Ashutosh Pattnaik

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RESEARCH INTERESTS

GPU Architectures, CPU-GPU Architectures, Near-Data Computing, Machine Learning Architectures

EDUCATION

Pennsylvania State University, University Park, PA Fall 2013 - Present
Ph.D. Candidate in Computer Science and Engineering, Expected Graduation: August 2019
Advisor: Dr. Chita R. Das
Current GPA: 3.82/4.0

National Institute of Technology, Rourkela, India Fall 2009 - Spring 2013
Bachelor of Technology (Honors) in Electronics and Instrumentation Engineering,
GPA: 9.24/10.0 (Junior and Senior GPA: 9.77/10.0)

WORK EXPERIENCE

Pennsylvania State University, Research Assistant Fall 2013 - Present
High Performance Computing Lab (HPCL)

• Understanding research issues and opportunities involved in bringing near-data computing paradigm to GPUs and CPU-GPU systems and optimizing the compute placement for improved performance and energy efficiency.

• Improving the GPU datapath for improved execution of irregular applications and machine learning applications.

AMD Research, Co-Op Engineer May 2016 - August 2016
Mentors: Nuwan Jayasena, Yasuko Eckert *Manager: John Keaty* Sunnyvale, CA

• Researched on efficient interconnect topologies and data placement techniques for a 3D-stacked processing-in-memory enabled, multi-chip module based architecture.

AMD Research, Co-Op Engineer June 2015 - September 2015
Mentor: Joseph Greathouse *Manager: John Keaty* Austin, TX

• Developed methodology and micro-benchmarks to perform detailed characterization of the energy usage of different ISA instructions and data movement in AMD GPUs.

PUBLICATIONS

[**ISCA 2019**] **Ashutosh Pattnaik**, Xulong Tang, Onur Kayiran, Adwait Jog, Asit Mishra, Mahmut T. Kandemir, Anand Sivasubramaniam and Chita R. Das, "**Opportunistic Computing in GPU Architecture**", In the Proceedings of the 46th International Symposium on Computer Architecture, Phoenix, Arizona, June 2019. *Accepatance Rate ≈ 17%*

[**SIGMETRICS 2019**] Xulong Tang, **Ashutosh Pattnaik**, Onur Kayiran, Adwait Jog, Mahmut T. Kandemir and Chita R. Das, "**Quantifying Data Locality in Dynamic Parallelism in GPUs**", In the Proceedings of the ACM on Measurement and Analysis of Computing Systems, Phoenix, Arizona, June 2019. *Accepatance Rate ≈ 8%*

[**HPCA 2017**] Xulong Tang, **Ashutosh Pattnaik**, Huaipan Jiang, Onur Kayiran, Adwait Jog, Sreepathi Pai, Mohamed Ibrahim, Mahmut T. Kandemir and Chita R. Das, "**Controlled Kernel Launch for Dynamic Parallelism in GPUs**" In the Proceedings of the 23rd International Symposium on High Performance Computer Architecture, Austin, Texas, February 2017. *Accepatance Rate ≈ 22%*

[**PACT 2016**] **Ashutosh Pattnaik**, Xulong Tang, Adwait Jog, Onur Kayiran, Asit Mishra, Mahmut Kandemir, Onur Mutlu and Chita Das, "**Scheduling Techniques for GPU Architectures with Processing-In-Memory Capabilities**" In the Proceedings of the 25th Parallel Architecture and Compilation Techniques, Haifa, Israel, September 2016. *Accepatance Rate ≈ 22.3%*

[**PACT 2016**] Onur Kayiran, Adwait Jog, **Ashutosh Pattnaik**, Rachata Ausavarungnirun, Xulong Tang, Mahmut Kandemir, Gabriel Loh, Onur Mutlu and Chita Das, "**μC-States: Fine-grained GPU Datapath Power Management**" In the Proceedings of the 25th Parallel Architecture and Compilation Techniques, Haifa, Israel, September 2016. *Accepatance Rate* $\approx$ *22.3%*

[**IISWC 2016**] Vignesh Adhinarayanan, Indrani Paul, Joseph Greathouse, Wei N. Huang, **Ashutosh Pattnaik** and Wuchun Feng, "**Measuring and Modeling On-Chip Interconnect Power on Real Hardware**", In the Proceedings of IEEE International Symposium on Workload Characterization, Providence, Rhode Island, 2016. **(Best Paper Award)** . *Accepatance Rate* $\approx$ *30.4%*

[**SIGMETRICS 2016**] Adwait Jog, Onur Kayiran, **Ashutosh Pattnaik**, Mahmut Kandemir, Onur Mutlu, Ravi Iyer and Chita Das, "**Exploiting Core-Criticality for Enhanced Performance in GPUs**", In the Proceedings of the 42nd ACM International Conference on Measurement and Modeling of Computer Systems, Antibes Juan-les-Pins, France, June 2016. *Accepatance Rate* $\approx$ *13.4%*

[**MEMSYS 2015**] Adwait Jog, Onur Kayiran, Tuba Kesten, **Ashutosh Pattnaik**, Evgeny Bolotin, Nilardish Chatterjee, Steve Keckler, Mahmut Kandemir and Chita Das, "**Anatomy of GPU Memory System for Multi-Application Execution**", In the Proceedings of the 1st International Symposium on Memory Systems, Washington D.C., October 2015.

[**ICCCS 2012**] **Ashutosh Pattnaik**, Sharad Agarwal, Subhasis Chand, "**A New and Efficient Method for Removal of High Density Salt and Pepper Noise Through Cascade Decision based Filtering Algorithm**", In the Proceedings of the 2nd International Conference on Communication, Computing & Security, India, 2012.

TEACHING EXPERIENCE

Teaching Assistant, Penn State Spring 2014
CMPEN 431, Introduction to Computer Architecture

Teaching Assistant, Penn State Fall 2013
CMPEN 270, Digital Design: Theory and Practice

Guest Lecturer, Penn State
CSE 597: Advances and Applications in Deep Learning (Spring 2017)
CSE 532: Multiprocessor Architecture (Spring 2015)
CMPEN 431: Introduction to Computer Architecture (Fall 2017, Spring 2018)
CMPEN 331: Computer Organization And Design (Spring 2015)

TALKS

- Scheduling Techniques for GPU Architectures with Processing-In-Memory Capabilities
  PACT 2016, Haifa, Israel, September 2016
- μC-States: Fine-grained GPU Datapath Power Management
  PACT 2016, Haifa, Israel, September 2016
- Exploiting Core-Criticality for Enhanced Performance in GPUs
  SIGMETRICS 2016, Antibes Juan-les-Pins, France, June 2016
- A New and Efficient Method for Removal of High Density Salt and Pepper Noise Through Cascade Decision based Filtering Algorithm
  ICCCS 2012, India, October 2012

HONORS AND AWARDS

Best Paper Award:

- Measuring and Modeling On-Chip Interconnect Power on Real Hardware, IISWC 2016

Student Travel Grant:

- 2017: IEEE Travel Grant for HPCA, ACM SIGARCH Travel Grant for ISCA
- 2016: ACM SIGMETRICS Travel Grant, NSF Travel Grant for PACT
- 2015: ACM SIGARCH Travel Grant for ISCA

SERVICE AND MEMBERSHIPS

Submission/Web Chair, Workshop on General Purpose Processing Using GPU (GPGPU), Providence, RI, April 2019
Submission Chair, International Conference on Supercomputing (ICS), Turkey, June 2016
Reviewer:

- Transactions on Cloud Computing, IEEE
- Transactions on Parallel and Distributed Systems, IEEE
- Microprocessors and Microsystems: Embedded Hardware Design, Elsevier
- ETRI Journal, Wiley

On-Behalf Reviewer:

- 2019: HPCA, ISCA
- 2018: ASPLOS, HPCA, CF, TC
- 2017: MICRO, ASPLOS, TACO, IPDPS, NPC,
- 2016: ISCA, MICRO, ICCD
- 2015: PPOPP, HPCA, IGSC

Student Member:

- ACM, SIGARCH, SIGMETRICS
- IEEE, IEEE Computer Society

REFERENCES

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Penn State University
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