# Ayaan Bedi

**Ayaan Bedi**
Marseille, France | +33 0780879076 | ayaanbedi.lis@gmail.com | https://bediayaan.github.io/

**Key Interests:** Automata Theory, Logic, Games, Verification, Language Theory, Finite Model Theory.

## Summary

I'm an alumnus of the Chennai Mathematical Institute, focused on models of computation and their interplay with logic, verification and language theory. Recent work includes projects on history-determinism in pushdown automata, Multi-Context-Free Grammar (MCFG) characterisations and concurrent stochastic games.

## Education

### Chennai Mathematical Institute / Masters of Science (M.Sc.), Computer Science
Aug 2024 - July 2026, Chennai, India

- Current CGPA: 10/10
- Relevant Courses: Theory of Computation, Logic, Games on Graphs, Software Verification, Weighted Automata.

### Krea University / Bachelor of Science (B.Sc Hons.), Computer Science (minor in Mathematics)
Jul 2021 - Jun 2024, Sricity, India

- CGPA: 9.49/10
- Awarded Excellence in Computer Science (Top of the Batch)
- Relevant Courses: Advanced Functional Programming, Complexity Theory, Models of Computation.

## Experience

### Institute of Science and Technology Austria / Research Intern
May 2026 - July 2026, Vienna, Austria

Stochastic Games with Constraint Optimisation (MCFL) | Advisor: Thomas A Henzinger.

- Looked into a new setting of 2-player concurrent stochastic games and models it subsumes

### Chennai Mathematical Institute / Masters' Thesis
March 2025 - May 2026, Chennai, India

Multi-Context Free Languages (MCFL) | Advisor: Prof. C. Aiswarya (CMI).

- Developed a Double Greibach Normal Form (DGNF) for MCFGs with formal termination/correctness proofs.
- Proposed a logical framework capturing MCFL expressiveness; mapped key closure and decidability properties.

### Aix Marseille University / Research Intern
May 2025 - July 2025 , Marseille, France

Explorability in Pushdown Automata | Under: Karoliina Lehtinen

- Studied *explorability*, a measure of nondeterminism that generalizes history-determinism, in Pushdown Automata.
- Established a hierarchy of explorable Pushdown Automata, introduced a parameterized notion of explorability, and got expressiveness and succinctness results.
- Published at FSTTCS2025

### IIT Delhi / Research Intern
May 2024 - July 2024, Delhi, India

Algebraic Complexity Theory | Under: Nikhil Balaji.

- Studied algebraic complexity theory and complexity classes such as Valiant's P (VP) and Valiant's NP (VNP).
- Focused on exploring classes analogous to VNP. In particular, defining something on the "co" side.
- Formulated a class CoVNP (dropping VNP's degree bound) and found a complete polynomial for it.

### Krea University / Bachelors' Thesis
Oct 2023 - May 2024, Sricity, India

Word problem in Right-Angled Artin-Tits Groups: Formal Verification | Under: Turaga Prathamesh

- Worked on the Isabelle to formalize Right-Angled Artin-Tits Groups and verify proofs of the Word Problem.
- Implement the algorithm by John Crisp, Eddy Godelle, and Bert Wiest in a functional framework.
- Used Isabelle to prove the correctness of the algorithm.

## Publications

### FSTTCS 2025 / Explorability in Pushdown Automata
December 2025

- Co-authored by Karoliina Lehtinen
- https://drops.dagstuhl.de/entities/document/10.4230/LIPIcs.FSTTCS.2025.12

## Teaching Assistance

**Theory of Computation** / Chennai Mathematical Institute
August 2025 - December 2025, Chennai, India

- Taught by Prof. C. Aiswarya.

**Design And Analysis of Algorithms** / NPTEL
August 2025 - Present, Online

- Taught by Prof. Madhavan Mukund

**Special Support Teacher** / Krea University
September 2023- May 2024

- Provided academic support to students from freshman years with diverse needs, such as visual impairments, dyscalculia and dyslexia.
- Taught Subjects like Mathematical Reasoning, ICT, and Algorithms.

## Social Work

**Boys Town Project** / Teaching Intern
July 2023 - October 2023, Gummidipoondi, Tamil Nadu, India

- Led an English and Mathematics teaching program at an underprivileged boys orphanage called 'Boys Town'
- Established a strong rapport with 60 boys aged 12-17, creating an engaging and supportive learning environment
- Designed interactive English/Mathematics lessons, tailored to the boys' skill levels and individual needs, contributing to their language proficiency and self-confidence

**Innayat** / NGO
May 2018-July 2022, Jaipur, Rajasthan, India
Student-led NGO, tackling problems like menstrual health and improving quality of life in underdeveloped sectors

- Founded an NGO to address social issues of women's sanitary health, animal awareness/welfare and blood shortage
- Led a team of 65 volunteers from more than 10 schools, to crowd fund and distribute 12,000 sanitary pads
- Collaborated with 5 hospitals to conduct blood donation and sanitary pads distribution drives

## Talks / Seminars

**BITS Goa** / Explorability in Pushdown Automata
December 2025

**Krea University** / Pushdown Systems and the effect of Nondeterminism
December 2025

**Chennai Mathematical Institute** / Logic for Multiple Context Free Languages
September 2025

**Chennai Mathematical Institute** / Explorability in Pushdown Automata
September 2025

## Leadership

**Chairperson** / Student Government, Krea University
Sep 2023 - May 2023

**Representative** / Computer Science Club, Krea University
Sep 2022 - May 2023

**Cultural Head** / Student Government, Krea University
Sep 2023 - May 2023