towards the drum. Using computer vision, we detect color, predict load size, and determine dominant load type. The washer uses this information to select the best cycle to use for any given load; if any color mixture problems are detected (the classic case of red socks in a white load) washer will notify the user.
  **Filed Date**: 23 Jan 2020
  https://patents.google.com/patent/US20210230783A1

- **502357US01 – Artificial Intelligence (AI) Sound Dry**

  This invention uses a microphone, with artificial intelligence, embedded in a dryer to obtain information about cloth dryness, load size, load type, RPM, air flow, valve activation and service diagnostics. The microphone can be part of an already existing voice assistant service on the unit. Service diagnostics can look for abnormal noises including SPL or pure tone sounds indicative of potential problems such as belt failures, rattles, or squeaks.
  **Filed Date**: 3 Mar 2020
  https://patents.google.com/patent/US20210277564A1

- **502155US01 – Artificial Intelligence (AI) Sound Wash**

  This invention uses a microphone, with artificial intelligence, embedded in a washer to obtain information about critical bumps, drips when valve should be closed, vibration noises during spin, suds lock, hard items in the washer (change, weights, etc.), dry drain pump, suspension squeak, valve activation and service diagnostics.
  **Filed Date**: 16 Oct 2020
  *Patent Pending*

- **502830US01 – Automatic Tea Dispensers for Personalized Tea Based on Body Vitals Signs**

  There are two major components to this invention, a tea dispensers and a wearable watch. An app in the wearable watch decides a certain tea by considering your body vitals. Once the tea is suggested, the user will be able to confirm if they want to make that tea. Upon confirming, the wearable communicates with the automated brewer to dispense the tea leaves and start the brewing process.
  **Filed Date**: 17 Mar 2021
  *Patent Pending*

- **502840US01 – Automatic Folding of Laundry Garments Using Artificial Intelligence**

  This invention describes a mechanism that automatically folds clothing items as they are fed by a loading mechanism not discussed here. After the clothing items are loaded, an image is captured by a camera to differentiate between different clothing items, edges, and other relevant features to improve decision of the folding sequence mechanism.
  **Filed Date**: 16 Mar 2021
  *Patent Pending*

- **502838US01 – Closet Recommendation System for Clothes Folding Machine**

  This invention describes a recommendation system working together with a laundry folding appliance described in a different disclosure. A trained model will extract relevant features from collected images of user garments such as: type, shape, and edges. The features are stored and used by a recommendation system, in combination with weather information, to suggest cloths for any given day.
  **Filed Date**: 16 Mar 2021
  *Patent Pending*

- **502948US01 – User embeddings of appliance data to predict failure and user behavior**

  This invention describes a system that uses connected home appliances to automatically generates mathematical embeddings for users across the globe. We use sequence embedding techniques and apply the topology for predictive analytics to enhanced recommendation systems, and diagnostic tools.
  **Filed Date**: 01 Oct 2021
  *Patent Pending*

- **503272US01 – Offloading model inference from home appliance to nearby mobile device**

  This invention describes a method to perform model inference on a home appliance without requiring the computation to be done by the appliance. The system depends on a nearby mobile device (android or iOS) using wireless PAN (such as Bluetooth). The method works as follows, an appliance has an inference request; the appliance then connects to a mobile device, or multiple devices. Finally the mobile device uses an app to process the inference request and sends a response to the appliance.
  **Filed Date**: 16 Oct 2020
  *Patent Pending*

## Software Engineering Skills

- **Programming Languages**

  *Python, C/C++, Java, SQL, Kotlin, Lua*

- **Web Technologies**

  *HTML5, CSS3/SASS, JavaScript/CoffeeScript/jQuery, Tone.js, Amazon Web Services, Google Cloud Platform*