Collins Munene Kariuki

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Education

Pomona College Claremont, CA
Bachelor of Arts in Computer Science and Physics *May 2024*
GPA *3.72/4.0*
Relevant Coursework *Statistical Physics Computational Applications, Quantum Mechanics, Classical Mechanics, Electricity and Magnetism, Contemporary Experimental Physics, Electronics, Data Structures and Algorithms, Computer Systems, Computer Vision, Machine Learning*

Honors and Awards

Rhodes Scholarship Finalist (2023): Selected as one of the 8 finalists in the Kenyan Constituency for the prestigious Rhodes Scholarship - a highly competitive, fully funded postgraduate award for study at the University of Oxford
SPS-Google Scholarship: Supported by Google, this award seeks to aid undergraduate students with the potential and intention for continued scholastic success who are in need or have overcome significant obstacles
RISE (Research Internships in Science and Engineering) Germany: Received an international fellowship to complete a summer research internship at top German universities and research institutions
Sigma Xi Member: Sigma Xi, The Scientific Research Honor Society, acknowledges substantial scientific contributions
Pomona College (PC) Scholar: Awarded to students in the top 25% of their class each semester. Received it during my freshman year
The Tilestone Physics Prize: Given annually to outstanding first-year or sophomore students in the introductory courses
Herbert Levy Memorial Scholarship: Awarded to undergraduate students based on scholarship, Society of Physics Students (SPS) participation, and financial need

Research Experiences

Computational Mathematics Research Assistant Oct 2024 – Present
Edray Goins Research Group *Claremont, CA*

- Engineer methods to transfer, modify, and slice Mathematica-generated Dessin d'Enfants for 3D printing applications
- Design a mobile application for augmented reality visualization of Dessin d'Enfants, enhancing interactive exploration on mobile devices
- Pioneer a comprehensive database linking Belyĭ maps to their corresponding Dessin d'Enfants and monodromy triples, enabling seamless cross-referencing, and design a user-friendly web interface for browser-based access

Society of Physics Students (SPS) Program Engagement Intern Jul – Aug 2024
American Institute of Physics (AIP) *Washington, DC*

- Implemented a Python-based automated system to streamline chapter activity report updates, utilizing fuzzy matching to reconcile records across multiple Excel sheets, improving data accuracy and saving significant time
- Processed over 200 chapter report submissions from SPS chapters across the US, ensuring accurate and up-to-date records in zone-specific databases contributing to AIP's ability to support and engage SPS chapters effectively

Undergraduate Research Assistant Feb 2023 – May 2024
Pomona College - Hudgings Lab *Claremont, CA*

- Simulated and optimized passive daytime radiative cooling (PDRC) devices using COMSOL Multiphysics ™as part of my Physics thesis, "Modeling Passive Daytime Radiative Cooling Devices (PDRCs) using COMSOL Multiphysics™"
- Investigated the resistance-temperature relationship of Tungsten using a FLIR A700 thermal camera and a pyrometer, providing insights into its electrical properties under varying thermal conditions
- Designed and conducted experiments to evaluate the spatial resolution of the FLIR A700 thermal camera, incorporating gold resistor mass analysis and temperature benchmarking against a tungsten bulb

Computational Research Assistant May – Aug 2023
Simons Foundation *New York City, NY*

- Engineered four complex compounds by authoring over 2,000 lines of Python code to enhance the tight-binding model in the TRIQS (Toolbox for Research on Interacting Quantum Systems) package, improving its functionality for computational physics research
- Authored a comprehensive tutorial to facilitate effective use of custom code for running experiments and interpreting outcomes within the tight-binding model framework enhancing accessibility for researchers
- Developed working expertise in Condensed Matter Physics, specifically the Hubbard model, through in-depth study of over 200 pages of graduate-level textbooks and completion of 15+ hours of advanced online coursework, enhancing theoretical foundations for research

Extended Reality Researcher May – Aug 2022
Deggendorf Institute of Technology (DIT) – European Campus *Pfarrkirchen, Germany*

- Improved wound assessment accuracy through the development of Virtual Reality (VR) software using Unity and C#, enabling more reliable telemedical experimental outcomes
- Designed comprehensive telehealth lesson plans incorporating advanced VR/AR/MR technologies, enhancing student engagement by connecting concepts to real-world applications
- Interviewed 20 local medical professionals to identify rural healthcare challenges, shaping a data-driven strategy to enhance telemedical consultations and expand access to underserved areas

Summer Research Fellow Jun – Jul 2021
David Harold Blackwell Summer Research Institute (DHBSRI) *Remote*

- Analyzed Gastric Emptying Scan percentages of Type I diabetic patients using Python's Pandas library, leveraging autoregressive linear modeling to uncover key relationships and correlations
- Generated detailed reports featuring statistical analyses and visualizations, presenting findings to DHBSRI organizers and earning commendation for their accuracy and clarity

Other Experiences

Physics Department (Laboratory) Assistant Aug 2024 – Present
Pomona College - Physics Department *Claremont, CA*

- Design a Python tutorial mini-course to introduce underclassmen to computational methods, focusing on foundational coding skills for physics simulations and fostering early engagement with essential academic tools
- Assist in the setup and preparation of lab equipment for physics courses ensuring timely and accurate support for professors and students during laboratory sessions

Post-Graduate Instructional Tech, Instructional Technology Group Aug 2024 – Present
Pomona College - Information Technology Services (ITS) *Claremont, CA*

- Train and support students and faculty in using educational technologies and software, enhancing the integration of technology in teaching and research
- Maintain and update the internal database resources, ensuring instructional materials and information remain accurate, current, and accessible

Teaching Assistant (TA) Sep 2021 – Dec 2024
Pomona College *Claremont, CA*

In each of the teaching experiences below, I led mentor sessions, guiding students in comprehending the material, assisting them with assignments, addressing general inquiries, and offering advice pertaining to the physics major. In some cases, I undertook the responsibility of grading assignments.

- TA for Thermodynamics and Statistical Physics (Jan - May 2024) and (August – Dec 2024)
- TA for Fundamentals of Quantum Physics (Sep – Dec 2022) and (Aug – Dec 2023)
- TA for Introductory Classical Physics and Electricity & Magnetism (Jan – May 2022)
- TA for Multivariable Calculus (Calculus III) (Jan – May 2022)
- TA for Physics 050 (Robotics with a Purpose), a novel course mostly on Newtonian Mechanics, Robotics and Programming. In charge of mentoring 5 students on course material (Sep 2021 – Dec 2021)

Career Development Office Peer Advisor Aug 2022 – May 2023
Pomona College - Career Development Office (CDO) *Claremont, CA*

- Guided students on career development, including crafting industry-standard resumes and cover letters, to enhance their professional opportunities
- Led workshops on resume and cover letter composition, promoted Career Development Office (CDO) resources, and enhanced students' career development skills; organized and facilitated events, co-hosted engaging career sessions, and managed event logistics to ensure their success
- Curated and distributed weekly lists of STEM and health-related job opportunities to the student body ensuring timely access to relevant career resources

Staff Writer and Social Media Associate Mar 2021 – May 2022
International Collegiate Journal of Science *Remote*

- (Co)-authored review articles exploring emerging trends in physics, cognitive sciences, and behavioral sciences, showcasing interdisciplinary research insights
  Authored articles such as *Superconductivity: Past, Present, and Future*, *PCR: Captivation Through Replication*, and *The Cognitive Aspects Behind Computer Code Comprehension*. My extended review, *Superconductivity: Past, Present, and Future*, was featured in the Winter 2021 print edition of the Dartmouth Undergraduate Journal of Science.
- Crafted engaging captions and managed targeted social media advertising campaigns to enhance online visibility and audience engagement

College Access Peer Mentor May 2020 – May 2021
Equity Bank, Kenya *Nairobi, Kenya*

- Tutored 250 high-achieving, low-income high school graduates in SAT preparation and overseas college application processes supporting their efforts during the 2020/21 college application cycle
- Conducted intensive workshops to familiarize mentees with American liberal arts colleges, broadening their understanding of academic and cultural opportunities

Projects

Countdown Timer Mobile App | *Kotlin with Jetpack Compose* May – August 2024

- Designed and developed an intuitive user interface using Jetpack Compose, delivering a seamless user experience for creating and managing countdown events
- Implemented robust data storage solutions for user sleep logs using SharedPreferences for lightweight data handling and Room Database for complex data management, ensuring data integrity, and accessibility
- Integrated Google Places API to provide location-based event suggestions, enhancing user convenience, data accuracy, and overall app functionality

5C Hackathon, BrAIn Brawl | *C#, HTML, High-Level Shader Language* Apr 2023

- Developed *brAIn Brawl*, a 3D educational game using C# and Unity, designed to engage and educate young players through interactive gameplay; awarded Best Beginner Project at the 5C Hackathon
- Utilized Autodesk software to design intricate 3D models, enhancing the depth and realism of user interactive experiences
- Integrated ChatGPT's OpenAI API to dynamically generate real-time, subject-specific questions and answers, enhancing player engagement and interactivity

Skills and Certificates

Physics Skills: Computational modeling (COMSOL), Teaching assistantships, Electronics, Optical lab techniques, Scientific communication
Programming Languages: Python, Java, C/C++, C#, SQL, JavaScript, HTML/CSS, Coq, Mathematica
Tools and Frameworks: Git, GitHub, VS Code, Visual Studio, Agile Development, Unit Testing, React, Node.js, Flask, FastAPI, JUnit
Libraries: Pandas, NumPy, Matplotlib, SymPy, OpenCV
Certificates: Software Engineering Virtual Experience (JPMorgan Chase & Co.), Front-End Developer Professional Certificate (Meta), Python for Data Science (IBM), Unity 2D Game Development in C# (Udemy)