

# SHASHI GOWDA

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With my software engineer hat on, I love to build well-rounded software that is simple, beautiful and fast. With my CS researcher hat on, I think about interpreters, compilers, program synthesis, symbolic computation, machine learning, and the coming together of these fields.

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## EDUCATION

2018-current

### **PhD Candidate in Computational Science and Engineering Massachusetts Institute of Technology, Cambridge, MA**

My thesis project, Symbolics.jl, is the basis for the next generation of programming abstraction in scientific simulation. Combining symbolic programming and partial evaluation, it allows scientists to make a “compiler” for every problem. Right now, 54 other projects with 217 second-degree dependents use Symbolics.jl ([source](#))

Advisor: [Prof. Alan Edelman](#) | [The Julia Lab](#)

2010-2014

### **B. Tech., Information Technology National Institute of Technology, Surathkal, India**

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## EXPERIENCE

2016-2018

### **Principal Software Engineer, Julia Computing Inc.**

Built *JuliaDB*—A distributed-memory analytical database competitive with Spark, pandas (+dask) (more details in our [PyData NYC 2017](#) presentation), and kdb. I built about 80% of the project working at every level, including indexed relational tables (*IndexedTables.jl*), text parser compiler (*TextParse.jl*), compression, distributed blob storage (*MemPool.jl*), parallel scheduling (*Dagger.jl*), distributed table operations and statistics (*JuliaDB.jl*). I also helped clients deploy JuliaDB in machine learning applications and achieve orders of magnitudes of speedups over systems it replaced.

2014-2016

### **Research Software Engineer, (Remote) CSAIL, MIT**

Developed a research distributed-memory array implementation and scheduler (*Dagger.jl*). Also developed DLs for pedagogical visualizations (*Interact.jl*) and functional-reactive dashboards (*Escher.jl*) which were used in the famous MIT 18.06 and other courses. Later distilled the core of these into a framework called WebIO, it allows creation of libraries of UI widgets that work in Jupyter, VS Code, and over a standalone web app, without requiring modification.

See [shashi.biz](http://shashi.biz) for a detailed software portfolio.

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## PUBLICATIONS

2021

### **High-performance symbolic-numerics via multiple dispatch**

S. Gowda, Y. Ma, A. Cheli, M. Gwóźdz, V.B. Shah, A. Edelman, C. Rackauckas.  
ACM Communications in Computer Algebra Vol. 55 ([dl.acm.org](https://dl.acm.org))

2021

### **ModelingToolkit: A Composable Graph Transformation System For Equation-Based Modeling**

Y. Ma, S. Gowda, R. Anantharaman, C. Laughman, V. Shah, C. Rackauckas.  
preprint [arXiv:2103.05244](https://arxiv.org/abs/2103.05244)

2019

### **Sparsity Programming: Automated Sparsity-Aware Optimizations in Differentiable Programming**

S. Gowda, Y. Ma, V. Churavy, A. Edelman, C. Rackauckas.  
NeurIPS Program Transformations for Machine Learning Workshop. ([pdf](#))

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TEACHING EXPERIENCE

*Spring 2019* Introduction to computational thinking (18.S191)  
*& Fall 2020*  
*Fall 2018* High-performance computing (18.337)

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## NOTABLE TALKS

2022 Strange Loop, St Louis. "Symbolic-numeric programming in Julia"  
2022 SciMLCon, Boston, MA "Symbolic arrays: past, present and future"  
2018 JuliaCon, London, UK "How JuliaDB works"  
NeurIPS, Workshop on Programming languages for ML, Vancouver  
2019 BC "Sparsity aware optimizations in differentiable programming"  
PyData NYC, NYC "JuliaDB: A data system for Julia (with Jeff  
2017 Bezanson and Josh Day)"  
2016 Microsoft, Bangalore "Keynote: A Functional Algebra of UIs"  
2015 JuliaCon, Boston, MA "Escher.jl-a new way to make and deploy UIs"

September 23, 2023