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divyeshunadkat  
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# Divyesh Unadkat

## Education

- Ph.D.* **Computer Science and Engineering**, *Indian Institute of Technology Bombay (IITB)*, Mumbai. **2023**  
CPI: 9.48/10
- B.E.* **Computer Engineering**, *Dharmsinh Desai University (DDU)*, Nadiad. **2006–2010**  
Aggregate: 80.12 %

## Ph.D. Thesis

**Title:** *Techniques for Precise and Scalable Verification of Array Programs*  
**Supervisors:** Prof. Supratik Chakraborty , Prof. Ashutosh Kumar Gupta  
**Institution:** IIT Bombay, India  
**Area:** Formal Methods and Software Verification

## Experience

**Scientist/Senior Software Engineer**, *TCS Research*, Pune. **Jun'21–Present**  
**Researcher/Software Engineer**, *TCS Research*, Pune. **Jun'10–May'21**  
**Software Engineering Intern**, *TCS Research*, Pune. **Dec'09–Apr'10**

## Technical Skills

**Programming:** C++, C, Java, Python, LaTeX  
**Compilers:** LLVM, Clang, GNU Tool Chain (GCC, GDB, Make)  
**Research Tools:** Z3, CBMC, Daikon, CPAChecker, InvGen  
**Development Tools:** Emacs, Vim, Eclipse  
**Version Control:** Git, CVS

## Tools/Artifacts

- Diffy* Generalized Inductive Reasoning for Arrays. Published in CAV 2021 [3]. [figshare repository](#).
- Vajra* Full-Program Induction. Published in TACAS 2020 [4, 5], STTT 2022 [2]. [figshare repository](#).
- Tiler* Verifying Array Programs by Tiling. Published in SAS 2017 [6]. [code repository](#).
- DIV* Dynamic Inference Verifier. Internal Tool, TCS Research. Published in HVC 2013 [8].
- ScaleM* Scaling Model Checking with Abstractions Inferred using Dynamic Analysis. Internal Tool, TCS Research. Published in ICST 2013 [7].
- AutoGen* Automatic Test-case Generation using Model Checking. Internal Tool, TCS Research.

## Awards

**Team Award (Recurring):** Best Verification Tool

**Institution:** International Software Verification Competition (SV-COMP)

**Description:** Designed verification techniques based on induction for programs in the Arrays sub-category and implemented them in the tools DIFFY [3], VAJRA [4, 2] and TILER [6]. As a team member, I re-purposed these tools and integrated them within the VERIABS tool. VERIABS [5] stood first in the ReachSafety category at SV-COMP in 2020, 2021 and 2022. My work got a mention on IITB page. Refer [5] and [1] for details.

**Individual Award:** Most Admired Sprint Thesis Talk

**Institution:** Indian Institute of Technology Bombay, Mumbai

**Description:** Runner-up, Senior Researcher Sprint Talks, RISC 2017, IIT Bombay.

**Individual Award:** Best Speaker in Sprint Thesis Talk

**Institution:** Indian Institute of Technology Bombay, Mumbai

**Description:** Winner, Early Researcher Sprint Talks, RISC 2016, IIT Bombay.

**Individual Award:** Eklavya Gold Medal

**Institution:** Dharmsinh Desai University, Nadiad

**Description:** Highest aggregate in first four semesters of computer engineering at DDU.

## Publications

- [1] Divyesh Unadkat. Techniques for Precise and Scalable Verification of Array Programs. *Doctoral Dissertation, IIT Bombay*, December 2022.
- [2] Supartik Chakraborty, Ashutosh Gupta, and Divyesh Unadkat. Full-Program Induction: Verifying Array Programs sans Loop Invariants. In *International Journal on Software Tools for Technology Transfer (STTT)*, September 2022.
- [3] Supartik Chakraborty, Ashutosh Gupta, and Divyesh Unadkat. Diffy: Inductive Reasoning of Array Programs using Difference Invariants. In *Proc. of the 33rd International Conference on Computer-Aided Verification (CAV)*, pages 911–935, 2021.
- [4] Supartik Chakraborty, Ashutosh Gupta, and Divyesh Unadkat. Verifying Array Manipulating Programs with Full-Program Induction. In *Proc. of the 26th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*, pages 22–39, 2020.
- [5] Mohammad Afzal et. al. VeriAbs : Verification by Abstraction and Test Generation (Competition Contribution). In *Proc. of the 26th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*, pages 383–387, 2020.
- [6] Supratik Chakraborty, Ashutosh Gupta, and Divyesh Unadkat. Verifying Array Manipulating Programs by Tiling. In *Proc. of the 24th International Static Analysis Symposium (SAS)*, pages 428–449, 2017.
- [7] Anand Yeolekar et. al. Scaling Model Checking for Test Generation using Dynamic Inference. In *Proc. of the 6th International Conference on Software Testing, Verification and Validation (ICST)*, pages 184–191, 2013.
- [8] Anand Yeolekar and Divyesh Unadkat. Assertion Checking using Dynamic Inference. In *Proc. of the 9th Haifa Verification Conference (HVC)*, pages 199–213, 2013.

## Conference Presentations

**Diffy: Verifying Array Programs using Difference Invariants:** 33rd International Conference on Computer Aided Verification (CAV), Los Angeles, USA (*Online*), July 2021

**Verifying Array Manipulating Programs with Full-Program Induction:** 26th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), Luxembourg (*Online*), March 2021

**Verifying Array Manipulating Programs by Tiling:** 24th International Static Analysis Symposium, SAS, New York, USA, August 2017

**Assertion Checking using Dynamic Inference:** 9th Haifa Verification Conference, Haifa, Israel, November 2013

## Invited Talks

**Dance of the Dragons: Induction, Difference Computation and SMT Solving:** Formal Methods Update Meeting, IIT Delhi, July 2022

**Difference Invariants for Inductive Verification:** 6th Indian SAT+SMT School (*Online*), December 2021

**Exploiting Induction and Difference Computation to Verify Array Programs:** Formal Methods Update Meeting (*Online*), July 2021

**The Full-Program Induction Technique:** 5th Indian SAT+SMT School, IIT Hyderabad (*Online*), December 2020

**Verifying Array Manipulating Programs with Full-Program Induction:** Software Engineering Research India (SERI), IIIT Hyderabad (*Online*), July 2020

**Lightening Talk: Verifying Array Manipulating Programs by Tiling:** 2nd Indian SAT+SMT School, Infosys Campus, Mysuru, December 2017

## Competition Talks

**Verifying Array Manipulating Programs by Full-Program Induction:** Research and Innovation Symposium in Computing, RISC 2019, IIT Bombay

**Verifying Array Manipulating Programs by Tiling:** Sprint Thesis Talk, Research and Innovation Symposium in Computing, RISC 2017, IIT Bombay

**Towards Precise Software Verification:** Sprint Thesis Talk, Research and Innovation Symposium in Computing, RISC 2016, IIT Bombay

## Poster Presentations

**Verifying Array Programs with Full-Program Induction:** 4th Indian SAT+SMT School, IIT Bombay, December 2019

**Executive Summary on Tiling to Verify Array Programs :** TCS Anvetion Workshop, IIT Madras Research Park, Chennai, 2018

**Verifying Array Manipulating Programs by Tiling:** Research and Innovation Symposium in Computing, RISC 2017, IIT Bombay

## Interests

**Sports:** Table Tennis, Volleyball, Football

**Recreation:** Yoga, Novels, Music, Movies

## Links

**Webpage:** <https://divyeshunadkat.github.io/>

**dblp:** <https://dblp.uni-trier.de/pers/hd/u/Unadkat:Divyesh>

**Scholar:** <https://scholar.google.co.in/citations?user=8d48NqMAAAAJ>

**GitHub:** <https://github.com/divyeshunadkat/>

**LinkedIn:** <https://www.linkedin.com/in/divyeshunadkat/>

## Contact

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## References

Available upon request.