

# YOUSUF ABUBAKR

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## EDUCATION AND SKILLS

University of California, Berkeley, Class of 2024

GPA: 3.7 | August 2020 - Present

Mechanical Engineering BS & Electrical Engineering and Computer Science Minor

**Relevant Coursework:** Material Mechanics, Fluid Mechanics, Orthopedic Biomechanics, Thermodynamics, Dynamics, Statics, Mechatronics, Heat Transfer, Dynamic Systems, Machine Learning, Data Structures

**Engineering Software:** ANSYS, NX, ANSA, ABAQUS, LS-Dyna, Optistruct, FEBio, Gmsh, Paraview, Metapost, SolidWorks

**Design and Manufacturing:** Composite Layups and Molds (Wet/Prepreg Layups), Mill and Lathe, CAD, FEA, DOE

**Programming Languages and Systems:** Java, Python, MATLAB, Git

## EXPERIENCE

*Materials Researcher* | Cornell University

Ithaca, NY | May 2023 – Aug 2023

- Multiscale computational, theoretical, and experimental solid mechanics of biomaterials and engineering metals

*Interior CAE Intern* | General Motors

Detroit, MI | June 2022 – Aug 2022

- Performed linear and nonlinear structural FEA analysis on multiple IP components to assess performance of design
- Coordinated with test engineers to prototype, set up, and execute dynamic loading tests on IP components
- Collaborated with design engineers to share analysis, provide design recommendations, and assure that product testing and consumer protocols are met and validated

*Senior Advisor* | CalSol, UC Berkeley Solar Vehicle Team

Berkeley, CA | July 2020 – Present

- Co-led manufacturing of 30+ squared meters of aluminum and Nomex composite sandwich panels for exterior shell and interior structural panels of solar vehicle
- Optimized interior structural composite frame of vehicle by iterating design of chassis to fit driver configurations, additional interior mechanical systems, and vehicle impact loading conditions
- Validated aerodynamic performance of solar vehicle by performing wind tunnel tests and over 60+ CFD simulations in ANSYS to strengthen understanding of flow conditions on vehicle
- Enhanced design of shell in SolidWorks by refining surface modeling of our vehicle's geometry to reach appropriate 0.00+ degree draft angles to prepare for molding and manufacturing of exterior shell for vehicle

*Research Assistant* | Grace O'Connell Biomechanics Lab

Berkeley, CA | December 2020 – Present

- Developed 3+ ANSYS Meshing models by optimizing node/element features to account for node conformity at contact regions, unique material assignments, and simulation parameters in FEBio (Biomechanics solver)
- Enhanced validation of FEM bovine model by constructing 7+ experiments in FEBio to verify mechanical properties of model over multiple loading modalities and physical, experimental data
- Modeled 4+ biphasic and triphasic tissue structures with validated bovine disc model in FEBio to examine stress and strain distributions and to simulate transport of solvent, ion, and water contents in fiber-reinforced tissues

## PUBLICATIONS

*Torque- and Muscle-Driven Flexion Induce Disparate Disc Mechanical Behavior* | O'Connell Lab

UC Berkeley | August 2021

- Examined impact of torque and muscle driven flexions on IVD mechanics to produce more clinically relevant data and improve current understanding of torque loading schemes under a computational framework
- Concluded that greater concentration of solid stress and strain in posterolateral outer AF region more accurately simulates herniation, which challenges current complications in replicating herniations *in vitro*

*Non-enzymatic Glycation Strengthens Annulus Fibrous Through Crosslinks Aligned with Primary Collagen Fibers*

UC Berkeley | August 2022

- Studied anisotropy of glycated and nonglycated IVD tissues to characterize tissue mechanics with diabetic patients
- Determined glycation induced fiber crosslinking, which stiffened tissue modulus in direction of primary collagen fibers

## HONORS AND AWARDS

- 4th Place American Solar Challenge & 4th Place Formula Sun Grand Prix 2022
- JUMP Undergraduate Research Initiative Scholarship
- NSF REU (National Science Foundation Research Experience for Undergraduates) Grant

July 16, 2022

August 19, 2021

April 23, 2021

## INTERESTS

- Languages:** Arabic (conversational), Spanish (conversational)
- Interests:** Avid Basketball Fan (~~#DontSleepOnTheSuns~~), Casual Movie and TV Reviewer, Messi Enjoyer