

# RUPANSHU SOI

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## EDUCATION

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**Birla Institute of Technology and Science, Pilani**  
*Bachelor of Engineering in Computer Science*

*2018–2022*  
**CGPA: 8.99**

## RESEARCH EXPERIENCE

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**Exploring LLVM using Software Engineering Techniques**  
*MITACS Globalink Research Intern*

*Summer 2021*

- Explored the feasibility of using the Anaximander approach, a technique for microservice exploration, to understand a compiler’s architecture.
- Developed modular probes to extract information about LLVM’s internal architecture, and techniques to recursively compose this information to construct *maps* about LLVM.
- Advised by [Prof. Sébastien Mosser](#) and [Prof. Jean Privat](#).

**Dynamic Analysis for Index Launches**

*Fall 2020–Spring 2021*

- Implemented a dynamic program analysis in the Regent compiler. [[PRs](#)]
- Greatly increased the scope of the index launch optimization by providing safety guarantees in cases unsuceptible to static analysis.
- Advised by [Dr. Elliott Slaughter](#). Collaborated with [Legion](#) contributors.

**Development of an Implicitly Parallel Meshfree Solver in Regent**

*Spring 2020*

- Wrote a high-performance CFD solver in Regent’s implicitly parallel programming model. [[Code](#)]
- Achieved higher performance than corresponding Fortran and Julia implementations.
- Advised by [Dr. Anil Nemili](#).

## REFEREED PUBLICATIONS

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**R. Soi**, M. Bauer, S. Treichler, M. Papadakis, W. Lee, P. McCormick, A. Aiken, E. Slaughter.  
Index Launches: Scalable, Flexible Representation of Parallel Task Groups. [[Abstract](#)][[Paper](#)][[Slides](#)]  
In *Supercomputing (SC21)*, November 2021, to appear.

**R. Soi**, N. R. Mamidi, E. Slaughter, K. Prasun, A. Nemili, S. M. Deshpande.  
An Implicitly Parallel Meshfree Solver in Regent. [[Abstract](#)][[Paper](#)][[Slides](#)]  
In *Parallel Applications Workshop: Alternatives to MPI+X (PAW-ATM)*, November 2020.  
In conjunction with *Supercomputing (SC20)*.

## SUMMER SCHOOLS

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**Programming Language Implementation Summer School (PLISS)**

*Summer 2021*

**Programming Language Analysis and Optimizations**

*Hosted online by IIT Hyderabad*

*Summer 2021*

## SELECTED PROJECTS

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**Open-Source Contributions to the Regent Compiler**

*2020–2021*

- Added the `__import_cross_product` and `__future` keywords, support for some bitwise operators, and reported several bugs. [[PRs](#)][[Bug Reports](#)]

**Misty: A Scheme Interpreter in Lua**

*Spring 2021*

- Implemented lexical scoping, HOFs, and tail-call optimization. [[Code](#)]

**Selective Repeat Inspired File Transfer Protocol in Racket** *Spring 2021*

- Built reliability against packet loss, corruption, reordering, and delays over UDP sockets. [\[Code\]](#)

**Runi: Handwritten Lexer and Parser in Go** *Spring 2021*

- Wrote a CFG, lexer, and predictive recursive descent parser for a C-like language. [\[Code\]](#)
- Visualized the parse tree using Graphviz.

## TEACHING ASSISTANTSHIPS

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**Theory of Computation** *Fall 2021*

**Operating Systems** *Spring 2021*

**Differential Equations (Math III)** *Fall 2020*

**Mechanics, Oscillations and Waves (Physics I)** *Spring, Fall 2019*

## SCHOLASTIC ACHIEVEMENTS

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**MITACS Globalink Research Internship** *Summer 2021*

- A competitive 12-week undergraduate research internship in Canada. [\[Website\]](#)

**10/10 Semester GPA** *Fall 2018*

- Top 5 in 1100 students.

**BITS Pilani Merit Scholarship** *Spring, Fall 2019*

- Top 1-3% of the batch.

**Sir CV Raman Prize** *Spring 2019*

- Awarded to the top performer in Physics I.

## PROGRAMMING SKILLS

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<b>Languages</b>	C, Python, Lua, Go, Racket, <a href="#">Regent</a>
<b>Systems</b>	LLVM, Flex, Bison, Linux, MERN stack, $\text{\LaTeX}$

## LEADERSHIP & MANAGEMENT EXPERIENCE

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**Joint Secretary, Ad Astra (Astronomy and Science Club)** *Fall 2019–Spring 2020*

- Managed and organized club activities including discussions, talks, quizzes and star-gazing sessions.
- Responsible for club events during our annual technical fest, ATMOS.