# Omar Kamal

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## Research Statement

Multidisciplinary researcher with expertise in biomaterials, clinical research methodologies, and advanced software solutions for research applications. Passionate in combining materials engineering principles with biological and medical applications to address complex healthcare and medicine challenges. Highly experienced in software development solutions for various research purposes; further experience in designing and implementing controlled trials, and conducting systematic reviews and meta-analyses.

## Relevant Research Interests

**Biomedical Engineering:** Epigenetics-Materials Interactions, Regenerative Medicine, Tissue Engineering, Controlled Drug Delivery Systems, Medical Device Design, Biofabrication
**Materials Science:** Advanced Biomaterials, Nanomaterials, Nanofabrication, Biodegradable Materials, Implant Materials, Piezoelectronics, Thermoelectronics, Semiconductors, Solar Cells
**Research Methods:** Biostatistics, Bioinformatics, Clinical Trial Design, Advanced Research Methodologies, Computational Methods, Software Development for Research Applications

## Education

**University of Alberta** Sep. 2017 – Apr. 2023
*Bachelor of Science in Materials Engineering* *Edmonton, AB*

- **Relevant Coursework:** Materials Characterization, Phase Transformations, Electrochemistry, Biomaterials, Bioengineering Design, Mechanical Properties, Materials Processing, Process Design, Failure Analysis, Thermodynamics, Cell Biology, Chemistry, Dielectric Materials, Semiconductors
- **Technical Skills:** Materials Selection, Computational Materials Science, Materials Modeling and Simulations, ThermoCalc, Porosity Measurement Methods, Processing Techniques, Data Analysis, Data Transformations

## Research Experience

**University of Alberta** 2023 – Present
*Research Assistant, Department of Medicine, under Dr. Roni Kraut* *Edmonton, AB*

- **Pharmaceutical Interventions in Geriatric Care:** Contributed to published research on antihypertensive deprescribing protocols in long-term care settings, optimizing medication regimens for older adults. Applied statistical analysis techniques to evaluate efficacy and safety outcomes.
- **ADHD Assessment Optimization:** Designing and implementing controlled trials of various form designs to evaluate impact on ADHD diagnosis accuracy and efficiency in clinical settings. Creating a digital platform with four distinct form versions to analyze how design influences diagnostic outcomes. Leveraging software development expertise to build custom research tools.
- **Meta-Analysis on Breast Cancer Risk Factors:** Conducting systematic review and meta-analysis of observational studies examining whether breast density serves as a prognostic factor for breast cancer mortality. Applying advanced statistical methods for data extraction, synthesis, and interpretation.
- **Medical Device Efficacy Assessment:** Evaluating inhaler technology, comparing dose delivery accuracy between inhalers with and without dose counters to improve patient medication management and reduce waste. Applying materials engineering principles to analyze device performance and reliability.
- Collaborate with multidisciplinary teams to develop research methodologies, analyze complex datasets, and prepare manuscripts for peer-reviewed publication. Integrate computational approaches to improve research efficiency and data quality.

## Publications

### Peer-Reviewed Journal Articles

- Kraut, R., Kamal, O., Vucenovic, A. (2024). "Deprescribing antihypertensives with weekly taper intervals in long-term care, secondary data analysis of OptimizeBP data." *The Annals of Family Medicine November 2024, 22 (Supplement 1) 6687.* DOI: https://doi.org/10.1370/afm.22.s1.6687

### Manuscripts in Preparation

- Kraut, R., et al. "Is breast density a prognostic factor of breast cancer mortality? A systematic review and meta-analysis of observational studies." *In preparation.*
- Kraut, R., et al. "Comparing the doses remaining in inhalers with dose counters and inhalers without dose counters." *In preparation.*
- Kraut, R., et al. "Effectiveness of different form designs on ADHD diagnosis rates in clinical settings." *In preparation.*

### Conference Presentations & Posters

- Kraut, R. (2024). "Digital Form Design Impact on Clinical ADHD Assessment Efficiency." Poster presented at the North American Primary Care Research Group, Quebec City, QC.

## Engineering Projects

**Binder Jetting & Sintering Process Optimization for QT 450-10 Ductile Iron** 2023
*Research Collaboration, Red Deer Polytechnic & University of Alberta* *Edmonton, AB*

- Led materials characterization study using advanced porosity assessment techniques including gas/liquid pycnometry and image data processing to optimize additive manufacturing processes.
- Collaborated with academic researchers to implement and refine characterization methodologies for ductile iron, contributing to advancements in materials science.
- Analyzed process-structure-property relationships to optimize sintering parameters for enhanced mechanical properties.
- Developed custom software tools for image analysis and data processing, improving measurement precision and experimental throughput.

**Process Design for Wear-Resistant Excavator Blade Teeth** 2022
*Capstone Project, University of Alberta* *Edmonton, AB*

- Developed a comprehensive manufacturing process for high-performance wear-resistant components involving Ni-60 wt% Tungsten Carbide and 17-4 PH Stainless Steel.
- Performed detailed energy, material, and economic analyses to optimize the 50+ step manufacturing process, resulting in 15% cost reduction without compromising performance.
- Utilized ThermoCalc and other computational tools to predict and validate material properties and process parameters.
- Applied statistical design of experiments to efficiently identify optimal processing conditions, reducing development time by 30%.

## Research Skills & Methodologies

**Experimental Design:** Clinical Trial Design, Comparative Studies, Randomized Controlled Trials, Blinded Studies, Crossover Studies
**Data Analysis:** Statistical Analysis, Meta-Analysis, Biostatistics, Data Visualization, Regression Analysis, Survival Analysis
**Research Methods:** Systematic Literature Review, Qualitative Research, Survey Design, Meta-analysis Research
**Materials Characterization:** SEM/TEM, XRD, Mechanical Testing, Porosity Assessment, Thermal Analysis

## Technical Skills

**Programming & Data Analysis:** MATLAB, Python, Rust, Go, TypeScript/JavaScript, C, SQL, Statistical Analysis, Data Visualization, Image/Audio/Data Processing
**Software & Tools:** ThermoCalc, CAD Software, Materials Databases, Research Data Management Systems, Laboratory Information Management Systems
**Programming for Research:** Algorithm Development, Automated Data Collection, Digital Platform Creation, Research Tool Design, Statistical Software Implementation
**Languages:** Fluent in English; Proficient in Urdu/Hindi; Basic proficiency in German, Punjabi and Japanese

## Additional Experience

**Corsace** 2015 – 2024
*Lead Software Developer & Project Manager* *Edmonton, AB*

- Developed data management systems and analytical tools for large-scale international events, handling complex datasets and implementing efficient data processing workflows.
- Created automation systems that reduced manual workload by 50% through implementation of database-driven solutions and process optimization.
- Led cross-functional teams and coordinated with stakeholders to ensure project milestones were met consistently and efficiently.
- Applied advanced statistical methods to analyze user engagement patterns and optimize platform performance.

**Shifa Medical Clinic** 2014 – 2017
*Technical Assistant* *Edmonton, AB*

- Managed electronic medical record systems, ensuring 100% compliance with PIPEDA protocols while optimizing database performance for improved clinical workflow.
- Established secure protocols for patient data transfer between healthcare facilities, maintaining strict confidentiality standards and data integrity.
- Developed technical solutions for healthcare data management that reduced information retrieval time by 200% and improved clinical decision-making efficiency.