

AYUSH BEEKUM

COMPUTER SCIENTIST · FINAL-YEAR BSC COMPUTER SCIENCE

Pretoria, South Africa | 083 2955 900 | ayush.beekum@gmail.com | github.com/Ayush-B99 | www.linkedin.com/in/ayush-beekum-6423862b4/

PROFILE

Final-year BSc Computer Science student at the University of Pretoria with two years of paid, client-facing development experience delivering and maintaining live production websites for a South African digital agency. Winner of the Best Validator category at the 2026 Universal Acceptance Hackathon and a national qualifier for the CHPC Student Cluster Competition. Comfortable across the full stack; Python, TypeScript, Java and C++; with a deepening focus on backend systems, computer vision and high-performance computing.

EDUCATION

University of Pretoria: BSc Computer Science

- **Key modules:** Software Engineering (COS 301), Databases (COS 221), Software Design & Design Patterns (COS 214), Computer Networks (COS 332), Programming Languages (COS 333), Computer Graphics (COS 344), Machine Learning (COS 314), Data Structures & Algorithms, Operating Systems.

PROFESSIONAL EXPERIENCE

Web Developer (Part-time): 4IR Digital, Pretoria

2022 – Present

Digital agency and cybersecurity services provider

- Designed, built and deployed five live client websites end to end from scoping and quoting through design, development, hosting and handover all currently in production.
- Built bespoke frontend components in vanilla HTML, CSS and JavaScript for a multi-page cybersecurity services platform, including canvas-driven animations, scroll-linked sections, an interactive SVG map of Africa and a modular service selector.
- Developed custom WordPress and PHP functionality, including a replacement site-search subsystem with a full data migration, delivered without downtime.
- Automated WooCommerce catalogue and bulk price-update pipelines for retail clients using Python scrapers (BeautifulSoup, Playwright) and CSV import workflows, cutting a manual multi-day task to under an hour.
- Worked directly with non-technical clients to translate business requirements into technical scope and delivery timelines.

Live client sites: [WebAchutes](#) · [Zida Invest](#) · [Jarrod Waberski](#) · [Perpetual Services](#) · [Rylo Group](#)

SELECTED PROJECTS

Gesture-Based Drone Control: Final-Year Capstone (COS 301), Team Codex Merchants

2026

Python · FastAPI · React · TypeScript · MediaPipe · Project AirSim · Docker

- Full-stack system that pilots a drone in real time from hand gestures captured on a standard webcam, with a simulation environment for safe testing.
- Built the computer-vision pipeline: camera capture → MediaPipe landmark detection → gesture recognition (rule-based and ML classifiers) → temporal stabiliser → asynchronous WebSocket stream to the flight controller.
- Designed and implemented the gesture-calibration subsystem; a session state machine with REST and WebSocket endpoints and a dependency gate preventing uncalibrated flight commands from reaching the drone.
- Set up CI/CD with GitHub Actions; test suite in pytest / pytest-asyncio, linting via ruff, dependency management with uv.

Universal Acceptance Reference Validator: Hackathon project; Registry.Africa, University of Pretoria July 2026

Python (standard library only)

- Built a reference email and domain validator that eliminates the "three-character TLD trap", a legacy validation assumption that locks South Africans out of government, municipal, banking and insurance portals when they use addresses on .africa, .capetown, .joburg or .durban.

- Achieved a perfect 100% score on the competition test suite using nothing but the Python standard library: dynamic Public Suffix List / IANA root zone lookups instead of hard-coded arrays, full Unicode and Punycode handling for internationalised domains, RFC-compliant 64-octet local parts and sub-addressing support.
- Awarded **Best Validator** in the coding category. Work covered by MyBroadband; [read the article](#).

CHPC Student Cluster Competition: Team Uptime, representing the University of Pretoria 2026
Linux · OpenMPI · OpenBLAS / Intel MKL · Slurm · Terraform · Ansible · Prometheus / Grafana

- Qualified for the national finals as part of the University of Pretoria team.
- Specified two competing cluster architectures (an R650k baseline at ~8.8 TFLOPS and an extended EPYC/H100 build at ~100 TFLOPS) with full cost, power and performance justification.
- Ran HPL benchmarking on OpenStack infrastructure, reaching ~1,098 GFLOPS with OpenBLAS, and profiled the stack to identify the BLAS library as the primary remaining performance lever.
- Automated cluster provisioning and configuration with Terraform and Ansible; CI pipelines via GitHub Actions and CircleCI.

Price Comparison Platform: COS 221 Databases team project 2025
 • Full-stack price comparison site over a normalised MySQL database populated with real-world retail data, served through a REST API written in PHP with a responsive JavaScript frontend.

Plant Nursery Management System: COS 214 Software Modelling & Design team project 2025
 • C++ simulation architected around classical Gang of Four design patterns, with UML modelling, unit tests and full documentation.

TECHNICAL SKILLS

Languages	Python, TypeScript, JavaScript, Java, C++, C#, PHP, SQL, R, Assembly
Frontend	React, Next.js, Angular, HTML5, CSS3, Tailwind, Three.js
Backend	FastAPI, Node.js, NestJS, Django, Spring Boot, REST API design, WebSockets
Data	PostgreSQL, MySQL, MariaDB, database design and normalisation
ML / CV	MediaPipe, PyTorch, OpenCV, neural networks, genetic algorithms
DevOps	Git, GitHub Actions, Docker, Terraform, Ansible, CircleCI, Linux, Slurm, OpenMPI
Testing	pytest, Jest, JUnit, Postman
Web platforms	WordPress, Elementor, WooCommerce
Other tools	Figma, Unity, Blender

AWARDS & ACHIEVEMENTS

- **Winner Best Validator, Universal Acceptance Hackathon** (Registry.Africa, hosted at the University of Pretoria), July 2026.
- **National qualifier CHPC Student Cluster Competition 2026**, representing the University of Pretoria as part of Team Uptime.
- Open-source activity: 270+ contributions and 37 pull requests across 9 repositories on GitHub.

INTERESTS

Electric and acoustic guitar and piano · long-running car restoration project (Nissan 200SX S13) · AI modelling and development with different training models like supervised vs. unsupervised, reinforcement and others.

References available on request.