Reva Teotia

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Education

The University of British Columbia — Vancouver, Canada
M.A.Sc. in Electrical and Computer Engineering; 97% (GPA 4.33/4.33) — *Sept 2023 - present*

Birla Institute of Technology and Science, Pilani — Pilani, India
B.E. in Electrical and Electronics Engineering; CGPA:9.19/10.0 — *Sept 2019 - May 2023*

Experience

- **Technical University of Munich (TUM)** — Munich, Germany
  Research Internship, Chair of Circuit Design — *Feb 2023 - April 2023*
  - **Miniaturized Impedimetric Electrochemical Ion Sensor**
    - Studying literature on the principle of Electrochemical Impedance Spectroscopy (EIS) and Ion Sensitive Electrode based ion-sensing and bio-sensing applications.
    - Conducting FEM simulations using *COMSOL Multiphysics* to design and investigate the performance of ion sensor under varied membrane composition and electrode design
    - Developing an equivalent circuit for the sensor through measured data, in order to estimate the relative permittivity of the membrane in response to the ion solution

- **University of Windsor** — Windsor, Canada
  Mitacs Globalink Research Intern, e-Minds Lab — *Jun 2022 - August 2022*
  - **Investigation of CMUTs for gas sensing application**
    - Conducted FEM simulations using *COMSOL Multiphysics* to design and investigate the performance of MEMS sensor under varied conditions
    - Measured the response of the fabricated MEMS devices using multiple instruments like *impedance analyzer* and *Laser Doppler Vibrometer(LDV)*
    - Compared the simulated results with the measured values through analysis in *MATLAB*

- **CSIR-Central Electronics Engineering Research Institute** — Pilani, India
  Summer Research Intern, VLSI Design & Circuit Design group — *Jun 2021 - Jul 2021*
  - **Design and Investigation of Photoacoustic Detector** [presentation][report]
    - Conducted literature review on photoacoustic detectors and MEMS microphones, specifically the design aspect of capacitive MEMS microphones
    - Designed a *circular corrugated diaphragm capacitive MEMS microphone* for photoacoustic detection of trace gases on COMSOL Multiphysics
    - Simulated the capacitive MEMS microphone using *COMSOL-Multiphysics* and studied the effects of microphone design parameters on sensitivity response

Publications

- CNN and LSTM based Ensemble Learning for Human Emotion Recognition using EEG Recordings,
  Abhishek Iyer, Srimit Sritik Das, **Reva Teotia**, S. Maheshwari, Rishi Raj Sharma,
  Multimedia Tools and Applications [paper]

- Flexible and Wearable Sensors for Health Monitoring Applications
  Navneet Gupta and **Reva Teotia**,
  Miniaturized Electrochemical Devices: Advanced Concepts, Fabrication, and Applications, 2023 [book chapter]

Academic Projects

- **Fabrication and Characterization of Solid State VOC Sensor**
  Dr. Arnab Hazra, Dept. of EEE, BITS Pilani *Sept 2022 - Dec 2022*
  - Fabricated MoS_2 quantum dot decorated TiO_2 nanotubes sandwitched between Au and Ti electrode based solid state sensor for volatile organic compound (VOC) sensing
  - Studing the sensor response for various VOCs at different temperatures to get the most sensitive response
  - Charactering the sensor using impedance analysis from LCR meter and through capacitive response of the sensor

- **Review on Flexible Batteries for Wearable Applications** [presentation]
  Prof. Navneet Gupta, Dept. of EEE, BITS Pilani *Feb 2022 - May 2022*
  - Conducted literature review on different battery topologies that are employed for flexible batteries
  - Reviewed Li-ion, Metal oxide and polymer based batteries for flexible wearable applications

- **Study on Flexible & Wearable Sensors for Human Health Monitoring** [presentation]
  Prof. Navneet Gupta, Dept. of EEE, BITS Pilani *Jan 2022 - May 2022*
  - Conducted literature review on various transduction methods for flexible health monitoring sensors
  - Studied wearable sensors with main focus on temperature, pressure and strain sensors

- **Implementation of DoubleU-Net** [presentation][code]
  Prof. Surekha Bhanot, Dept. of EEE, BITS Pilani *Oct 2021 - Dec 2021*
  - Studied *DoubleU-Net: A Deep Convolutional NeuralNetwork for Medical Image Segmentation* and re-implemented using TensorFlow, Keras
  - Analysed the model features like VGG-19 encoder, squeeze and excite blocks, ASPP between the encoder and decoder blocks, etc and compared the model with traditional U-net
  - Trained the model with modified hyperparameters and achieved significantly better performance than the author's model for CVC-ClinicDB dataset. The performance is evaluated on IoU, DSC, precision, recall and testing loss

- **Study of Non-Invasive Devices for Health Monitoring** [presentation]
  Dr. Syamantak Majumdar, Dept. of Biology, BITS Pilani *Aug 2021 - Dec 2021*
  - Conducted literature review on various non-invasive methods of human health monitoring and the different applications of real time health monitoring
  - Simulated a microfluidic sweat collector and electrochemical detectors for monitoring multiple biomarkers, namely glucose, sodium and chloride
  - Designed and simulated transimpedence amplifier and voltage amplifier with low pass filter for the readout of the electrochemical signal

- **Deep Learning for Human Emotion Recognition using EEG Recordings** [presentation]
  Dr. Shishir Maheshwari, Dept. of EEE, BITS Pilani *Jan 2021 - April 2021*
  - Designed and developed a CNN and LSTM based hybrid deep learning model to classify EEG signal data into different emotions
  - The developed model with ensemble learning achieves near state-of-the-art accuracy of 97.16% on *SJTU Emotion EEG Dataset (SEED)*
  - This work is published in *Multimedia Tools and Applications*

Technical Skills

- **Software and Tools**: COMSOL Multiphysics, LTspice, Gamry Echem Analyst, Microwind, Logisim
- **Laboratory Instruments**: Impedance Analyzer, Laser Doppler Vibrometer, LCR meter
- **Programming Languages**: MATLAB, Python(Libraries: Pytorch, TensorFlow, Keras, numpy)

Relevant Courses

- **Electrical Engineering**: Electronic Devices, Microelectronics, Control Systems, Analog Electronics,Digital Design, Analog and Digital VLSI Design, Microprocessors Programming and Interfacing Electrical Science, Power Electronics, Nanoelectronics and Nanophotonics Technology
- **Interdisciplinary**: Flexible and Stretchable Electronics, Introduction to MEMS, Medical Instrumentation, Introduction to Biomedical Engineering
- **Deep Learning**: Neural Networks and Fuzzy Logic, Deep Learning Specialization*
- **Mathematics**: Introduction to Differential & Integral Calculus (Math I), Linear Algebra & Complex Analysis (Math II), Differential Equations (Math III), Probability & Statistics, Optimization

* -online Coursera courses,

Scholastic Achievements

- Awarded the *Best Girl Graduating* Student Award Electrical and Electronics Engineering Department for the year 2023
- Selected for the Mitacs Globalink Research Internship program-2022 to conduct research in Canada

Extra Curricular and Voluntary Work

- **Coordinator**, Academic Counseling Cell BITS Pilani (2022-2023 session)
  - Managed the event 'Life at BITS and Beyond', a panel discussion aimed at providing guidance to the newly admitted students
  - Supported and uplifted the general student community and helped enrich the student-faculty interaction with the objective of enhancing academic ambience on campus
- **Mentor**, Peer Mentorship Program BITS Pilani (2020-2021 session)
  - Assisted several first year students in overcoming their initial anxieties and guided them so that they could settle down comfortably in the university environment
  - Personally guided 9 juniors of Electrical Department and supported them in all spheres of their lives