Aviral Goel

Phone: +1 (917) 443 0228
Date of Birth: February 25, 1991

aviral.io aviral@aviral.io aviralg aviralgoel 0000-0002-0814-5015

Expertise

Areas Programming Languages • Software Engineering • Compilers
Techniques Dynamic Analysis • Static Analysis

Software Skills

Languages R • C/C++ • Python • JavaScript • HTML • CSS • PHP
Tools Linux • Git • GitHub • Make • Emacs • Docker • Shell

Education

'17–'23 **Ph.D.**, Computer Science — *Advised by Dr. Jan Vitek*
Northeastern University, Boston, USA

'16–'17 **MS**, Computer Science — GPA–4.0/4.0
Northeastern University, Boston, USA

'08–'12 **BE**, Electronics and Communication Engineering — 81%–First Class with Distinction
Netaji Subhas Institute of Technology, New Delhi, India

Work Experience

Jan'17–Present **Ph.D. Candidate** at **Northeastern University**, *Boston, USA*

Designing a tool to insert strictness and type annotations in R packages.

Designed a tool to migrate the R language ecosystem from lazy to strict semantics with minimal impact on end-user code.

Performed large-scale studies of the use of laziness, meta-programming, eval, and first-class environments in the R ecosystem.

Studied the degree of polymorphism in end-user R code, designed a type language to introduce types to functions in R packages, and implemented a tool to type-check values at function boundaries through runtime contracts.

Designed an instrumentation framework for R to gather runtime information and a map-reduce style pipeline to analyze tera-bytes of runtime data from millions of lines of R code.

May–Aug'19 **Research Assistant** at **Oracle Austria GmbH**, *Linz, Austria*

Designed a Java framework to implement BLAS functions for different numeric types in the GraalVM compiler to enable high-level optimizations for numerical programs.

Feb–Dec'15 **Technology Manager** at **InStem**, *Bengaluru, India*

Implemented an algorithm in C++ for smooth rendering of neuronal networks in a 3D viewer.

Sep'13–Feb'15 **Programmer** at **National Center for Biological Sciences**, *Bengaluru, India*

Designed a 3D viewer for neuronal networks using OpenSceneGraph, Qt, Python, and C++ to visualize electrical activity from simulations of neuron models.

July'12–Aug'13 **Software Engineer** at **Yahoo!**, *Bengaluru, India*

Extracted usage metrics for the Yahoo! Toolbar from raw data using Hadoop and Pig Latin and designed a dashboard in PHP, Javascript, HTML, and CSS to display them.

Jun–July'10 **Intern** at **Siemens Limited**, *New Delhi, India*

Implemented a tool in C++ for managing and reporting differences in software versions across a grid of computers used in a power plant.

Teaching Experience

Fall'18 **CS7400: Intensive Principles of Programming Languages**
Ph.D. Teaching Assistant at Northeastern University

Fall'17 **CS6240: Parallel Data Processing in Map Reduce**
M.S. Teaching Assistant at Northeastern University

Spring'17 **DS5110: Introduction to Data Management and Processing**
M.S. Teaching Assistant at Northeastern University

Summer'16 **CS4800: Algorithms and Data**
B.S. Teaching Assistant at Northeastern University

Publications

OOPSLA'21 **Promises Are Made to Be Broken**
Chicago • USA Aviral Goel, Jan Ječmen, Sebastián Krynski, Olivier Flückiger, Jan Vitek
10.1145/3485478 10.5281/zenodo.5394235

OOPSLA'21 **What We Eval in the Shadows**
Chicago • USA Aviral Goel, Pierre Donat-Bouillud, Filip Křikava, Christoph M. Kirsch, Jan Vitek
10.1145/3485502 10.5281/zenodo.5415230

DLS'21 **First-Class Environments in R**
Chicago • USA Aviral Goel, Jan Vitek
10.1145/3486602.3486768

OOPSLA'20 **Designing Types for R, Empirically**
Virtual Alexi Turcotte, Aviral Goel, Filip Křikava, Jan Vitek
10.1145/3428249 10.5281/zenodo.4037278

OOPSLA'19 **On The Design, Implementation, and Use of Laziness in R**
Athens • Greece Aviral Goel, Jan Vitek
10.1145/3360579 10.5281/zenodo.3369573

POPL'18 **Correctness of Speculative Optimizations with Dynamic Deoptimization**
California • USA Olivier Flückiger, Gabriel Scherer, Ming-Ho Yee, Aviral Goel, Amal Ahmed, Jan Vitek
10.1145/3158137

Conference Talks

OOPSLA'21 **Promises Are Made to Be Broken**
https://youtu.be/8L_a7mhYdyM

OOPSLA'21 **What We Eval in the Shadows**
https://youtu.be/aEPd8ijSHuI

DLS'21 **First-Class Environments in R**

ICOOOLPS'21 **Non-Intrusive Migration from Lazy to Eager Evaluation**

PL DAY'19 **On The Design, Implementation, and Use of Laziness in R**

OOPSLA'19 **On The Design, Implementation, and Use of Laziness in R**
https://youtu.be/qLxz9HPP6wI

META'19 **Meta-Programming in Data Science** Keynote

RIOT'19 **RDT: A Dynamic Tracing Framework for R**

Invited Talks

2022 **Data-Driven Language Ecosystem Migration**
IIT Delhi, India

2022 **Non-Intrusive Migration from Lazy to Eager Evaluation**
University of California Santa Cruz, USA

2021 **Non-Intrusive Migration from Lazy to Eager Evaluation**
RStudio, USA

2021 **On The Design, Implementation, and Use of Laziness in R**
Tufts University, USA
University of California Santa Cruz, USA

2020 **On The Design, Implementation, and Use of Laziness in R**
Harvard University, USA
Carnegie Mellon University, USA
Cornell University, USA
University of California San Diego, USA
Princeton University, USA
University of California Riverside, USA
Purdue University, USA
National University of Singapore, Singapore
University of Washington, USA
University of Colorado Boulder, USA
Northwestern University, USA
University of Maryland, USA
University of Utah, USA
University of Wisconsin-Madison, USA
Rutgers University, USA
University of Pennsylvania, USA
University of Kent, UK

Service

SCP'21 Reviewer
REBASE'21 Co-Chair
SPLASH'21 PLTea Chair
ICFP'21 PLTea Organizer
PLTea Organizer
REBASE'20 Co-Chair
OOPSLA'20 Artifact Evaluation Committee and Session Chair
REBASE'19 Session Chair
SPLASH'19 Web Chair
SPLASH'18 Web Chair

Awards

OOPSLA'20 Distinguished Artifact Reviewer

Languages

Hindi Native/Bilingual Proficiency
English Full Professional Proficiency