Sk Asif Iqbal

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Education	**Indian Association for the Cultivation of Science**, Kolkata, India	October 2020-Present
	Integrated BS-MS	Graduation: June 2025

Specialization: Computer Science
CGPA: 7.41/10.00

Publications

Sk Asif Iqbal, Mir Md Sajid Sarwar, Rajarshi Roy. *Explaining Unsolvability of Planning Problems in Cyber-Physical Systems.* [Long Paper]. In Proceedings of the 18th Innovations in Software Engineering Conference (ISEC '25), Article No. 14, pp. 1–11, 2024.
DOI: 10.1145/3717383.3717395

Madhusudan Ghosh, Payel Santra, **Sk Asif Iqbal**, Partha Basuchowdhuri. 2022 *Astro-mT5: Entity Extraction from Astrophysics Literature using mT5 Language Model.* [Short Paper]. In Proceedings of the first Workshop on Information Extraction from Scientific Publications, pages 100 - 104, Online Association for Computational Linguistics.
DOI: 10.18653/v1/2022.wiesp-1.12

Presentations

Explaining Unsolvability of Planning Problems in Cyber-Physical Systems. ISEC 2025.

Explaining Unsolvability of Planning Problems in Hybrid Systems. SAT+SMT School 2024, co-located with SAT 2024.

Automatic Benchmark Generation and Explanation by Relaxation. IACS Master's Research Evaluation May 2024.

Explaining Unsolvability of Planning Problems in Hybrid System using Component-wise Reachability Analysis. IACS Master's Research Evaluation Dec 2023.

Ongoing Work

Developing a framework for explaining the property violations in Real-Time Systems through causal analysis of traces.

Research Experience

IACS Verification Lab with Dr. Rajarshi Ray   Sep 2023-Present
Worked on *Explaining Unsolvability in Cyber-physical systems* as the lead researcher and first author.

- Analyzed unsolvable planning problems in systems modeled as Linear Hybrid Automata (LHA), where planning problems were formulated to intentionally lack a feasible solution, thereby representing scenarios that cannot occur over time.

- Developed a component-wise decomposition framework to analyze sequences of transitions (plans) within the LHA. Applied the bounded reachability checker (BACH tool) on these components to pinpoint states or transitions where execution fails providing explanations for unsolvability.

- Developed a C++ based benchmark generator for warehouse domains, capable of generating unsolvable instances by automatically assessing the dynamics and constraints of hybrid systems, including invariant and flow equations.

- Designed a relaxation process for constraints associated with transitions derived from component-wise reachability analysis. This process specifically relaxed the strict conditions imposed by the flow dynamics of the source location in these transitions.

- Evaluated the framework containing the component analysis and relaxation process on hybrid systems in domains such as warehouse automation and water level monitoring. Applied heuristics to optimize the analysis process, ensuring the analysis time remains reasonable despite the problem's exponential complexity at greater plan depths. Wrote the paper

IACS ML Lab for CS with Dr. Partha Basuchowdhuri   April 2022-Feb 2023
Worked on *Astro-mT5* and a *Document Classifier* model

- Preprocessed astrophysical datasets by converting JSON formats into text files, and optimizing Python scripts for data cleaning, parsing, and tokenization, which improved data quality and reduced processing time.

- Conducted experiments with transformer-based models, including Longformer and RoBERTa, to find the best-performing model for the NER sequence labeling task. Contributed to research documentation and illustrations.
- Contributed to developing a document classification model utilizing image texture features (24 attributes from GLCM) and spatial relations between text tokens, extracted via bounding box dimensions and Euclidean distances between token centroids.
- Preprocessed data for training by extracting text via OCR, tokenizing using BertTokenizer-Fast, and computing spatial features such as bounding box coordinates, then normalizing and transforming images with z-score normalization.

Grad Course Projects	

COM 5202 Compiler Construction with Prof. Goutam Biswas   Spring 2024
- Developed a recursive descent parser in C for an LL(1) grammar, using flex for lexical analysis and integrating syntax checks with computed First and Follow sets.
- Implemented a symbol table as a linked list for context analysis, handling variable declarations, type assignment, and initialization checks with error handling.
- Implemented error-handling strategies to detect and report multiple syntax and semantic errors without halting the analysis.

COM 5103 Advanced ML with Dr. Debarshi Kumar Sanyal   Fall 2023
- Implemented a deep learning classifier using PyTorch for hand sign recognition (digits 0-5), incorporating regularization techniques like L2-norm penalty, early stopping, data augmentation, and dropout, with three dense layers using ReLU activation.
- Experimented with optimization methods, including Gradient Descent, SGD, AdaGrad, Adam, and Batch Normalization, evaluating model performance through accuracy metrics and visualizing loss and validation accuracy per epoch.

Work Experience	

Cloud Service Provider Startup Initiative   July 2022-Present
Self-Initiated Project with Peers.
- Collaborated with a team to design and develop the initial infrastructure for a cloud service provider platform.
- Set up and managed OpenStack and MinIO services on CentOS, creating cloud storage solutions.
- Worked with various block storage and object storage systems to configure distributed, fault-tolerant environments.

Game Development Startup Initiative   Nov 2022-Sep 2023
Self-Initiated Project with Peers.
- Collaborated with peers to prototype and develop a game focused on immersive story-driven gameplay, single-player with modern graphics.
- Implemented game mechanics, including character movement, collision detection, and AI-based enemy behaviors using Unreal Engine.

Workshops and Schools		
	Attended ISEC 2026	Feb 2025
	Attended IndoML 2024	December 2024
	Attended SAT+SMT School 2024	August 2024
	Attended and volunteered at the Recent Trends in Algorithms(RTA) 2024	June 2024

Awards and Achievements		
	Secured Rank 1 in WIESP 2022 Shared Task for achieving the highest F1 score with Astro-mT5	2022
	Achieved a Top 10 position in Datathon@IndoML	2022

References	**Dr. Rajarshi Ray**

Dr. Rajarshi Ray
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Dr. Partha Basuchowdhuri
Associate Professor of Computer Science at Indian Association for the Cultivation of Science
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