

# 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 & EECS Minor

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

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

**Design and Manufacturing:** Composite Layups and Molds (Wet/Prepreg), Mill/Lathe, GD&T, CAD, FEA, DOE, SOM, DFX

**Programming Languages and Systems:** MATLAB, Python, Simulink, Git, Java, LabVIEW, PyTorch, Tensor Flow

## EXPERIENCE

*Biomechanics Researcher* | Grace O'Connell Biomechanics Lab

Berkeley, CA | December 2020 – Present

- Used experimental testing framework to guide FEA modeling of 7+ multi-scale tissue and joint level models
- Enhanced validation of FEA models to verify mechanical properties over multiple loading modalities and physical data
- Post-processed and analyzed stress and strain distributions in fiber-reinforced tissues in MATLAB and Paraview
- Tested 10+ IVD tissue samples in uniaxial loading conditions to investigate chemical and anisotropic disc characteristics
- Parameterized scoliotic joint level model to measure and validate how varying degrees of surgical corrective tethering techniques impact long term spinal growth and health

*Materials Researcher* | Cornell University

Ithaca, NY | May 2023 – Aug 2023

- Built and analyzed efficacy of 4+ multi-scale theoretical, FEA biomaterial models to simulate interplay between cell mechanobiology and fundamental tissue mechanics
- Designed and assembled fixture for nanoscale metal impact tester to improve testing efficiency and precision

*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+ square meters of sandwich panels for exterior and interior structural panels of vehicle
- Managed weekly mechanical team meetings and design presentations to advance manufacturing of 10<sup>th</sup> gen vehicle
- Optimized interior structural frame of vehicle by iterating chassis and joint design to fit 3+ driver configurations
- 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 and heat transfer to battery cells and driver
- Enhanced design of shell in SolidWorks by refining surface modeling of our vehicle's geometry to reach appropriate 0+ degree draft angles to prepare for molding and manufacturing of exterior shell for vehicle

## PUBLICATIONS

*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

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

UC Berkeley | August 2021

- Built 3+ multi-scale joint level FEA models to examine impact of flexion on IVD failure mechanics
- 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*

## 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 (professional), Spanish (conversational)
- Interests:** Avid Basketball Fan/Nerd (#sunsinfour), Casual Movie and TV Reviewer, Messi Enjoyer