

# HUANSONG FU

**PhD student**

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## RESEARCH INTERESTS

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My works involve building and optimizing distributed computing systems, distributed in-memory storage, parallel programming models and communication runtime for HPC.

## EDUCATION

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<b>Florida State University</b> <i>Ph.D. candidate</i> in Computer Science	Aug. 2015 - Nov. 2018 (expected)
<b>Auburn University</b> <i>M.S.</i> in Computer Science (GPA: 3.91/4.0)	Aug. 2013 - Aug. 2015
<b>University of Electronic Science &amp; Technology of China</b> <i>B.S.</i> in Information Security (GPA: 3.7/4.0, ranking: 2 of 143)	Sep. 2007 - Jul. 2011

## RESEARCH PROJECTS

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- **High-performance Graph Processing using one-sided communication.** (Jan 2017 - present)  
By efficiently utilizing one-sided operations and mitigating the costly synchronization overheads due to imbalanced workload, we achieve 30% performance improvement compared to the state-of-the-art Gemini framework on 8 nodes.
- **High-performance Key-Value Store on OpenSHMEM and MPI.** (Apr 2016 - Jul 2017)  
Brings novel solutions to read/write races and cache management issues resulted from using one-sided operations in a distributed KV store, achieving at least an order of magnitude lower latency and higher throughput than Memcached.
- **MPI Runtime Optimization.** (May 2015 - Aug 2016)  
Explored various techniques to improve efficiency and scalability of MPI startup. The resulting software module speeds up the startup of Open MPI by an average of 32.0% and significantly reduce the memory consumption.
- **Fault-tolerance of Hadoop/YARN.** (Nov 2014 - May 2015)  
Revealed serious performance breakdown of Hadoop/YARN when dealing with node failures. Proposed and implemented a solution design that improved YARN's failure recovery speed by more than 80% for small (1GB) jobs and 30% for median (10GB) jobs.
- **Image processing in MapReduce.** (Feb 2014 - Aug 2014)  
Designed a new indexed file format for storing image data in HDFS and explored image processing capability on MapReduce framework (YARN).
- **Security Leaks in cloud.** (May 2014 - Oct 2014)  
Revealed the threat of covert channel exploits in RDMA interconnects. Implemented a prototype of RDMA covert channel which had a bit rate of 50 ~100 Kb/s.

- **Integrate Lustre with Hadoop.** (Aug 2013 - Dec 2013)

Mainly helped with experiments and results analysis.

## PUBLICATIONS

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### Refereed Journal Articles

1. **Huansong Fu**, Haiquan Chen, Yue Zhu and Weikuan Yu. “FARMS: Efficient MapReduce Speculation for Failure Recovery in Short Jobs.” *Journal of Parallel Computing (ParCo’16)*.

### Refereed Conference Publications

1. Yue Zhu, Fahim Chowdhury, **Huansong Fu**, Adam Moody, Kathryn Mohror, Kento Sato and Weikuan Yu. “Entropy-Aware I/O Pipelining for Large-Scale Deep Learning on HPC Systems.” 26th IEEE International Symposium on the Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS’18). Milwaukee, WI, Sep 2018.
2. **Huansong Fu**, Manjunath Gorentla Venkata, Shaeke Salman, Neena Imam and Weikuan Yu. “SHMEMGraph: Efficient and Balanced Graph Processing Using One-sided Communication.” 18th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (CCGrid’18). Washington, DC, May 2018. [20.8% acceptance rate]
3. **Huansong Fu**, Manjunath Gorentla Venkata, Ahana Choudhury, Neena Imam and Weikuan Yu. “High-Performance Key-Value Store On OpenSHMEM.” 17th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (CCGrid’17). Madrid, Spain, May 2017. [23% acceptance rate]
4. Yandong Wang, **Huansong Fu** and Weikuan Yu. “Cracking Down MapReduce Failure Amplification through Analytics Logging and Migration.” 29th IEEE International Parallel & Distributed Processing Symposium (IPDPS’15). Hyderabad, India. May 2015. [21.9% acceptance rate]

### Refereed Workshop Publications

1. **Huansong Fu**, Manjunath Gorentla Venkata, Neena Imam and Weikuan Yu. “Portable SHMEM-Cache: A High-Performance Key-Value store on OpenSHMEM and MPI.” Fourth Workshop on OpenSHMEM and Related Technologies(OpenSHMEM’17). Annapolis, Maryland. August 2017. Annapolis, Maryland. August 2017.
2. **Huansong Fu**, Swaroop Pophale, Manjunath Gorentla Venkata and Weikuan Yu. “DISP: Delayed Initialization for Scalable MPI Startup.” Communication Optimizations in HPC Workshop (COMHPC’16) in conjunction with the ACM/IEEE Supercomputing Conference (SC’16). Salt Lake City, UT. Nov 2016. [10-page, 30.4% acceptance rate]
3. **Huansong Fu**, Kunal SinghaRoy, Manjunath Gorentla Venkata, Yue Zhu and Weikuan Yu. “SHMemCache: Enabling Memcached on the OpenSHMEM Global Address Model.” Third workshop on OpenSHMEM and Related Technologies(OpenSHMEM’16). Baltimore, Maryland. August 2016.
4. **Huansong Fu**, Yue Zhu and Weikuan Yu. “A Case Study of MapReduce Speculation Mechanism for Failure Recovery.” International Workshop on Data-Intensive Scalable Computing Systems (DISCS) in conjunction with the ACM/IEEE Supercomputing Conference (SC’15). Austin, TX. Nov 2015.

## REVIEWER

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<i>INFOCOMM</i>	2018
IEEE International Conference on Computer Communications.	
<i>TPDS</i>	2018

IEEE Transactions on Parallel and Distributed Systems. <i>JPDC</i>	2018
Journal of Parallel and Distributed Computing. <i>Cluster</i>	2018
IEEE International Conference on Cluster Computing. <i>ICPADS</i>	2016
IEEE International Conference on Parallel and Distributed Systems.	

## PROFESSIONAL EXPERIENCE

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**Argonne National Laboratory** May 2018 - Aug. 2018  
*Research Intern* Lemont, IL

- Analysis and optimization of an OpenSHMEM runtime on MPI.

**Florida State University** Aug. 2015 - present  
*Research Assistant* Tallahassee, FL

- Several research projects on Hadoop, MPI and OpenSHMEM.
- Representative to the OpenSHMEM Standards Committee.

**Oak Ridge National Laboratory** May 2015 - Aug. 2015  
*Research Intern* Oak Ridge, TN

- Characterization and optimization of initialization cost of MPI collectives operations.

**Auburn University** Aug. 2013 - May 2015  
*Research Assistant* Auburn, AL

- A collection of research conducted on big data framework & applications, high speed interconnects and cloud security.

**iSoftStone** Mar. 2013 - Jul. 2013  
*Java Developer* Shanghai, China

- Part of a team that developed commercial car-renting system for Hertz.

**University of Miami** Aug. 2011 - May. 2012  
*Teaching Assistant* Coral Gables, FL

- Taught programming lab course and helped with other course work.

## SKILL PROFICIENCY

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- In-depth understanding in Hadoop, YARN, Spark, RDMA, OpenSHMEM, MPI.
- Proficient with Unix/Linux programming (C/C++, JAVA etc.)
- Over 5 years of experience working with HPC platforms.
- System management for a large-scale cluster environment.
- Good command of both written and spoken English.

## HONORS & AWARDS

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- Student volunteer at SuperComputing'17.
- Woltoz Fellowship at Auburn University in 2013-2015.

- People's Scholarship for bachelor students at UESTC in 2008-2010.
- Excellent Youth Volunteer at UESTC in 2009.
- Most Outstanding Student Leader at UESTC in 2008.

## **TEACHING EXPERIENCE**

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- "Introduction to Algorithms".
- "Basics of Programming Language".
- "Cryptography: Theory and Practice".

## **REFERENCES**

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**Available Upon Request.**