

# YOUSUF ABUBAKR

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## EDUCATION

University of California, Berkeley, Class of 2024

GPA: 3.8 | August 2020 - Present

Mechanical Engineering BS & Electrical Engineering and Computer Science Minor

*Relevant Coursework:* Mechanical Behavior of Engineering Materials, Solid Mechanics, Thermodynamics, IoT Electronics, CAD Modeling and FEA, MATLAB, Physics I & II, Computer Programming (Python), Data Structures and Algorithms (Java)

## EXTRACURRICULAR ACTIVITIES

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
- Assembled FEA data from FEBio in MATLAB to categorize, curve-fit, and graph results of computational models

Aero Lead | CalSol, UC Berkeley Solar Vehicle Team

Berkeley, CA | July 2020 – Present

- Validated aerodynamic performance of solar vehicle by performing over 30+ Flow tests in ANSYS Fluent to strengthen understanding of weather conditions impact on vehicle and to forecast driving techniques in future races
- Optimized 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
- Investigated model stability by parameterizing meshing features and conducting mesh convergence studies to evaluate validity of ANSYS Fluent simulations
- Conducted 4+ PDR (Preliminary Design Reviews) with CalSol managers, alumni, and General Motor representatives

## 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 intervertebral disc mechanics to produce more clinically relevant data and improve current understanding of torque loading schemes under a computational framework
- Developed FE models in FEBio with varying Instantaneous Centers of Rotation (ICRs) located in the anterior region of the disc to more accurately and physiologically represent torque-driven flexion
- Simulated muscle-driven flexion with validated FEMs, examining unique ICRs to evaluate disc mechanical behaviors
- Determined that varying levels of ICR location notably highlighted drastic differences in bulk deformation, stress-bearing mechanisms, and intradiscal stress and strain distributions, particularly around disc endplates
- 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*

## WORK EXPERIENCE

Network Engineering Assistant | STS (Student Technology Services)

UC Berkeley | October 2020 – August 2021

- Wrote and programmed 3+ Python scripts and templates to expedite data collection process in Excel documents
- Renewed network switches and access points in 150+ ports in university housing to sustain ethernet connection systems

SLC Math Tutor | SLC (Student Learning Center)

UC Berkeley | January 2021 – August 2021

- Backed up professor instruction by creating custom practice questions to reinforce lecture topics and review concepts
- Spearheaded group tutoring sessions of 4+ to help students struggling in similar areas in single-variable calculus

## HONORS AND AWARDS

- 6th Place American Solar Challenge 2021 & 5th Place Formula Sun Grand Prix 2021 August 8, 2021
- NSF REU (National Science Foundation Research Experience for Undergraduates) Grant April 23, 2021
- CSWA (Certified SolidWorks Associate) Certification (Certification Number: C-SHL4RND67P) November 16, 2019

## SKILLS AND INTERESTS

- **Engineering/Computer Applications:** SolidWorks (proficient), MATLAB (proficient), ANSYS (proficient), FEBio (proficient), Python (proficient), Java (proficient), Gmsh (proficient), NX (competent), Paraview (competent)
- **Languages:** Arabic (conversational), Spanish (conversational)
- **Interests:** Avid Basketball Fan (#DontSleepontheSuns), Casual Movie and TV Reviewer, Ardent Minecraft Enthusiast