YOUSUF ABUBAKR

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EDUCATION AND SKILLS

University of California, Berkeley, Class of 2024 GPA: 3.8 | **August 2020 - Present**
Mechanical Engineering BS & Electrical Engineering and Computer Science Minor
Relevant Coursework: Material Mechanics, Statics, Fluid Mechanics, Thermodynamics, Orthopedic Biomechanics, IoT Electronics, MATLAB, Computer Programming (Python), Data Structures and Algorithms (Java)
***Engineering Software*:** ANSYS, NX, ANSA, LS-Dyna, Optistruct, FEBio, Gmsh, Paraview, Metapost, SolidWorks
Design and Manufacturing: Composite Layups and Molding (Wet Layups and Bakes), Engineering Machining Tools, FEA, DOE
Programming Languages: Java, Python, MATLAB

ENGINEERING EXPERIENCE

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

Aero/Shell Lead | **CalSol, UC Berkeley Solar Vehicle Team** Berkeley, CA | **July 2020 – Present**
- Co-led manufacturing of 20+ squared meters of aluminum and kevlar-hexcore composite sandwich panels for exterior shell of new solar vehicle
- 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
- 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

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 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*

HONORS AND AWARDS

- 4th Place American Solar Challenge & 4th Place Formula Sun Grand Prix 2022 **July 16, 2022**
- JUMP Undergraduate Research Initiative Scholarship **August 19, 2021**
- NSF REU (National Science Foundation Research Experience for Undergraduates) Grant **April 23, 2021**

INTERESTS

- **Languages**: Arabic (conversational), Spanish (conversational)
- **Interests**: Avid Basketball Fan (#DontSleepontheSuns), Casual Movie and TV Reviewer, Ardent Minecraft Enthusiast