ANKAN **DUTTA**

Connected Biomedical Devices | Deep Learning | Flexible Ultrasound

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Summary

• Biomedical engineer with 5+ years of experience in connected wearable devices and robotics
• Founder of a medical startup *(failed)* providing home doctor facility along with at-home diagnostics
• Author of 7 papers (9 in review) and contributed two NIH proposals and one company-based proposal
• Interdisciplinary researcher worked with research groups in USA, China, India, Germany, and South Korea
• Research featured in The Science Times, Scary Mommy, Wevolver, DailyMail, New York Post, Toledovuzz

Education

2021 - Present — The Pennsylvania State University, University Park
Ph.D. (2^{nd} year) in Engineering Science and Mechanics *(Expected Graduation 2026)*
GPA : 4.00 / 4.00

Technical Skills

PROGRAMMING	• Python • MATLAB • OpenAI Gym• Java • LaTeX
SIMULATION	• COMSOL • Simulink • LabVIEW• ABAQUS• ROS • AutoCAD • ANSYS • SolidWorks • Creo
NANOFABRICATION	• Maskless Pattern Exposure • Evaporator • Sputtering • Wet Bench
CHARACTERIZATION	• FESEM • EDX • Dicing • Poling (w/o Temperature) • Impedance Analyzer
COURSES COVERED	• Wearable Electronics•NEMS/MEMS• Cellular and Molecular Neuroscience • Neural Interfaces• Neural Data Analysis• Nano Optoelectronics • Underactuated Robotics

Research Experience

Present – August 2021 | **Cheng Research Lab | Ph.D. Researcher, Pennsylvania State University, University Park**
Working with **Prof. Huanyu (Larry) Cheng** to :
- fabricate, characterize *stretchable Ultrasound array* for neural imaging and cavitation
- fabricate *on-demand transient electronics* based magnetic soft-robotics
- design *Reinforcement Learning*-enabled controller for maneuvering transient electronics based soft-robots to targeted location for drug delivery
- develop *Deep Learning* algorithm to detect then decipher words using strain sensor data
- simulate and fabricate *iontronic pressure sensors* to control the sensitivity and linear range
- *decouple stimuli* like gas and temperature using multi-parameter based VO_2-doped Laser Induced Graphene sensor.
- fabricate and design stretchable *energy harvesting and self-powering sensors*

Flexible Ultrasound | On-Demand Transience | Photoacoustic | Transient Implants | Soft Robots | Deep Learning

May 2021 – May 2018 | **Thin Film & Nanoscience Lab | Undergraduate Researcher, Jadavpur University, India**
Working with **Prof. Kalyan Kumar Chattopadhyay** to :
- fabricate and model I-V characteristics of disorder governed Resistive Random Access Memory using Non-Equilibrium Green's Function and Many Body Localization at Room Temperature
- fabricate CNT-based ECG electrodes for heart monitoring textiles (under MEDhof)

Nano | RRAM | Neuromorphic | Synaptic Plasticity | NEGF | Quantum Transport | Bio-synapse | Many Body Localization

May 2021 – August 2018 | **Artificial Intelligence Lab | Undergraduate Researcher, Jadavpur University, India**
Working with **Prof. Amit Konar** to :
- develop statistical learning theory for ANN using Riemannian Manifold
- develop fluid inspired path planning algorithm for Brain Computer Interface controlled wheel-chair
- model Motion Planning for ABB Robotic Manipulator to play table tennis

Neural Network | Robotics | Statistical Learning Theory | Reinforcement Learning | Brain Computer Interface

Leadership & Teaching Skills

• Founded MEDhof, a medical startup supplying at-home diagnostics and providing home doctor facility
• Lead a team of 35 doctors and 12 core members under MEDhof with a valuation of $150k
• Served as a Teaching Assistant for a year, teaching Statics and Dynamics to a class of 420 students.

Publications

- Pathway of Transient Electronics towards Connected Biomedical Applications *(First Author)* Nanoscale

- Vanadium Oxide-Doped Laser-Induced Graphene Multi-Parameter Sensor to Decouple Soil Nitrogen Loss and Temperature *(Fourth Author)* Advanced Materials
- Pencil-on-Paper Humidity Sensor Treated with NaCl Solution for Health Monitoring and Skin Characterization *(Fourth Author)* Nano Letters
- Fully stretchable, porous Mxene-Graphene foam nanocomposites for energy harvesting and self-powered sensing *(Fiveth Author)* Nano Energy
- Iontronic pressure sensor with ultra-board linear range and high sensitivity enabled by laser-induced gradient pyramidal structures *(Second Author)* Preprint
- Chaos and complexity from quantum neural network. A study with diffusion metric in machine learning *(Second Author)* JHEP
- Geometry perspective of estimating learning capability of neural networks *(First Author)* arXiv

Projects

MEDhof | Founder 2016 - 2018

medhof.com
A medical startup that provides distributed patient-centered medical home facility. We are working on point-of-care medical technologies by collecting real-time medical data-points
• ECG based e-textile for cardiac patients with Jadavpur University Thin Film & Nanoscience Lab
• Volumetric Food Calorie Estimation using GIF captured in mobile camera
• Multi Piezo-Based Shoe to analyse the gait movement with Jadavpur University Organic Nano Piezoelectric Devices Lab

Medical Service Startup | Health Monitoring Textile | Food Calorie Estimator | Gait Movement

Friendly sleep pattern monitoring device Jan 2020

MIT India Initiative Design, Technology & Social Innovation Workshop under Community based Healthcare
A friendly, comfortable EEG cap with a personal touch of cartoon characters close to people has been prototyped, collecting EEG data for a much longer period. The project was selected to be funded by Aarogya Seva, India.

EEG | Sleep Pattern | Brain Computer Interface

QUICKSOLUTIONS : Sewage Pooling Test for SARS-CoV-2 April 2020

Techstars Startup CoVID-19 Challenge, India Chapter Sewage Pooling Test for SARS-CoV-2
A method that uses wastewater samples from sewage systems to pinpoint the regions which are affected by maximum chances of the virus spread. The algorithm also uses a priority-based backtracking procedure to perform testing in sewage links depending on the probability of infection in the sub-areas.

CoVID-19 | Sewage Pooling Test | Bio-statistics

Neuromatch Academy | Project Student - Computational Neuroscience July 2021

Neuromatch Academy
Improved the latency detection and Brain Atlas correspondence using Face-House Dataset.

Neural Data | EEG | Brain Atlas

Awards & Achievements

2022 Attended SAE Media Group's Biosensors for Medical Wearables conference, Boston, MA
2022 Selected for Business of Science Bootcamp, Penn State, PA
2021 Awarded Science & Engineering Research Board (SERB) Fellowship for Theoretical and Simulation of an alternative Resistive Switching of Ag-PANI composite - Indian Association for the Cultivation of Science
2020 Awarded Science & Engineering Research Board (SERB) Fellowship for Size Selective Carbon Quantum Dots and its Application to Luminescence and Solar Cell - Jadavpur University, India
2020 Selected for MIT India Initiative Design, Technology & Social Innovation Workshop under Community based Healthcare
2020 Winner at Techstars Startup CoVID-19 Challenge, India Chapter for QUICKSOLUTIONS
2020 Selected for MIT CoVID-19 Challenge and one of the founding members of the team, which became one of the finalists in Falling Walls 2020

Social Activities

- Member of Blood Donors Association and responsible for organizing monthly cultural orientation for Thalassemia patients
- Organized Medical Camps to spread awareness about mental health under Social Responsibility flag of MEDhof
- Part of a survey visit at St Jude's India Child Care Centers, Mumbai, India under MIT India Initiative