SOURADIP GHOSH

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EDUCATION

Carnegie Mellon University — Pittsburgh, PA
Ph.D in Computer Science — Aug '21 – Present
Advisors: Brandon Lucia and Nathan Beckmann

Northwestern University — Evanston, IL
B.A. in Computer Science — Sep '17 – Jun '21
Advisors: Peter Dinda and Simone Campanoni

HONORS AND AWARDS

Department of Energy Computational Science Graduate Fellowship (DOE CSGF) — Sep '21 – Present
NSF REU Fellowship, Northwestern University — Jun '19 – Aug '21
Outstanding Senior in CS, Weinberg School of Arts and Sciences — Jun '21
Outstanding Undergraduate Researcher – Honorable Mention, CRA — Dec '20

PUBLICATIONS

1. **NUPEA: Optimizing Critical Loads on Spatial Dataflow Architectures via Non-Uniform Processing-Element Access** — ISCA '25
   Souradip Ghosh, Graham Gobieski, Tom Jackson, Keyi Zhang, Brandon Lucia, Nathan Beckmann, Tony Nowatzki.
2. **The TYR Dataflow Architecture: Improving Locality by Taming Parallelism** — MICRO '24
   Nikhil Agarwal, Mitchell Fream, **Souradip Ghosh,** Brian C. Schwedock, Nathan Beckmann.
3. **UDIR: Towards a Unified Compiler Framework for Reconfigurable Dataflow Architectures** — CAL '24
   Nikhil Agarwal, Mitchell Fream, **Souradip Ghosh,** Brian C. Schwedock, Nathan Beckmann.
4. **Pipestitch: An Energy-Minimal Dataflow Architecture With Lightweight Threads** — MICRO '23
   Nathan Serafin, **Souradip Ghosh,** Harsh Desai, Nathan Beckmann, Brandon Lucia.
5. **UDIR: Towards a Unified Compiler Framework for Reconfigurable Dataflow Architectures** — WDDSA '23
   Nikhil Agarwal, Mitchell Fream, **Souradip Ghosh,** Brian C. Schwedock, Nathan Beckmann.
6. **RipTide: A Programmable, Energy-Minimal Dataflow Compiler and Architecture** — MICRO '22
   Graham Gobieski, **Souradip Ghosh,** Marijn Heule, Todd C. Mowry, Tony Nowatzki, Nathan Beckmann, Brandon Lucia.
7. **FPVM: Towards a Floating Point Virtual Machine** — HPDC '22
   Peter Dinda, Nick Wanninger, Jiacheng Ma, Alex Bernat, Charles Bernat, **Souradip Ghosh,** Christopher Kraemer, Yehya Elmasry.
8. **WARio: Efficient Code Generation for Intermittent Computing** — PLDI '22
   Vito Kortbeek, **Souradip Ghosh,** Josiah Hester, Simone Campanoni, Przemysław Pawełczak.

9. **CARAT CAKE: Replacing Paging via Compiler/Kernel Cooperation** **ASPLOS '22**
   Brian Suchy, **Souradip Ghosh,** Drew Kersnar, Siyuan Chai, Zhen Huang, Aaron Nelson, Michael Cuevas, Gaurav Chaudhary, Alex Bernat, Nikos Hardavellas, Simone Campanoni, Peter Dinda.

10. **NOELLE Offers Empowering LLVM Extensions** **CGO '22**
    Angelo Matni, Enrico Armenio Deiana, Yian Su, Lukas Gross, **Souradip Ghosh,** Sotiris Apostolakis, Ziyang Xu, Zujun Tan, Ishita Chaturvedi, Brian Homerding, Tommy McMichen, David I. August, Simone Campanoni.

11. **Compiler-Based Timing For Extremely Fine-Grain Preemptive Parallelism** **SC '20**
    Souradip Ghosh, Michael Cuevas, Simone Campanoni, Peter Dinda.

TALKS AND POSTERS

1. **Ripple: Asynchronous Programming for Spatial Dataflow Architectures**
   DOE CSGF Program Review, July '24. Washington, D.C.

2. **Ripple: Asynchronous Programming for Energy-Minimal Edge Devices**
   DOE CSGF Program Review, July '23. Washington, D.C.

3. **RipTide: A Programmable, Energy-Minimal Dataflow Compiler and Architecture**
   SRC Artificial Intelligence and Hardware Annual Review, August '22. San Diego, CA.

4. **RipTide: A Programmable, Energy-Minimal Dataflow Compiler and Architecture**
   DOE CSGF Program Review, July '22. Arlington, VA.

5. **Compiler-Based Timing For Extremely Fine-Grain Preemptive Parallelism**
   SC, November '20. Virtual.

PROFESSIONAL EXPERIENCE

Graduate Research Assistant — Aug '21 – Present
Computer Science Department, Carnegie Mellon University — Pittsburgh, PA

- *Topic*: Post-von Neumann computer architectures.
- Designing and implementing spatial dataflow architectures and dataflow programming languages.

Research Intern — May '24 – Present
Efficient Computer Company — Pittsburgh, PA

- Architecting highly energy-efficient and general-purpose dataflow processors.

Visiting Researcher — Jun '23 – Sep '23
Pacific Northwest National Lab (PNNL) — Richland, WA

- Extended the SODA-OPT compiler and HLS toolchains for sparse tensor algebra workloads.
- Supervised by Antonino Tumeo.

Undergraduate Researcher — Jun '19 – Aug '21
Department of Computer Science, Northwestern University — Evanston, IL

- Built optimizing compilers co-designed with operating systems and embedded devices.
- Contributed to the Interweaving Project, Nautilus, Noelle, TimeSqueezer, and more.

Lead Software Developer, IT Manager Nov '18 – Sep '21
Karen Lynn + Associates Inc. Evanston, IL

Programming Aide Mar '21 – Jun '21
Office of Graduate Studies, Department of Computer Science, Northwestern University Evanston, IL

Front-End Web Developer Mar '19 – Sep '19
Lurie Medical Research Center Chicago, IL

Technical Computing Aide Mar '19 – Jun '19
IT Department, Kellogg School of Management, Northwestern University Evanston, IL

TEACHING EXPERIENCE

Graduate Teaching Assistant Spring '24
Department of Computer Science, Carnegie Mellon University Pittsburgh, PA

- 15-749 – Post-Von Neumann Computer Architectures

Student Instructor Winter '21
Department of Computer Science, Northwestern University Evanston, IL

- Student-led course – "Crash Course on UNIX and Systems Tools"

Peer Mentor Jan '20 – Present
Department of Computer Science, Northwestern University Evanston, IL

- CS 322 – Compiler Construction, Winter '21
- CS 323 – Code Analysis and Transformation, Fall '20
- CS 343 – Operating Systems, Winter '20

Academic Mentor – Project Excite Oct '17 – Jun '19
School of Education, Northwestern University | Evanston Township High School Evanston, IL

Private Tutor Jun '16 – Present
Greater Chicago and St. Louis Area