



VIJAYA KRISHNA KASULA

Principal Engineer, Processor Verification @ Synopsys | Jul 2010 - Present (15+ years)

Worked as a contractor for Synopsys from Jul 2010 - Feb 2014 at SoCtronics (full)

KEY PROJECTS (all)

Random Program Generators (RPGs) (details)

Dec 2011 - Present

Lead Developer & Team Lead, Synopsys

- Designed and developed 3 generations of RPGs from scratch for ARC processor verification, each addressing different design philosophies
- G1 (Perl-based, 2011-2016): Fast offline instruction generator supporting 20-30 engineers, primary RPG for 6+ years, phased out for G2
- G2 (SystemVerilog-based, 2016-Present): State-aware generator with coverage-driven features, longest-running tool, 50+ engineers, generates millions of instructions daily, with ~1000 test templates
- G3 (C-based, Sep 2025-Present): High-level scenario generator using CSmith, focuses on test scenarios rather than instruction-level details
- Managed the tools end-to-end, from planning to maintenance, supporting 50+ verification engineers across multiple parallel product lines
- Handled complex challenges: multi-issue scheduling, multicore systems, cache coherency, MMU/MPU, VLIW, SIMD, virtualization, APEX extensions
- Built advanced Memory Manager and Data Manager for architecture-aware instruction streams and complex scenario generation (e.g., cache coherency, DMP)
- Supports automatic extraction of ISA and CSR definitions from processor specs, enabling rapid support for new architectures and near-zero setup for new processors
- Provided SV-Python wrappers to load the test information generated in Text/YAML/JSON formats for seamless testbench integration, includes VSCode IDE with Ctags and extensive Doxygen/Sphinx documentation

AI-ML Log Anomaly Detector (details)

Feb 2022 - Present (Staggered)

Master's Thesis Project, BITS Pilani | Deployed in Production at Synopsys

- Developed intelligent log anomaly detector using scikit-learn, NLTK, and unsupervised learning algorithms
- Multi-stage ML pipeline: preprocessing (noise filtering, lemmatization), hashing vectorizer with trigram N-grams, KD-tree nearest neighbor, agglomerative clustering
- Handles noise (timestamps, file paths), unordered lines, parallel jobs, and template messages with variable parts
- Deployed for a while in production at Synopsys, automating verification failure log triaging
- Currently integrating LLMs into the flow for more intelligent clustering

C-Forge (details)

Mar 2025 - Present

Sole Developer, Synopsys

- Designed ML-enhanced configuration space optimization tool for ARC Processor IP verification
- Used Synopsys VCS Intelligent Coverage Optimization (ICO) with custom cov2gen flow and heuristics
- Auto analyzes uncoverable combinations, triages build failures using Random Forest and Decision Tree classifiers
- Presented at Purple Poster event (Synopsys internal innovation showcase) 2025
- Impact: Reduced verification effort by more than 50% by reducing configurations to verify by at least 50%

Co-Simulation Environment (details)

Dec 2012 - Mar 2013

Lead Developer, Synopsys

- Prototyped experimental co-simulation flow to automate processor-level verification
- Enabled seamless integration between SystemVerilog testbenches and C-based golden reference model
- The tool Changed the verification methodology, became critical component of verification infrastructure, enabled robust test development framework

CONTACT

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🌐 LinkedIn • 🔄 GitHub • 🏠 GitLab

🌐 Detailed Resume / CV

PROFESSIONAL SUMMARY

Hands-on verification experience of critical processor components. Improving team efficiency by proactively identifying problems and building advanced verification tools bottom-up using cutting-edge technologies. These solutions have significantly improved productivity and delivered measurable impact across multiple product lines.

AWARDS & RECOGNITION

Harvard University Certificate

Certificate of recommendation from Harvard University, Cambridge, MA, USA, for performance in online coding competition held in collaboration with NASA on TopCoder (2012)

Industry Recognition

Multiple Synopsys awards for technical contributions and innovation

EDUCATION (full)

M.Tech in Data Science & Engineering

BITS Pilani (WILP)

Nov 2019 - Feb 2022 | CGPA: 8.75

B.Tech in Electronics & Communication

SVIT (JNTU Hyderabad)

Jun 2006 - Jun 2010 | 71.40%

SKILLSET

Programming Languages:

Python, C, C++, SystemVerilog, MySQL, E, Perl, Shell, Bash, Tcsh, Zsh

AI & Machine Learning:

Scikit Learn, NLTK, Pandas, Anomaly Detection, Clustering, Hashing Vectorizer, Kd Tree, Decision Tree, Random Forest, Vibe Coding, Windsurf, Cursor, GithubCopilot

Data Visualization:

Streamlit, Plotly Dash, Grafana

Tools & Libraries:

Bison, Flex, Yacc, Graphviz, Dot, Compilers, Argparse, VSCode, Gvim, SLY, BNF, BeautifulSoup, Lex, Makefile, Verilator, WSL, Ctags, JSON, Parquet, YAML

Version Control & CI/CD:

Git, GitHub, Gitlab, SVN, Perforce, LSF, CI/CD, OGE

Documentation:

DocuSaurus, Sphinx, Doxygen, Markdown, RST, DITA, Documentation

EDA & Verification:

Verdi, VCS, Specman, ICO, VCS DVE, CSmith, Testbench, FPGA, FSDB, HVP, Synopsys, Debugging, IPXACT, Verification Plans

Project Execution:

Jama, Jira, 8D, Project Dashboard

Processor Architecture:

MMU, MPU, ISA, ISA Coverage, Action Points, ARC ISA, Debug Unit, RISC V, Processor State, Assembly Language, Cache Coherency, Caches, CSRs

Processor Verification:

Verification, Test Generation, Co Simulation, PLV, MLV, Coverage, Cov2Gen, Constraints, Configuration Space

Process & Methodology:

Automation, Best Practices, Templates, Checklists, Guidelines, Leadership, Prototyping, Training, Workaround Management

LEADERSHIP & MANAGEMENT

Verification Best Practices Team (VBPT) (details)

2020 - Present

Team Lead, Synopsys

Team Contributions:

- Led cross-functional team responsible for verification infrastructure and process improvement
- Established best practices, guidelines, and standards for verification across product lines
- Managed innovation initiatives and explored AI/ML capabilities for verification automation
- Led verification plans evolution through 3 generations (Excel → HVP/Verdi → Jama), built automation tools for spec linking and coverage back annotation, established templates and guidelines, conducted training sessions
- Introduced SystemVerilog coding guidelines across verification team
- Mentored engineers on verification methodologies, tools, and industry best practices

Individual Contributions:

- **Workaround Management System** (details) - Standardized automated workaround process, made automation generic and reusable across environment, auto-generated Markdown/RST documentation for stale workarounds
- **AI Integration Initiative** (details) - Worked with central engineering to enable internal LLM search engine, internal AI enabled tools, introduced AI editors (GitHub Copilot, Cursor, Windsurf) in the team

KEY PROJECTS (CONTINUED)

Verification Dashboard & Infrastructure (details)

2017 - Present

Sole Developer, Synopsys

- Gen-1 (2017): Built Grafana-based dashboard with MySQL backend, established templates and data structures, actively used and maintained by team
- Gen-2 (2024): Developed Streamlit-based dashboard (Darpan) with Python frontend, added disk caching and extensive documentation using DocuSaurus
- Both dashboards in active use by engineers and management up to SVP level to track project health metrics

Other Projects

- **Git Migration Project** (details) - Led Perforce to Git migration for entire ARC IP codebase, zero data loss, minimal downtime, established CI/CD infrastructure (Dec 2023 - Feb 2024)
- **Regression Automation System** (details) - End-to-end automation in use for 10+ years with auto error bucketing, Jira integration, and coverage management. Guided the OGE to LSF migration in team (2012-2016)
- **FSDB Tracer for Debugging** (details) - A tool that generates human-readable instruction traces from FPGA waveforms, bridging the gap between FPGA and RTL simulation

PUBLICATIONS & PRESENTATIONS (all)

Kasula, V. K. (2025). *C-Forge, Efficient Configuration Generator for Configuration Space Verification of ARC Processor IP*. Purple Poster, Synopsys.

Kasula, V. K., & Chedella, S. S. (2016). *Barrier Insertion in Test Programs for Controlled Verification of Cache Coherency*. Synopsys India Technical Conference (SITC), Bangalore.

Kasula, V. K. (2016). *Reverse Generation Technique for Functional Verification of Processor Cores*. Synopsys India Technical Conference (SITC), Bangalore.

Kasula, V. K., & Tadiboina, G. K. (2016). *Test Generation for Processors with Extended Address Capability*. Synopsys India Technical Conference (SITC), Bangalore.

OPEN SOURCE CONTRIBUTIONS (all)

argparse-enh (details) • Python Library, PyPI

Active

- Enhanced argparse with API, shell, and automatic GUI generation modes