Strategic Plan for The Department of Biomechanics
(2021–2025)

MISSION

The Department of Biomechanics advocates for advancing societal health by optimizing wellness and human performance through the rigorous application of mechanical principles to biological systems. We are committed to excellence in quantitative movement analysis education, translational research, clinical diagnostics, and ergonomic service.

VISION

By integrating engineering principles, rehabilitation science, and clinical practice, the Department of Biomechanics excels in:

- **Graduating** clinically analytical professionals capable of delivering precision-based client care through critical thinking, biomechanical evidence-based practice, and technological proficiency.

- **Providing** cutting-edge knowledge that bridges the gap between mechanical theory and clinical reality, supporting rehabilitation through expertise in kinematics, kinetics, and instrumentation.

- **Guiding** the physical therapy profession toward a more objective, data-driven future through engagement with international societies of biomechanics, engineering bodies, and rehabilitation communities.

VALUES

These values will serve as the basis for the Department of Biomechanics to fulfill its mission and achieve its vision.

- **Scientific Rigor & Precision:** Commitment to accuracy in measurement and analysis.

- **Innovation:** Embracing emerging technologies in motion capture and modeling.

- **Interdisciplinary Collaboration:** Bridging physical therapy with engineering and data science.

- **Excellence:** In teaching, research, and service.

- **Ethical Responsibility:** Integrity in data handling and subject safety.

- **Diversity & Inclusivity:** Ensuring broad representation in our faculty and research cohorts.

GOAL 1: ACHIEVE NATIONAL AND INTERNATIONAL PRE-EMINENCE THROUGH COLLABORATIONS AND INTER-PROFESSIONAL PART-NERSHIPS

- **Objective A:** Establish a specialized *"Center for Human Movement & Performance"* to address biomechanical factors affecting age-related mobility decline and fall prevention strategies.

- **Objective B:** Create advanced clinical residency and training programs focused on **Instrumented Gait Analysis** and **Occupational Ergonomics**.

- **Objective C:** Maximize interprofessional spheres of influence by partnering with Faculties of Engineering and Computer Science to utilize shared resources for biomedical modeling.

GOAL 2: ENSURE AN INFRASTRUCTURE OF HUMAN AND PHYSI-CAL RESOURCES THAT PROMOTES EFFICIENT, EFFECTIVE, AND CUTTING-EDGE OPERATIONS

- **Objective A:** Complete a postgraduate infrastructure plan to sustain the cali-bration, maintenance, and operation of high-fidelity **Motion Analysis Labora-tories**.

- **Objective B:** Develop a comprehensive recruitment plan to attract faculty spe-cializing in **Computational Biomechanics**, **Sports Engineering**, and **Tissue Me-chanics**.

- **Objective C:** Integrate advanced technologies—such as **3D Motion Capture Systems, Force Platforms, and Isokinetic Dynamometers**—to maximize edu-cational outcomes and research precision.

GOAL 3: ESTABLISH ROBUST RESEARCH INITIATIVES THAT DRIVE UNDERGRADUATE KNOWLEDGE AND STUDENT ENGAGEMENT

- **Objective A:** Publish high-impact research focusing on the **kinematic and ki-netic profiling** of musculoskeletal pathologies and the mechanical efficacy of therapeutic interventions.

- **Objective B:** Utilize and validate emerging technologies (e.g., **IMU wearable sensors vs. Optical Gold Standards**) to maximize the accuracy of range of mo-tion estimation and muscle activity recording (EMG).

- **Objective C:** Innovate or modify therapeutic techniques based on **tissue loading capacity** and **joint reaction forces** to treat specific human body disorders effectively.

- **Objective D:** Optimize the role of **fluid mechanics and drag forces** in designing hydrotherapy protocols for musculoskeletal rehabilitation.

- **Objective E:** Establish double-blind, randomized control trials to evaluate the mechanical efficiency of **new prosthetic/orthotic designs** and assistive devices.

- **Objective F:** Integrate **Artificial Intelligence (AI) and Machine Learning** to model human movement patterns and predict injury risk using large biomechanical datasets.

GOAL 4: ENSURE FINANCIAL VIABILITY, SUSTAINABILITY, RESILIENCY, AND GROWTH

- **Objective A:** Maximize available financial resources by commercializing lab services (e.g., offering **professional gait assessments for athletes** or **ergonomic consulting for local industries**).

- **Objective B:** Research and develop new recurrent funding sources through grants aimed at **Rehabilitation Engineering** and **Occupational Health**.

- **Objective C:** Maximize advancement opportunities by increasing endowments and seeking funding for specialized equipment (e.g., wireless EMG systems, pressure mats) from medical technology foundations.

Prof. Dr. Anees Saleh Gheit
Chairman, Department of Biomechanics

Prof. Dr. Mahmoud Ewidea
Dean, Faculty of Physical Therapy