

Shakti Banik

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EDUCATION

Master of Science in Mechanical Engineering

August 2025 – Present

Washington State University – Vancouver

Vancouver, WA

- CGPA – 4.00/4.00

Bachelor of Science in Mechanical Engineering

March 2018 – May 2023

Bangladesh University of Engineering and Technology (BUET)

Dhaka, Bangladesh

- CGPA – 3.52/4.00 (81st out of 189 students)
- University Merit Scholarship for academic excellence in one undergraduate semester.

RESEARCH EXPERIENCE

Graduate Research

August 2025 – Present

Title: Development of a Paper Based Colorimetric Biosensor for Cannabidiol (CBD) Monitoring Toward Pain Management Applications

Supervisor: *Dr. Jong-Hoon Kim, Associate Professor, Department of Mechanical Engineering, WSU Vancouver*

- **Experimentally developed** a low-cost paper-based colorimetric biosensor for CBD detection using Fast Blue B chemistry and smartphone imaging.
- **Developed a CIELAB-based digital image analysis method** for blank-referenced color segmentation and signal quantification.
- **Evaluated sensor performance** in CBD reference solutions and CBD-spiked saliva, with detectable responses down to 0.05 $\mu\text{g/mL}$ and 0.1 $\mu\text{g/mL}$, respectively.
- **Preparing for human-subject testing** with CBD-treated patients to evaluate sensor performance using clinical saliva samples.

Undergraduate Research

May 2022 – May 2023

Title: Design and Analysis of a Bladeless Air Jet Windscreen Wiper System

Supervisor: *Dr. Md. Ehsan, Professor, Department of Mechanical Engineering, BUET*

- **Designed and experimentally evaluated** a bladeless air-jet windscreen wiper system using different nozzle geometries.
- **Modeled rain and airflow characteristics** using experimental measurements and MATLAB, and assessed visibility and power consumption.

PUBLICATION

- **Banik, S., Fales, J., & Kim, J.-H.** (2026). Biosensing technologies for cannabinoid monitoring in pain management: Current methods, clinical needs, and translational challenges. *Journal of Pharmaceutical and Biomedical Analysis*, 281, 117673. <https://doi.org/10.1016/j.jpba.2026.117673>

CONFERENCE ABSTRACTS

- **Banik, S. and Kim, J.-H.**, “Development of a Paper-Based Colorimetric Biosensor for Cannabidiol Monitoring Toward Pain-Management Applications,” *ASME 2026 International Mechanical Engineering Congress and Exposition (IMECE 2026)*, Vancouver, British Columbia, Canada, November 8–12, 2026. (Accepted)

TEACHING & PROFESSIONAL EXPERIENCE

Graduate Teaching Assistant

August 2025 – Present

Washington State University Vancouver, School of Engineering and Computer Science

Vancouver, WA

- **Teaching Assistant for five undergraduate engineering courses:** MECH 211 Statics, MECH 215 Mechanics of Materials, MECH 304 Introduction to Electronic Circuits, MECH 310 Manufacturing Processes, and MECH 309 Engineering Materials.

- **Serve as laboratory instructor for MECH 309 Engineering Materials**, leading hands-on experiments in dimensional metrology, composite characterization, optical microscopy, and Instron mechanical testing.
- **Led two hands-on LTspice demonstration sessions** for MECH 304 Introduction to Electronic Circuits, teaching students circuit simulation and basic software use.
- **Support undergraduate instruction** through grading, office hours, laboratory supervision, technical guidance, and individualized assistance with engineering concepts and data analysis.

Industrial Trainee

October 2022 – November 2022

Synovia Pharma PLC (formerly Sanofi Bangladesh Limited)

Dhaka, Bangladesh

- **Analyzed water losses** in a pharmaceutical effluent treatment plant (ETP) and recommended calibration of process measurement instruments.
- **Developed a standardized condition-based monitoring profile** and supported troubleshooting of industrial HVAC systems.

PROJECTS

Arogya: Smart Medicine Dispensing Box for Elderly Care

Apr 2021 – Aug 2021

- Developed an Arduino-based medicine dispenser with automated alerts and Bluetooth-controlled scheduling through a caregiver-integrated Android app.

TECHNICAL SKILLS

- **Experimental & Biosensing:** Experimental design, biosensor development, biological sample testing.
- **Image & Data Analysis:** Image processing, statistical analysis, MATLAB, Python.
- **Cleanroom & Microfabrication:** Photolithography, spin coating, wet chemical etching, RF magnetron sputtering, thin-film processing.
- **Characterization & Instrumentation:** Optical microscopy, ellipsometry, optical/stylus profilometry, Instron mechanical testing.
- **Research Compliance:** CITI Human Subjects Research (Biomedical Research); Biomedical Responsible Conduct of Research (RCR).

TEST SCORE

IELTS Academic: Overall 8.0 (Listening: 8.0, Reading: 8.0, Writing: 8.0, Speaking: 7.0) October 2024

RESEARCH INTERESTS

Biosensors & Bioelectronics	Point-of-Care Diagnostics	Wearable Biosensors
Micro/Nanofabrication	Materials Characterization	Biomedical Imaging

RELEVANT COURSEWORK

Design of Experiments	MEMS Engineering
Lab-on-a-Chip	Machine Learning and AI for Engineers

SELECTED AWARDS & LEADERSHIP

- **Vice President, BUET Photographic Society** May 2022 – June 2023
- **Tareque Masud Best Emerging Director Award**, 15th International Inter-University Short Film Festival November 2023
- **Best Project Award**, Dhaka DocLab September 2023
- **Academic Excellence Award**, University Merit January 2018

REFERENCES

Dr. Jong-Hoon Kim

Associate Professor, Mechanical Engineering
Washington State University Vancouver
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Dr. Praveen Sekhar

Associate Professor, Electrical Engineering
Washington State University Vancouver
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