# Soroush Bateni

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## RESEARCH INTERESTS

**Cyber-Physical Systems**, in particular, autonomous systems such as self-driving vehicles.
**Real-Time Systems**, in particular, predictable GPGPU computing and deterministic models of execution.

## EDUCATION

**The University of Texas at Dallas** **Richardson, TX**
*PhD in Computer Science.* *Expected Graduation: June 2021*
GPA: 3.76/4.0

**The University of Texas at Dallas** **Richardson, TX**
*MS in Computer Science. Jonsson School Graduate Scholarship.* *Graduated: May 2018*
GPA: 3.76/4.0

## EXPERIENCE

**The University of Texas at Dallas** **Richardson, TX**
*Research Assistant* *May 2017 -*

- Published NeuOS, a timing-predictable DNN framework for autonomous embedded systems, designed to minimize energy consumption and maximize accuracy in USENIX ATC 2020.
- Published two papers in RTAS and RTSS in 2019 about data constraints and memory management in autonomous driving platforms.
- Published two first-author papers in RTSS 2018 about balancing energy, timing and accuracy of DNNs in autonomous driving platforms.
- Ongoing research on predictable, energy-efficient, and accurate computing in autonomous vehicles using Lingua Franca (repo.lf-lang.org).

**The University of California, Berkeley** **Berkeley, CA**
*Visiting Ph.D. Student Researcher* *Fall 2020, Summer 2021*

- Research on the semantics of Lingua Franca (LF), a synchronous programming language framework based on discrete time event models.
- Ported Autoware.auto 1.0, an open-source autonomous driving framework to LF.
- Continuing work on Federated Lingua Franca, a distributed variant of LF that can achieve a consistent global state across machines by default.
- Under the supervision of Prof. Edward A. Lee.

**Fujitsu Laboratories of America** **Richardson, TX**
*Research Intern* *Summer 2019*

- Developed a comprehensive prototype of an efficient distributed collective intelligence system for edge-connected autonomous vehicles.
- Used Java, C++, and CUDA, along with open source ROS and Autoware software to implement an interactive computing framework using the latest NVIDIA embedded platforms.

**Stanford University** **Remote**
*Stanford Crowd Research Collective* *Spring 2015*

- Worked with a large research group on Daemo, under the supervision of Prof. Michael Bernstein.

**Institute for Research in Fundamental Sciences (IPM)** **Tehran, Iran**
*Research Intern* *Summer 2013*

- Worked on parallel stereo vision for MEMOCODE 2013 (IPM won first place).

## SELECTED PUBLICATIONS

2021 Edward A. Lee, **Soroush Bateni**, Shaokai Lin, Marten Lohstroh, and Christian Menard. Quantifying and generalizing the cap theorem. *arXiv preprint arXiv:2109.07771*, 2021

2020 **Soroush Bateni** and Cong Liu. "NeuOS: A latency-predictable multi-dimensional optimization framework

for dnn-driven autonomous systems". *USENIX Annual Technical Conference (ATC)*

- **Soroush Bateni***, Zhendong Wang*, Yuankun Zhu, Yang Hu, and Cong Liu. "co-optimizing performance and memory footprint via integrated cpu/gpu memory management, an implementation on autonomous driving platform". *IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS)*. *Equal Contribution.

2019 **Soroush Bateni** and Cong Liu. "predictable data-driven resource management: an implementation using autoware on autonomous platforms". *Real-Time Systems Symposium (RTSS)*. To appear.

2018 **Soroush Bateni**, Husheng Zhou, and Cong Liu. "predjoule: A timing-predictable energy optimization framework for deep neural networks". *Real-Time Systems Symposium (RTSS)*

- **Soroush Bateni** and Cong Liu. "apnet: Approximation-aware real-time neural network". *Real-Time Systems Symposium (RTSS)*
- Husheng Zhou, **Soroush Bateni**, and Cong Liu. "$s^3dnn$: Supervised streaming and scheduling for gpu-accelerated real-time dnn workloads". *IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS)*. Best Paper Award
- Zheng Dong, Cong Liu, **Soroush Bateni**, Zelun Kong, Liang He, Lingming Zhang, Ravi Prakash, and Yuqun Zhang. "A general analysis framework for soft real-time tasks". *Transactions on Parallel and Distributed Systems*
- Husheng Zhou, **Soroush Bateni**, and Cong Liu. "gru: Exploring computation and data redundancy via partial gpu computing result reuse". *ACM International Conference on Supercomputing (ICS)*
- Zheng Dong, Cong Liu, **Soroush Bateni**, Kuan-Hsun Chen, Jian-Jia Chen, Georg von der Brüggen, and Junjie Shi. "shared-resource-centric limited preemptive scheduling: A comprehensive study of suspension-based partitioning approaches". *IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS)*

2016 Javad Salimi Sartakhti, Mohammad Hossein Manshaei, **Soroush Bateni**, and Marco Archetti. "evolutionary dynamics of tumor-stroma interactions in multiple myeloma". *PLOS ONE*, 11:1–17

## LECTURES

**Operating Systems Concepts** — **UT Dallas**
*Sole Instructor* — *Undergraduate Course - Summer 2018*

**General Purpose GPU Computing** — **UT Dallas**
*GPU/CUDA programming - Co-Instructor* — *Graduate Course - Spring 2018*

**Parallel Processing** — **Isfahan University of Technology**
*GPU/CUDA programming - Co-Instructor* — *Graduate Course*

**Medical Image and Signal Processing Research Center** — **Isfahan University of Medical Sciences**
*GPU/CUDA programming - Sole Instructor*

## Skills

**Programming Languages**
*CUDA_C, C, C++, C#, Java, Python*

**Open-Source Contributions**
*lflang/Lingua-Franca, NeuOS*

**Relevant System Experiences:**
*Researched on GPU Drivers (NOUVEAU + GDev), embedded Linux, LITMUS $^{RT}$ (Real-Time OS)*

**Autonomous Vehicle and Embedded System Frameworks:**
*ROS (Robot Operating System), Autoware, and Lingua Franca.*

**Neural Network Frameworks**
*Caffe (CaffeNet, AlexNet, ResNet, GoogleNet, VGGNet), Darknet (YOLO), TensorFlow*

**Platforms**
*NVIDIA Drive PX2 Autochauffeur, Jetson AGX Xavier, Jetson TX2, DGPU*

**Miscellaneous**
*Proficient in English, love teamwork, and very passionate about research.*