Curriculum Vitae

NANA OSEI-BONSU

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RESEARCH INTEREST

Aspiring Vision Scientist | Optometrist | Researcher in Ophthalmic Imaging and Computational Neuroscience.

EDUCATION

2016- 2020 Doctor of Optometry (OD) degree, University of Cape Coast, Ghana.

SUMMARY

Vision science researcher and Doctor of Optometry with hands-on experience in ophthalmic imaging, human visual function assessment, and low vision rehabilitation. Skilled in image processing, psychophysics, and deep learning methods for biomedical data analysis. Strong interest in the neural architecture of the human visual system and its computational modelling. Proven ability to support and lead research in both clinical and academic environments..

WORKING EXPERIENCE

Nov. 2023 – Present: Resident Optometrist | Sunshine Ophthalmic Consult, Kumasi, Ghana

- Performed objective and subjective refraction, prescribed and dispensed corrective glasses and contact lenses.
- Performed A-scan biometry for cataract surgeries.
- Performed Slit-lamp, Volk lens and ophthalmoscopic examination to diagnose and manage anterior and posterior segment eye diseases.
- Co-managed pre- and post-operative patients.
- Conducted binocular vision assessments and managed various types of binocular vision anomalies with optical correction, orthoptic exercises, occlusion and penalisation therapy, and referred to an ophthalmologist as necessary.
- Performed low vision assessments and managed patients with low vision aids.
- Operated and interpreted results of the ZEISS Cirrus High-Definition Spectral-Domain Optical Coherence Tomography (OCT) machine.
- Usage of anterior chamber and cornea external lenses in taking anterior segment scans.
- Operated and interpreted the results of Humphreys' Visual Field Analyser.
- Interpreted results of the Scanning Laser Polarimeter and Pachymeter.

Nov. 2022 – Oct. 2023: Research & Teaching Assistant | School of Optometry & Vision Sciences, University of Cape Coast, Ghana.

- Assist lecturers (professors) and final year dissertation students in the planning, development, and deployment of research.
- Teach and assess the performance of third, fourth, fifth, and final-year Doctor of Optometry students in ophthalmic, dispensing, and physiological optics.
- Teach, supervise and assess practicum students in preliminary examination, objective and subjective refraction, slit-lamp examination, ophthalmoscopy, binocular vision assessment and others.
- Supervise and assess the performance of student clinicians.

July 2022 – Aug. 2022: Clinical Clerkship | Sunshine Ophthalmic Consult, Kumasi, Ghana

- Performed objective and subjective refraction, prescribed and dispensed corrective glasses and contact lenses.
- Performed A-scan biometry for cataract surgeries.
- Performed Slit-lamp, Volk lens and ophthalmoscopic examination to diagnose and manage anterior and posterior segment eye diseases.
- Performed low vision assessments and managed patients with low vision aids.
- Operated and interpreted results of the ZEISS Cirrus High-Definition Spectral-Domain Optical Coherence Tomography (OCT) machine.
- Usage of anterior chamber and cornea external lenses in taking anterior segment scans.
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RESEARCH EXPERIENCE

Nov. 2022 – Nov.23: Research Assistant | University of Cape Coast, Ghana

- Assist in the development of appropriate techniques for data collection and analysis.
- Assisted in data coding, data entry, and data analysis.
- Perform statistical analysis on data sets using Statistical Package for the Social Sciences (SPSS), Microsoft Excel and Python.
- Assist Lecturers and final-year optometry students in their research projects.
- Coach junior optometry students in their mini research projects.

Oct. 2021 – Nov. 2022: Dissertation Research – Doctor of Optometry Thesis

"Development and Evaluation of a Low-Cost Alternative to Closed-Circuit Television for Visually Impaired Students"

School of Optometry & Vision Science, University of Cape Coast, Ghana

- Designed, developed, and evaluated Optosol iDigital, a low-cost, portable assistive device to serve as an alternative to traditional closed-circuit televisions (CCTVs) for students with moderate to severe visual impairment.
- Used Python 3.10.5 and local network communication (Iriun webcam) to integrate mobile phone camera input with computer-based text magnification, optical character recognition (OCR), and text-to-speech (TTS) functionality.

- Applied the waterfall software development model from requirement gathering to implementation, testing, and evaluation.
- Conducted user training and comparative usability testing with low-vision students at the Resource Centre for Assistive Media and Technology (R-CAMAT).
- Employed qualitative research methods and thematic analysis (Braun & Clarke's 6-phase model) to evaluate user experience, accessibility, adaptability, and device functionality based on structured interviews.
- Identified key usability improvements in portability, interface design, and feature preferences (e.g., magnification, contrast inversion, and voice output) through participant feedback.
- Demonstrated that low-cost digital visual aids can improve educational access, user autonomy, and functional independence in under-resourced academic settings.

Ongoing Research:

"Comparative Discrimination Ability of Magnocellular and Parvocellular Pathways in Myopic Eyes with and without Glaucoma".

- Conducted psychophysical studies exploring contrast sensitivity differences in the magnocellular (M) and parvocellular (P) pathways of individuals with myopia, glaucoma, or both, to identify early visual processing deficits.
- Designed and implemented visual discrimination tasks using Gabor patches and the steady vs. pulsed pedestal paradigms to isolate pathway-specific responses.
- Programmed visual stimuli in PsychoPy and conducted controlled laboratory testing using gamma-corrected displays with calibrated luminance and spatial frequency conditions.
- Applied staircase procedures to determine spatial frequency and contrast thresholds for both pathways.
- Processed and analysed data using Python, R (v4.2.2), and SPSS, including ANOVA, ANCOVA, and Pearson correlation, with results visualised through RStudio and statistical plotting libraries.
- Demonstrated that magnocellular contrast sensitivity may be a non-invasive, early biomarker for glaucoma detection in myopic eyes, supporting advanced diagnostic approaches.
- Co-authoring a manuscript titled *"Discriminative Ability of Contrast Sensitivity Assessment of Magnocellular and Parvocellular Pathways in Myopic Eyes with and without Glaucoma"* (under submission).

CONFERENCES/ SEMINARS

June 2023, "*Ocular Imaging – Visual Field Analysis, Optical Coherence Tomography & Scanning Laser Polarimeter*" by Dr. Samuel Danso-Debrah, Senior Optometrist and Head of St Joseph Hospital – Koforidua, SeeMore EyeCare – Koforidua at the University of Cape Coast, Ghana.

August 2022, "*Artificial intelligence in ophthalmology*" by Dr. Nicholas Jaccard, Dr. Jayashree Kalpathy-Cramer, Dr. Pearse Keane, Dr. Chris Leung, Dr. Chuku (Wanjiku) Mathenge, & Dr. Michael Abramoff, Cybersight live webinar,

May 2019, "*Ocular Discomfort Related to Binocular Vision, Convergence Insufficiency and Dry Eyes*" by Prof. Eric Papas of the University of New South Wales at the University of Cape Coast, Ghana.

Jan. 2019, "*Novel Trends in Amblyopia Management*" by Prof. Niall Strang of Glasgow Caledonian University at the University of Cape Coast.

SERVICE/ VOLUNTEERING

2022 Volunteer, Eric Kwadwo Baidoo Foundation, Helping Assinman Here & Now, Community-Based Health Outreach, Assin Fosu, Ghana.

2021 Volunteer, Sunshine Ophthalmic Consult, Community-Based Eye Health Outreach, Kumasi, Ghana.

2021 Volunteer, Ghana Optometric Association, Community-Based Eye Health Outreach, Elmina, Ghana.

2021 Volunteer and Eye Care Team Lead, International Medical Associates for Global Health Empowerment (IMAGHE), Medical Outreach, Gomoa Oguaa, Ghana.

2020 Volunteer, World Sight Day screening exercise at the University of Cape Coast

2019 Volunteer, World Sight Day screening exercise at the University of Cape Coast

SKILLS

- Programming & Analysis: Python (NumPy, Pandas, Matplotlib, Scikit-learn), MATLAB, R
- Software Tools: VSCode, RStudio, Git & GitHub, Microsoft Office
- Statistical & Imaging Tools: SPSS, Psychopy, TensorFlow
- Ophthalmic Imaging: Zeiss Cirrus HD-OCT, TopCon OCT, Humphrey Visual Field Analyser, A-Scan Biometry

OTHER POSITIONS

2020 – 2022: Electoral Committee Head, Optometry Students Association of Ghana (OSAG), UCC Chapter.

2019 – 2020: Media and Publicity Committee, Member, Optometry Students Association of Ghana (OSAG), UCC Chapter

Curriculum Vitae

REFEREES

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