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

RL	**Deep Reinforcement Learning**, CSCE 775, UofSC, 15 students.
	Fall 2020, Fall 2021
AI	**Artificial Intelligence**, CSCE 580, UofSC, 25 - 50 students.
	Spring 2021, Spring 2022, Fall 2022, Spring 2023, Spring 2024
Prog	**Algorithmic Design I**, CSCE 145, UofSC, 30 students.
	Fall 2023
Seminar	**Seminar Series in Advances in Computing**, CSCE 791, UofSC, 25 students.
	Spring 2022

Teaching Assistant

AI	**Introduction to Artificial Intelligence**, CS 171 UC, Irvine.
	Fall 2018 (~200 students), Winter 2019 (~200 students)
Java	**Programming in Java**, Ohio State University.
	2011 (~50 students)

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	**William Edwards**, *September 2022-*.
BS Student	**Amber Pospistle**, *January 2024-*.
BS Student	**Christian Geils**, *January 2024-*.

Previous Students

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

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

RLC **Learning Discrete World Models for Heuristic Search**.
Reinforcement Learning Conference, 2024 (in press).
Forest A., Misagh S.

ICAPS **Specifying Goals to Deep Neural Networks with Answer Set Programming**.
International Conference on Automated Planning and Scheduling, 2024 (in press).
Forest A., Vedant K., Rojina P.

HCII **Explainable Artificial Intelligence (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.

HCII **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.

AAAI Demo **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, In Press.
Kaushik Lakkaraju, Thahimum Hassan, Vedant Khandelwal, Prathamjeet Singh, Cassidy Bradley, Ronak Shah, **Forest Agostinelli**, Biplav Srivastava, Dezhi Wu

SPIE **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

Interaction Design and Children **Designing Children's New Learning Partner: Collaborative Artificial Intelligence for Learning to Solve the Rubik's Cube** ⧉ .
Interaction Design and Children, pp. 610-614, 2021.
Forest Agostinelli, Mihir Mavalankar, Vedant Khandelwal, Hengtao Tang, Dezhi Wu, Barnett Berry, Biplav Srivastava, Amit Sheth, and Matthew Irvin

ICLR **Solving the Rubik's Cube with Approximate Policy Iteration** ⧉ .
International Conference on Learning Representations, 2019.
Stephen McAleer*, **Forest Agostinelli***, Alexander Shmakov*, Pierre Baldi

KDD **Improving Survey Aggregation with Sparsely Represented Signals** ⧉ .
22nd SIGKDD Conference on Knowledge Discovery and Data Mining, pp. 1845-1854. ACM, 2016.
Tianlin Shi*, **Forest Agostinelli***, Matthew Staib, David Wipf, Thomas Moscibroda

NeurIPS **Adaptive Multi-Column Deep Neural Networks with Application to Robust Image Denoising** ⧉ .
Neural Information Processing Systems, pp. 1493-1501, 2013.
Forest Agostinelli, Michael Anderson, Honglak Lee

Journal Publications

Nature Communications	**Hippocampal Ensembles Represent Sequential Relationships Among Discrete Nonspatial Events** ⃞ . *Nature Communications*, 2022, 13.1: 1-17. Babak Shahbaba, Lingge Li, **Forest Agostinelli**, Mansi Saraf, Gabriel A Elias, Pierre Baldi, Norbert J Fortin
Nucleic Acids Research	**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
Materials in Electronics	**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*, 2022, 1-12. 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
Neural Networks	**SPLASH: Learnable activation functions for improving accuracy and adversarial robustness** ⃞ . *Neural Networks*, 140 pp. 1-12, 2021. Mohammadamin Tavakoli, **Forest Agostinelli**, Pierre Baldi
Nature Machine Intelligence	**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
Nucleic Acids Research	**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
Bioinformatics	**What Time is It? Deep Learning Approaches for Circadian Rhythms** ⃞ . *Bioinformatics*, 32 (12): i8-i17, 2016. (Selected for oral presentation at the ISMB 2016 conference). **Forest Agostinelli**, Nicholas Ceglia, Babak Shahbaba, Paolo Sassone-Corsi, Pierre Bald

Workshop Papers

NeurIPS	**Learning Discrete World Models for Classical Planning Problems.** ⃞ . *NeurIPS - Workshop on Generalization in Planning.*, 2023. **Forest Agostinelli**, Misagh Soltani
ICAPS	**Specifying Goals to Deep Neural Networks with Answer Set Programming.** ⃞ . *ICAPS - Workshop on Human-Aware Explainable Planning.*, 2023. **Forest Agostinelli**, Rojina Panta, Vedant Khandelwal
ICRA	**Independent Modular Networks.** ⃞ . *ICRA - Workshop on Effective Representations, Abstractions, and Priors for Robot Learning.*, 2023. Hamed Damirchi, **Forest Agostinelli**, Pooyan Jamshidi
ICAPS	**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
ICAPS	**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
ICLR	**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

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

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

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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, and Heuristic Search
2024   **SoCS Master Class**, *Kananaskis, AB, Canada*.

Deep Reinforcement Learning and Heuristic Search Algorithms
2024   **ICAPS PRL Workshop Keynote** ⬀ , *Banff, AB, Canada*.

Opportunities and Challenges for Domain-Independent Planning with Deep Reinforcement Learning
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

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