

Sunandita Patra

POSTDOCTORAL RESEARCHER · DEPARTMENT OF COMPUTER SCIENCE, UNIVERSITY OF MARYLAND, COLLEGE PARK

Role(s) Interested In: Research Scientist, Research Engineer, Software Engineer

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Education

University of Maryland, College Park

PHD IN COMPUTER SCIENCE (GPA: 3.9/4)

College Park, MD, USA

Fall 2015 - Summer 2020

Thesis Topic: Acting, planning and learning using hierarchical operational models (link). Advisor: Prof. Dana Nau

Indian Institute of Technology, Kharagpur

BACHELOR OF TECHNOLOGY AND MASTER OF TECHNOLOGY IN COMPUTER SCIENCE AND ENGINEERING (CGPA: 9.55/10)

Kharagpur, India

July 2009 - April 2014

Research Experience

AREAS OF INTEREST: AI PLANNING AND ACTING, REINFORCEMENT LEARNING, PLANNING AND LEARNING

Selected Publications (Google Scholar link):

- [2021] Sunandita Patra, Alex Velazquez, Myong Kang, Dana Nau. Using Online Planning and Acting to Recover from Cyberattacks on Software-defined Networks. IAAI-21.
- [2021] Ruoxi Li, Sunandita Patra, Dana Nau. Decentralized Refinement Planning and Acting. ICAPS-21.
- [2020] Sunandita Patra, James Mason, Amit Kumar, Malik Ghallab, Paolo Traverso, Dana Nau. Integrating Acting, Planning, and Learning in Hierarchical Operational Models. ICAPS. **Best Student Paper Honorable Mention Award.**
- [2019] Sunandita Patra, Malik Ghallab, Dana Nau, Paolo Traverso. Acting and Planning Using Operational Models. AAAI.
- [2018] Sunandita Patra, Malik Ghallab, Dana Nau and Paolo Traverso. APE: An Acting and Planning Engine. Journal of Advances in Cognitive Systems.
- [2017] Sunandita Patra, Paolo Traverso, Malik Ghallab and Dana Nau. Planning and Acting with Hierarchical Input/Output Automata. ICAPS Workshop on Generalized Planning (GenPlan).
- [2013] Sunandita Patra, Satya Gautam Vadlamudi, and Partha Pratim Chakrabarti. Anytime contract search. SGAI International Conference on Innovative Techniques and Applications of Artificial Intelligence.

University of Maryland, College Park

POSTDOCTORAL RESEARCHER

College Park, USA

August 2020 - present

- Developing a **goal-biased learning agenda** for temporal goal networks in dynamic environments in which hierarchical planning and reinforcement learning are combined online, using a hierarchical goal network formalism.

University of Maryland, College Park

DOCTORAL RESEARCH, ADVISOR: PROF. DANA NAU

College Park, USA

August 2015 - July 2020

- Developed **acting and online planning algorithms** for dynamic environments in which both planning (coming up with a strategy to accomplish a task) and acting (carrying out actions in the real world) use the same hierarchical operational models. This has several benefits wrt consistency verification of the different models and closed loop online decision making.
- **Integrated machine learning** with online acting and planning to learn: (a) the optimal operational model to accomplish a task; (b) a domain independent heuristic for our hierarchical operational models, using multi-layered perceptrons.
- Currently working in a research collaboration with the **Naval Research Labs** to use our refinement acting engine and online planner to defend software defined networks against incoming attacks.
- Graduate courses taken: Computational Linguistics, Computer Processing of Pictorial Information, Computational Geometry, Advanced Numerical Optimization, Theory of Quantum Information Processing, Quantum Algorithms, Logic and AI, Machine Learning.

Fondazione Bruno Kessler (FBK-ICT)

RESEARCH INTERN (TWICE), ADVISOR: DR. PAOLO TRAVERSO

Trento, Italy

June - August 2017, June - August 2018

- Designed and implemented the algorithms RAE (Refinement Acting Engine) and RAEplan. Developed four simulated test domains to evaluate the performance of RAE and RAEplan in terms of three newly designed metrics: efficiency, retry ratio and success ratio.

Indian Institute of Technology, Kharagpur

MASTER'S THESIS, ADVISOR: PROF. P. P. CHAKRABARTI

Kharagpur, India

May 2013 - May 2014

- Developed efficient anytime algorithms for multi-objective optimization which incrementally explores the state space with given contracts (intervals for reporting), works without restarting, and dynamically adapts for the next iteration.

Institute for Real-Time Computer Systems, TU-Munich

Munich, Germany

RESEARCH INTERN, ADVISOR: PROF. SAMARJIT CHAKRABORTY

May - July 2013

- Designed and implemented algorithms for co-design of controller and scheduler parameters for embedded systems with multiple control loops and a hierarchical scheduler, by calculating optimal delays in each control application.

Indian Institute of Technology, Kharagpur

Kharagpur, India

BACHELOR'S THESIS, ADVISOR: PROF. P. P. CHAKRABARTI

May 2012 - April 2013

- Developed an efficient anytime algorithm for heuristic search, called Anytime Contract Search, which outperformed the state-of-the-art algorithms for the sliding puzzle problem and travelling salesperson problem.

Indian Institute of Technology in collaboration with Xerox Research Labs

Kharagpur, India

RESEARCH INTERN, ADVISOR: PROF. SUDESHNA SARKAR

May-July 2011

- Developed an algorithm on motion analysis and behavior modeling from spatio-temporal data. The algorithm predicted daily, periodic, working day and weekend behavior of a person.

Software Engineering Experience

Programming Languages: Python, C/C++, C, Java, Ocaml, Ruby, Prolog

Software and Tools: pytorch, MATLAB, MS Office, Adobe Photoshop, Adobe Illustrator

Microsoft SOFTWARE ENGINEER

Hyderabad, India

- Worked in developing the 'Alarms & Clock' application (in C++) for Windows 10, in several features including alarms, comparing time in different locations, timer and stopwatch.

July 2014 - July 2015

Microsoft SOFTWARE TEST ENGINEER INTERN

Hyderabad, India

- Developed an Integration test Toolkit for Reader Application of Windows 8 using a Model-based approach.

May-July 2012

Teaching Experience

University of Maryland, College Park TEACHING ASSISTANT

College Park, USA

- In the courses Organization of Programming Languages, Discrete Structures, AI Planning, and Intro to AI.

Aug. 2015 - Dec. 2018

Indian Institute of Technology, Kharagpur TEACHING ASSISTANT

Kharagpur, India

- In the courses Software Engineering, and, Programming and Data Structure.

July 2013 - May 2014

Honors & Awards

2020	Received Best Student Paper Honorable Mention Award at ICAPS	USA
2019	Received the AAAI student travel scholarship	USA
2018	Got accepted for the French-American Doctoral Exchange Program (FADEX)	France
2018	Received the Goldhaber Travel Grant at University of Maryland	USA
2015, -16	University of Maryland Dean's Fellowship	USA
2013	DAAD-WISE (Working Internships in Science and Engineering) scholarship	Germany
2011, -12	Goralal Syngal Scholarship (for being one the best CGPA holders)	India
2009	Cleared IIT-Joint Entrance Examination with an All India Rank of 1264	India
2009	Cleared All India Entrance Examination (written & interview) for admission to Indian Statistical Institute	India
2007	Cleared Regional Mathematical Olympiad (RMO), attended Indian National Mathematical Olympiad (INMO) training camp at ISI Kolkata	India

Extracurricular Activity

Hackathons

August. 2011 - December. 2013

- First runner's up in HackU for building a web application, *Follower Circles* that creates labeled groups from Twitter followers.
- First runner's up in Anadigix contest (Analog and Digital Circuit Design) in Kshitij.
- Built a web application *MovieBuffs* in HackU (organized by Yahoo), which was judged to be one of the best apps.
- Qualified and participated in the finals of Overnite and Opensoft in Kshitij.

Dramatics

August 2009 - May 2014

- Acted and co-directed several Bengali productions, including *Paliye Berai* by Manoj Mitra, *Ashalin* and *Krishnogohobor* by Bratya Basu and *Tin Poishar Pala* by Ajitesh Bandhyopadhyay.

Creative writing and fine arts

1995 - present

- Won in several inter-school essay writing and arts competitions; and completed upto 5th year in fine arts (Rabindra Charukala Parishad) education from Kharagpur Academy of Fine Arts, India. Learned pottery at University of Maryland.