

Obumneme Godson Osele

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EDUCATION

Stanford University, Stanford, CA
Doctor of Philosophy in Mechanical Engineering

June 2025

Northwestern University, Evanston IL
Master of Science in Mechanical Engineering
Bachelor of Science in Biomedical Engineering

June 2021

RESEARCH INTERESTS

Developing cost-efficient mechatronic systems exploiting under-actuated, reconfigurable, and soft material designs outfitted with innovative sensors to inform autonomous systems and aid human-machine collaboration. Using devices and feedback to support humans and enhance their ability to perform activities of daily living to improve health and quality of life. Additional research interests include translating cost-efficient mechatronic systems into low-resource settings.

RESEARCH EXPERIENCE

Stanford University Collaborative Haptics and Robotics in Medicine Lab, *Graduate Researcher*
Stanford, CA
June 2021 – Present

Enabling Soft Growing Inflated Beam Robots to achieve strong, gentle and versatile grasps via topological transformations

- Co-defined a new class of grasping mechanisms, “loop closure grasping”, that addresses the different functional requirements of the different stages of the grasping process through topological transformations between open-loop and closed-loop morphologies.
- Co-inventor of Patent Application filings based on this work
 - International Patent Application No.: PCT/US2024/022246
 - International Patent Application No.: PCT/US2024/022241

A Soft, Everting Pneumatically Driven Sheet

- Designed a soft growing robot to manipulate and support the human body for patient transfer applications
- Co-inventor of Patent Application filings based on this work

Tip-Clutching Winch for High Tensile Force Application with Soft Growing Robots

- Co-designed a device into which vine robots can insert themselves and anchor to via powerful overlapping belt friction.
- Co-Authored an accepted paper to the 2024 IEEE International Conference on Robotics and Automation
- Co-inventor of Patent Application filing based on this work

A Lightweight, High-Extension, Planar 3-Degree-of-Freedom Manipulator Using Pinched Bistable Tapes

- Co-designed a lightweight manipulator capable of high extension ratios by locally modifying the transverse curvature of steel tape springs.
- Co-Authored an accepted paper to the 2022 IEEE International Conference on Robotics and Automation

Northwestern University Rogers Research Group, *Undergraduate Research Aide*
Evanston, IL

April 2019 – June 2021

Performed preliminary flow sensing studies to support the development of wireless devices that can estimate blood flow rate underneath the skin by analyzing the skin's anisotropic properties

- Designed phantom skins resembling the epidermis utilizing Solidworks to provide a basis for the quantification of skin penetration studies and perform fluid dynamics studies for dialysis patients
- Constructed electronic sensors to exploit thermal actuators as a means of studying on-skin blood flow at high flow rates in vascular accesses

- Assembled circuit boards utilizing a voltage divider and digital multimeter to track thermal sensor resistances simultaneously over time
- Fabricated current-carrying elastomer devices for continuous monitoring of biochemical signals
- Designed and milled encapsulation molds for wireless flow sensing devices.

Northwestern University Kiser Research Lab, Undergraduate Research Aide

September 2017 – April 2019

- Collected in-vitro drug release data of subcutaneous implants releasing HIV/AIDS medication into the bloodstream
- Performed different sealing mechanisms in the fabrication of the polymer implants to study which best resists tears in the devices
- Executed daily lab functions (running UV/VIS spectrophotometer, assembling implants, making buffers).

WORK EXPERIENCE

Johnson & Johnson MedTech: Ethicon, R&D Sensor Systems Intern

Redwood City, CA

June 2024 – September 2024

- Developed and implemented a low-level control algorithm on a robotic testing platform to assess the performance of a surgical robotics system, enhancing data reliability and repeatability.
- Designed and mitigated risks in system evaluation tests to optimize for freeing up personnel time by analyzing large datasets in MATLAB to refine testing parameters, and consequentially reducing the test matrix by 90%.
- Created a MATLAB-based graphical user interface for just-in-time monitoring of system testing data.

GE Healthcare

Edison Mechanical Engineering Intern

Waukesha, WI

July 2020 – August 2020

- Created CAD mockups using Creo Parametric to facilitate the integration of scan room electronics into a compact MRI system in order to reduce system footprint and space claim
- Researched market available options to actualize mockup designs and handled communications with vendors
- Delivered engineering solutions in a 4-week internship program shortened due to the COVID-19 pandemic

Edison Mechanical Engineering Intern

Waukesha, WI

June 2019 – September 2019

- Drafted a Design Change Verification Plan and Procedure to meet specifications with the global mobile MR Kizuna Voyager System field installations, and authored a standard procedure approved by the Quality and Assurance division
- Orchestrated mobile MR Kizuna Voyager system testing to address discrepancy with the fluid dynamics present in the magnet cooling mechanism and updated business-wide field installation manual to save 1.5 servicing hours and \$135000 in service costs
- Performed fixed MR Kizuna Voyager system testing to combat plumbing cavitation in cryogenic compressor and increase satisfaction of specification requirements by 80% which saved \$165000 in compressor costs
- Coordinated communications with part suppliers to drive root cause analysis for malfunctioning Integrated System Cabinet manifold and combat RIO Integrated System Cabinet leakage

Materials Leader: Intern

Florence, SC

June 2018 – September 2018

- Created and effectuated a supermarket model to improve material handling processes and reduce lead time by eliminating waste in the processes.

- Reduced foot distance necessary to complete builds by 74% and established standard locations and implemented visual management and FIFO to enhance parts organization
- Utilized feedback from material handling team to develop efficient, manageable, and sustainable methods
- Installed Kanban LEAN method to transition consignment parts to just-in-time manufacturing, reduce entitlement and improve manufacturing efficiency leading to reduction of company entitlement and on-hand inventory costs by \$60000
- Developed a tool to make data from Shortages Tracker digestible improving support team productivity and driving root-cause analysis for recurring issues
- Served as Team Lead to supervise and direct large groups of factory floor staff for tasks pertaining to Physical Inventory.

PUBLICATIONS AND PATENTS

O. Godson Osele*, Kentaro Barhydt*, Sreela Kodali, Cosima du Pasquier, Chase M. Hartquist, H. Harry Asada, and Allison M. Okamura. *Loop closure grasping: Topological transformations enable strong, gentle, and versatile grasps*. Submitted to Science Robotics, 2024.

O. Godson Osele*, Kentaro Barhydt*, Nicholas Cerone, Allison M. Okamura, and Harry H. Asada. *Tip-Clutching Winch for High Tensile Force Application with Soft Growing Robots*. IEEE International Conference on Robotics and Automation, 2024.

O. Godson Osele, Allison M. Okamura, and Brian H. Do. *A Lightweight, High-Extension, Planar 3-Degree-of-Freedom Manipulator Using Pinched Bistable Tapes*. IEEE International Conference on Robotics and Automation, 2022.

Kentaro Barhydt, **Obumneme Godson Osele**, Allison Okamura, Haruhiko Harry Asada. *Flexible Robotic Limbs*. International Patent Application No.: PCT/US2024/022246.

Kentaro Barhydt, **Obumneme Godson Osele**, Allison Okamura, Haruhiko Harry Asada. *Articulating Inverting and Everting Robotic Limbs*. International Patent Application No.: PCT/US2024/022241.

PRESENTATIONS

Conference Presentations/Abstract

O. Godson Osele, Allison M. Okamura, and Brian H. Do. *A Lightweight, High-Extension, Planar 3-Degree-of-Freedom Manipulator Using Pinched Bistable Tapes*. SystemX Robotics Fall Conference, 2022.

O. Godson Osele. *Utilizing Mixed Reality Glasses as a Computer Peripheral Device for Users with Mobility Disabilities*. Stanford Medical Mixed Reality Symposium, 2021.

INVITED TALKS AND LECTURES

A Lightweight, High-Extension, Planar 3-Degree-of-Freedom Manipulator Using Pinched Tape Springs. Conference for Emerging Black Academics in STEM. California Institute of Technology, Pasadena, CA, 2024.

Physically Assistive Soft Robots for Healthy Aging.

NSF ERC for Connected Health and Aging-in-Place Technology (CHAPTter) Webinar, 2022.

A Lightweight, High-Extension, Planar 3-Degree-of-Freedom Manipulator Using Pinched Bistable Tapes. SystemX Robotics Student Seminar, 2022.

PROJECT EXPERIENCE

Soft Robotics Project, Design of an Underactuated Origami Hand

September 2022 – December 2022

- Designed, modeled and fabricated a soft 3D printed under-actuated origami hand consisting of the origami unit cells.
- Conducted FEA simulations to capture the mechanical behavior of the origami unit cell under loading when fabricated with soft materials.

ME 310 Product Design Project, Oasis & Nomad: An Electric Construction Vehicle Support Solution

September 2021 – June 2022

- Our team of ME 310 students from Stanford University, USA, and Blekinge Institute of Technology, Sweden, was tasked with supporting the adoption of ECVs in areas with broken or non-existent energy infrastructure. We designed an ECV support system that provides a remote construction site with temporary energy infrastructure: Oasis, a renewable energy generator, and Nomad, a mobile charging station

Mahogany in Motion: Autonomous Robot for ME 210 Challenge

January 2022 – March 2022

- Designed a robot tasked with autonomously "herding sheep" (transporting balls) from a designated loading area to a scoring area with the ability to navigate holes in the playing field without losing any sheep.

Mixed Reality in Medicine Project

November 2021 – December 2021

- Developed an approach for employing a Mixed Reality Head Mounted Display (HoloLens 2) to accomplish mouse and keyboard actions on a PC for individuals with motor disabilities.
- Wirelessly connected Gaze and Voice input from the Head Mounted Display to command certain PC actions like cursor positioning and clicking.

Mechatronics Project: Autonomous Robot

April 2021–June 2021

- Built a robot for an autonomous navigation competition.
 - Designed the printed circuit board using Eagle CAD.
 - Implemented audio, visual and IMU sensing using both SPI and I2C communication protocols on a PIC32 microcontroller

Mechatronics Project: Motor Controller

January 2021–March 2021

- Built an intelligent motor driver using PI control to accept a desired motor trajectory, execute that trajectory, and send the results back to your computer for plotting.

Biomedical Engineering Design “Capstone” Project

September 2020–March 2021

- Worked with a team to design a robot for automated pooled sample testing for cost-effectively monitoring the efficacy of antiretroviral therapy in South Africa.
 - Leveraged an assembled Arduino CNC controller shield interfacing an Arduino microcontroller with stepper motors, position sensors and, motor drivers to implement G-Code communication with the system hardware.
 - Re-designed sample input rack, added barcode scanning and sample tracking capability and integrated optical limit switch for precise transition between unit samples

Independent Mechatronics Project: Soft Robotic Hand

August 2020–March 2021

- Designed and fabricated a low-cost, under-actuated soft robotic hand embedded with nylon wire tendon-driven by servo motors.

Northwestern University Robotic Design Competition

April 2020–June 2020

- Designed and programmed, via an Adafruit microcontroller board, a robot that navigates its surrounding via sound signals.

Northwestern University Design, Thinking, and Communication course

2 quarters: Fall 2017, Spring 2018

- Project 1: Worked in a team with a non-profit organization called Kids-In-Danger to design and manufacture a safe, engaging, and interactive entertainment unit for a baby.
 - The project yielded a baby bouncer with several features to promote safety including:

- A sturdy base and strong frame to support the weight of the baby and toddler
 - Harness design that prevents hip dysplasia
 - Straps that minimize choking hazard and secure to the baby to prevent falls
 - Shielding of all parts that may cause pinching.
 - Allows an infant to recline naturally, with inclination set to any angle.
 - An adaptable and easy-to-clean feeding station.
- Project 2: Worked in a team with doctors at the Shirley Ryan Ability Labs to design and fabricate an adaptive tricycle for a child with cerebral palsy
 - Our team designed the system to include:
 - A user-friendly cable steering and braking mechanism
 - Added structural elements to improve rider comfort
 - A re-designed mechanical frame of the device to support more weight and increase product-life and improve the maneuverability of the tricycle

Northwestern University Hodge EXCEL Scholars Program Project

June 2017–July 2017

- Designed an IR Motion Sensor by pairing an Arduino Uno microcontroller programmed in C with an IR sensor to communicate motion to an LED Screen

RELATED COURSEWORK

Stanford University (2021– present):

Global Engineering Design Thinking, Innovation, and Entrepreneurship, Mixed Reality in Medicine, Introduction to Mechatronics, Introduction to Sensors, Feedback Control Design

Northwestern University (2017– 2021):

Biomedical Engineering Design (Capstone), Machine Dynamics(Python), Robotic Manipulation, Introduction to Mechatronics, Advanced Mechatronics, Soft Robotics and Bio-inspired Robotics, Machine Learning for Biomedical Applications, Biomedical Robotics, Robot Design Competition, Computer Integrated Manufacturing, Bioelectronics, Biomedical Systems Analysis, Biomedical Signals & Circuits, Quantitative Systems Physiology, Quantitative Experimentation & Design, Biomechanics of Movement, Linear Algebra, Differential Equations, Transport Fundamentals, Introduction to Medical Imaging, Introduction to Biomechanics, Biostatistics, Cell Biology, Introduction to Materials Science, Life Cycle Analysis

AWARDS/FELLOWSHIP

Black In Robotics Travel Award (2024)

Stanford Alumni Association Community Impact Award (2023)

RAISE: Research, Action, and Impact for Strategic Engagement Doctoral Fellowship (2022)

Ford Foundation Predoctoral Fellowship (2022)

SystemX Robotics DEI Fellowship (2022)

Stanford Enhancing Diversity in Graduate Education Fellowship (2021)

GEM Associate Fellowship (2021)

Stanford Summer First Program Fellow (2021)

McCormick School Alumni Award (2021)

Lyle F. Mockros Outstanding Senior Award (2020)

Questbridge Scholar

FOCUS Scholar (2020)

SERGE Scholar (2020)

IDEAL Foundation Scholarship (2018, 2019)

NSBE Northwestern Chapter Male Freshman of the Year (2018)

Hodge EXCEL Program Outstanding Boeing Summer Scholar (2017)

Georgia Compensatory Educational Leaders Scholarship (2017)

Secretary of State Outstanding Georgia Citizen (2017)

Gwinnett County Hometown Hero Award (2017)

SERVICE AND LEADERSHIP ACTIVITIES

Stanford University Black Community Services Center

Graduate Scholar in Residence, September 2023 – Present

- Develop and execute programming to engage and support members of the Stanford graduate community who identify as Black and/or of African descent.
- Serve as Teaching Assistant for the Ernest Houston Johnson Scholars program – a program that supports Stanford first-years who identify as Black and/or of African descent with guidance and resources to help transition into the college environment
- Act as liaison between the Black Community Services Center and Black Men's Guild – a student-run organization that curates programs to foster community and accountability for Stanford-affiliated individuals who identify as Black men.

Stanford Robotics Center Summer Research Program, Stanford University

Program Co-Coordinator, 2022-2023

- Designed a summer research enrichment program for underrepresented groups in STEM
- Organize applicant search and review for summer internship
- Raised \$31,000 to pilot the program
- Coordinate and support mentor-student pairings
- Advocated for added resources to support exposure of program to underrepresented groups in STEM

Collaborative Haptics and Robotics in Medicine (CHARM) Lab Summer High School Internship Program, Stanford University

Program Co-Coordinator, 2022-2023

- Organize applicant search and review for summer internship
- Coordinate and support mentor-student pairings
- Advocate for added resources to support exposure of program to underrepresented groups in STEM

Biomedical Engineering Department Diversity, Equity, and Inclusion, Northwestern University

Undergraduate Committee Chair, 2020-2021

- Designed, developed, and lead DEI workshops for the Biomedical Engineering department
- Planned events to promote inclusivity in the Biomedical Engineering department
- Served as a student advocate to university leadership on DEI efforts

Alpha Phi Alpha Fraternity Inc., Alpha Mu Chapter (Northwestern University)

Vice President, April 2019 – 2021

- Directed philanthropy efforts in the greater Chicagoland area in conjunction with city chapters
- Planned and executed annual \$15000 Scholarship ball aimed to celebrate the academic achievements of minority Northwestern students

- Designed, developed, and lead DEI workshops for the Northwestern community
- Planned events to support the needs and concerns of the Northwestern Black community
- Served as a student advocate to university leadership on DEI efforts

National Society of Black Engineers, Northwestern University

Pre-Collegiate Initiative Co-Chair, September 2017 – March 2019

- Led bi-weekly NSBE Jr meetings at Evanston Township High School to guide young aspiring engineers and STEM majors
- Served on the planning committee for the city-wide event called A Walk For Education aimed to expose young black students to the opportunities in higher education
- Planned out STEM-focused field trips for NSBE Jr Chapters
- Established new NSBE Jr chapter at Northside Preparatory High School
- Mentored 2 first-year Black engineering students

Black Mentorship Program, Northwestern University

Mentor, 2018-2020

- Mentored 2 first-year Black Northwestern University students outside of NSBE

National Pan-Hellenic Council, Northwestern University

Student Government Senator, 2018-2019

- Represented the interests of Northwestern University Black Greek-lettered organizations at the Associated Student Government
- Organized fundraising events for philanthropy efforts aimed at the greater Chicagoland area
- Participated in community support initiatives in Evanston, Illinois

New Student and Family Programs, Northwestern University

Peer Adviser, 2019-2020

- Served as a mentor for 11 incoming undergraduate students beginning in the Summer through the end of their first year at Northwestern.
- Lead intentional dialogues about new student experiences during orientation week
- Taught a two-quarter seminar designed to introduce them to the engineering curriculum

Georgia Secretary of State, Georgia, USA

Student Ambassador, 2016-2017

- Directed community efforts to engage and educate Georgia residents on their civic rights and duties.

Parish School of Religion, Saint Lawrence Catholic Church, Sheil Catholic Center

Teacher, 2014-2021

- Served as an educator and mentor to students in 1st to 5th grade every Sunday

SKILLS

Prototyping/Manufacturing: SolidWorks, Fusion 360, Creo, CNC Milling, Laser Cutting, Rapid Fabrication, Thermoforming, Ultrasonic Welding

Programming/Software: Proficient with MATLAB, Python, SolidWorks, | Intermediate with C, C#, C++, ABAQUS, Creo | Beginner with GRBL Computer Numerical Control, G-Code |

Mechatronics: State Machines, Event-Driven Programming, Soldering, Motors, Sensors, Thermal Actuators, Electromagnetic Circuits

Soft: Technical Documentation, Collaboration, Root Cause Analysis, Empathy, Adaptability, Dependability, Critical Thinking

LANGUAGES

English (Native), Igbo (Native)