Forest Agostinelli

Assistant Professor
University of South Carolina

AI Institute
Department of Computer Science and Engineering
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Current Appointment

2020-Present **Assistant Professor**, University of South Carolina.
AI Institute, Department of Computer Science and Engineering

Education

2019 **PhD in Computer Science**, University of California, Irvine.
Thesis: Deep Learning for Puzzles and Circadian Rhythms
Advisor: Pierre Baldi

2014 **MS in Computer Science**, University of Michigan.
Advisor: Honglak Lee

2012 **BS in Electrical and Computer Engineering**, Ohio State University.
Magna cum Laude
Advisors: Bruce Weide and Paolo Bucci

Research Positions

2020 **Postdoctoral Researcher**, University of California, Irvine, USA.

Sum 2019 **Visiting Scholar**, Syntiant, Irvine, USA.

Sum 2017 **Research Intern**, Google DeepMind, London, UK.

Sum 2015 **Research Intern**, Microsoft Research, Beijing, China.

Sum 2014 **Research Intern**, Adobe Research, San Francisco, USA.

Teaching

Instructor

Deep Reinforcement Learning, CSCE 775, UofSC, 15-20 students
Fall 2020, Fall 2021, Spring 2025

Artificial Intelligence, CSCE 580, UofSC, 25 - 50 students
Spring 2021, Spring 2022, Fall 2022, Spring 2023, Spring 2024

Artificial Intelligence for All, CSCE 180, UofSC, 20 students
Fall 2024

Algorithmic Design I, CSCE 145, UofSC, 30 students
Fall 2023

Seminar Series in Advances in Computing, CSCE 791, UofSC, 25 students
Spring 2022

Teaching Assistant

Introduction to Artificial Intelligence, CS 171, UC, Irvine, 200 students
Fall 2018, Winter 2019

Programming in Java, , Ohio State University, 50 students
2011

Advising

Current Students

PhD Student **Vedant Khandelwal**, *January 2021-*, co-advised with Amit Sheth.

PhD Student **Rojina Panta**, *August 2021-*.

PhD Student **Cale Workman**, *August 2021-*.

PhD Student **Misagh Soltani**, *August 2022-*.

BS Student **Michael Culver**, *September 2024-*.

BS Student **Eli Hatcher**, *January 2024-*.

BS Student **William Edwards**, *September 2022-*.

BS Student **Amber Pospistle**, *January 2024-*.

Previous Students

BS Student **Christian Geils**, *January 2024-May2024*.

BS Student **Ian Turner**, *January 2022-June 2023*.

BS Student **Anna Phan**, *January 2023-August 2023*.

BS Student **Chris Nelson**, *January 2022-May 2023*.

BS Student **Michael Sana**, *August 2021-May 2022*.

BS Student **Ralph Gleaton**, *May 2021-May 2022*.

HS Student **Toluwanimi Ariyo**, *August 2021-December 2021*.

Funding

2024-2027 **RI: Small: Scalable Learning in Heuristic Search**, *NSF*.
$339,482, PI

2023-2026 **MRI: Track 2 Acquisition of a High-Performance Computing Cluster for Boosting Artificial Intelligence Enabled Science, Engineering, and Education in South Carolina**, *NSF*.
$1,100,000, Co-PI

2023-2024 **How Does this Puzzle Work? Towards Foundation Models for Pathfinding Problems**, *University of South Carolina: ASPIRE-I*.
$14,700, PI

2023-2024 **Quantifying Vascular Calcification and Predicting Patient Outcome with Synthetic Data, Deep Neural Networks, and Logic Programming**, *MADE in SC*.
$68,000, PI

2023-2023 **Chemical Reaction Prediction at the Reaction Mechanism Level**, *University of South Carolina: McNair Junior Fellow*.
$3,000, PI

2023-2023 **Chemical Reaction Prediction at the Reaction Mechanism Level**, *University of South Carolina: Magellan Apprentice*.
$1,000, PI

2022-2023 **Radiation Hard and Machine Learning Reinforced 4H-SiC Radiation Detectors for Space Applications**, *NASA EPSCoR*.
$70,059, Co-PI

2022-2023 **Automatic and Personalized Identification of Smoking Using Smartwatches**, *University of South Carolina: ASPIRE-II*.
$99,190, Co-PI

2022-2023 **Big Data Health Science Fellow Program in Infectious Disease Research**, *NIH R25*.
$56,544, Mentee

2021-2022 **Collaborative Artificial Intelligence for Learning to Solve the Rubik's Cube**, *University of South Carolina: ASPIRE-II.*
$98,535, Co-PI

2021-2022 **Direct Detection of Sub-GeV Dark Matter Using Reinforced Single-Crystalline Diamond, 4H-SiC Detectors, and Convolutional Neural Networks**, *University of South Carolina: ASPIRE-II.*
$100,000, Co-PI

2021-2022 **Proactive and Automated Material Control**, *South Carolina Department of Commerce.*
$239,808, Co-PI

Publications

Conference Papers

1. **Learning Discrete World Models for Heuristic Search**
Reinforcement Learning Conference (RLC), 2024.
Forest A., Misagh S.
2. **Specifying Goals to Deep Neural Networks with Answer Set Programming**
International Conference on Automated Planning and Scheduling (ICAPS), 2024
Forest A., Vedant K., Rojina P.
3. **Explainable AI (XAI) User Interface Design for Solving a Rubik's Cube**
International Conference on Human-Computer Interaction, 2022
Cassidy B., Dezhi W., H. T., Ishu S., Katelyn W., B. C., K. W., Forest A., Matthew I., Biplav S.
4. **AI-Driven User Interface Design for Solving a Rubik's Cube**
International Conference on Human-Computer Interaction, 2022
Dezhi W., H. T., C. B., Brittany C., Ishu S., Katelyn W., Karen W., Matt I., Forest A., Biplav S.
5. **ALLURE: A Multi-Modal Guided Environment for Helping Children Learn to Solve a Rubik's Cube with Automatic Solving and Interactive Explanation**
AAAI Demonstration Track, 2022
Kaushik Lakkaraju, Thahimum Hassan, Vedant Khandelwal, Prathamjeet Singh, Cassidy Bradley, Ronak Shah, Forest Agostinelli, Biplav Srivastava, Dezhi Wu
6. **A CdZnTeSe gamma spectrometer trained by deep convolutional neural network for radioisotope identification**
Hard X-Ray, Gamma-Ray, and Neutron Detector Physics XXIII, 2021
Sandeep K Chaudhuri, Joshua W Kleppinger, Ritwik Nag, Kaushik Roy, Rojina Panta, Forest Agostinelli, Amit Sheth, Utpal N Roy, Ralph B James, Krishna C Mandal
7. **Designing Children's New Learning Partner: Collaborative Artificial Intelligence for Learning to Solve the Rubik's Cube**
Interaction Design and Children, 2021
Forest Agostinelli, Mihir Mavalankar, Vedant Khandelwal, Hengtao Tang, Dezhi Wu, Barnett Berry, Biplav Srivastava, Amit Sheth, and Matthew Irvin
8. **Solving the Rubik's Cube with Approximate Policy Iteration**
International Conference on Learning Representations (ICLR), 2019
Stephen McAleer*, Forest Agostinelli*, Alexander Shmakov*, Pierre Baldi
9. **Improving Survey Aggregation with Sparsely Represented Signals**
22nd SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), 2016
Tianlin Shi*, Forest Agostinelli*, Matthew Staib, David Wipf, Thomas Moscibroda
10. **Adaptive Multi-Column Deep Neural Networks with Application to Robust Image Denoising**
Neural Information Processing Systems (NeurIPS), 2013
Forest Agostinelli, Michael Anderson, Honglak Lee

Journal Publications

1. **Hippocampal Ensembles Represent Sequential Relationships Among Discrete Nonspatial Events**
   Nature Communications, 13.1: 1-17, 2022.
   Babak Shahbaba, Lingge Li, Forest Agostinelli, Mansi Saraf, Gabriel A Elias, Pierre Baldi, Norbert J Fortin
2. **CircadiOmics: Circadian Omic Web Portal**
   Nucleic Acids Research, Volume 50, Issue W1, W183-W190, 2022
   Muntaha Samad, Forest Agostinelli, Tomoki Sato, Kohei Shimaji, Pierre Baldi
3. **Synthesis of CdZnTeSe single crystals for room temperature radiation detector fabrication: mitigation of hole trapping effects using a convolutional neural network**
   Journal of Materials Science: Materials in Electronics, 1-12, 2022
   Sandeep K Chaudhuri, Joshua W Kleppinger, OmerFaruk Karadavut, Ritwik Nag, Rojina Panta, Forest Agostinelli, Amit Sheth, Utpal N Roy, Ralph B James, Krishna C Mandal
4. **SPLASH: Learnable activation functions for improving accuracy and adversarial robustness**
   Neural Networks, 140 pp. 1-12, 2021.
   Mohammadamin Tavakoli, Forest Agostinelli, Pierre Baldi
5. **Solving the Rubik's Cube with Deep Reinforcement Learning and Search**
   Nature Machine Intelligence, Volume 1, Issue 8, 356-363, 2019.
   Forest Agostinelli*, Stephen McAleer*, Alexander Shmakov*, Pierre Baldi
6. **CircadiOmics: Circadian Omic Data Web Portal**
   Nucleic Acids Research, Volume 46, Issue W1, W157-W162, 2018.
   Nicholas Ceglia, Yu Liu, Siwei Chen, Forest Agostinelli, Kristin Eckel-Mahan, Paolo Sassone-Corsi, and Pierre Baldi
7. **What Time is It? Deep Learning Approaches for Circadian Rhythms**
   Bioinformatics, 32 (12): i8-i17, 2016.
   Forest Agostinelli, Nicholas Ceglia, Babak Shahbaba, Paolo Sassone-Corsi, Pierre Baldi

Workshop Papers

1. **Independent Modular Networks**
   ICRA - Workshop on Effective Representations, Abstractions, and Priors for Robot Learning, 2023
   Hamed Damirchi, Forest Agostinelli, Pooyan Jamshidi
2. **Explainable Pathfinding for Inscrutable Planners with Inductive Logic Programming**
   ICAPS - Workshop on Explainable AI Planning, 2022
   Forest Agostinelli, Rojina Panta, Vedant Khandelwal, Biplav Srivastava, Bharath Chandra Muppasani, Kausik Lakkaraju, and Dezhi Wu
3. **Obtaining Approximately Admissible Heuristic Functions through Deep Reinforcement Learning and Search**
   ICAPS - PRL Workshop, 2021
   Forest Agostinelli, Stephen McAleer, Alexander Shmakov, Roy Fox, Marco Valtorta, Biplav Srivastava, Pierre Baldi
4. **Learning Activation Functions to Improve Deep Neural Networks**
   International Conference on Learning Representations, Workshop, 2015
   Forest Agostinelli, Matthew Hoffman, Peter Sadowski, Pierre Baldi

Book Chapters

1. **Bioinformatics and Systems Biology of Circadian Rhythms: BIO_CYCLE and CircadiOmics**
   Methods in Molecular Biology, pp. 81-94. Humana, 2022.
   Muntaha Samad, Forest Agostinelli, and Pierre Baldi
2. **From Reinforcement Learning to Deep Reinforcement Learning: An Overview**
   Key Ideas in Learning Theory from Inception to Current State: Emmanuel Braverman's Legacy, pp. 298-328. Springer, Cham, 2018.

Forest Agostinelli, Guillaume Hocquet, Sameer Singh, Pierre Baldi

Media Coverage

Jan 2021 **Explainable Artificial Intelligence**.
Research on how we can collaborate with AI to find solutions to problems that we can understand.
The Conversation

July 2019 **Artificial Intelligence Solves the Rubik's cube**.
Research on artificial intelligence and the Rubik's cube. Appeared in over 70 news articles.
BBC *Forbes* *Newsweek* Gizmodo

Invited Talks

Deep Learning, Reinforcement Learning, Logic, and Heuristic Search

2024 **Aachen RLeap Symposium**, *Vaals, Netherlands.*
2024 **SoCS Master Class**, *Kananaskis, AB, Canada.*
2024 **ICAPS PRL Workshop Keynote** , *Banff, AB, Canada.*
2024 **ICAPS HSDIP Workshop Keynote** , *Banff, AB, Canada.*

Specifying Goals to Deep Neural Networks

2024 **University of California, Irvine**, *Irvine, CA, USA.*
2023 **Augusta University**, *Augusta, GA, USA.*
2023 **KDD Workshop on Knowledge-Infused Learning**, *Long Beach, CA, USA.*

Explainable Artificial Intelligence and the Rubik's Cube

2022 **University of Virginia**, *Charlottesville, VA, USA.*
2022 **Region 2, Network of the National Library of Medicine**, *Columbia, SC, USA.*
2022 **NSF EPSCoR Workshop on Artificial Intelligence and No-Boundary Thinking**, *Little Rock, AR, USA.*
2022 **Indian Institutes of Science Education and Research, Cubing Society**, *Virtual.*
2021 **University of Chicago**, *Virtual.*
2021 **Profs and Pints**, *Virtual.*

From Combination Puzzles to the Natural Sciences

2020 **Ohio State University**, *Virtual.*
2020 **University of California, Irvine** , *Virtual.*
2020 **Wayne State University**, *Virtual.*
2020 **University of South Carolina**, *Columbia, SC, USA.*
2020 **Temple University**, *Philadelphia, PA, USA.*
2020 **Binghamton University**, *Binghamton, NY, USA.*
2019 **University of California, Berkeley (Pieter Abbeel's group)**, *Berkeley, CA, USA.*

What Time is It? Deep Learning Approaches for Circadian Rhythms

2016 **University of Pennsylvania**, *Philadelphia, PA, USA.*
2016 **Intelligent Systems for Molecular Biology (ISMB)**, *Orlando, FL, USA.*
2016 **University of California, Irvine**, *Irvine, CA, USA.*

Software and Web Servers

2018-Present **DeepCube** .
Solve the Rubik's Cube with deep reinforcement learning. Over 40,000 unique visitors.

2016-Present **BIO_CYCLE** .
Analyze circadian -omic experiments with deep learning.

2016-Present **Circadiomics** .
Explore, analyze, and visualize circadian data

Professional Service

Organizing

Topic Chair International Conference on Automated Planning and Scheduling (ICAPS), 2025

Organizer Workshop on Generalization and Planning (GenPlan) at AAAI, 2025

Reviewing

Journals Nature Machine Intelligence, Neural Networks, Neurocomputing

Conferences Neural Information Processing Systems, International Conference on Machine Learning, International Conference on Learning Representations, International Conference on Artificial Intelligence and Statistics, Association for the Advancement of Artificial Intelligence, International Joint Conference on Artificial Intelligence

Agencies NSF GRFP - Panelist (2020)

Honors & Awards

Fellowship **National Science Foundation Graduate Research Fellowship Program**, *2014-2019.*

Fellowship **Graduate Education for Minority Students Fellowship Program**, *2014-2015.*

Outreach

2014-2019 **Prospective Minority Graduate Student Recruitment**, *Irvine, CA.*
Discuss research interests and how to get into graduate school with prospective minority graduate students. Many of the students I have met with are currently Ph.D. students in the UC system.

2014-2015 **Students Tutoring and Outreaching to the Minority Population (S.T.O.M.P.)**, *Long Beach, CA; Compton, CA.*
Held workshops for underrepresented high school students on how to prepare strong applications for universities in the UC system.

2012-2014 **Hands-On Engineering Projects**, *Detroit, MI.*
Worked with middle school students on a hypothetical engineering project of building a railroad system. The program culminated in a demonstration at the University of Michigan with the students and their parents.

2011 **STEMFest**, *Columbus, OH.*
Worked on a city-wide day of STEM activities for middle and high schools students as part of the Lambda Psi minority engineering honorary. Coverage of the event appeared on a local news channel.

2010-2012 **Hands-On Electrical Engineering Projects**, *Columbus, OH.*
Worked with high school students to do fun electrical engineering projects, such as building a homemade speaker.

Spoken Languages

- **English:** Native speaker
- **Nepali:** Conversational
- **Spanish:** Working knowledge
- **Chinese:** Working knowledge