

# Reva Teotia

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## EDUCATION

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### The University of British Columbia

*M.A.Sc. in Electrical and Computer Engineering; 93.7% (GPA 4.22/4.33)*

Research topic: microfabrication of biomedical sensor based on shape memory alloy

Vancouver, Canada

*Sept 2023 - present*

### Birla Institute of Technology and Science, Pilani

*B.E. in Electrical and Electronics Engineering; CGPA:9.19/10.0*

Pilani, India

*Sept 2019 - May 2023*

## RESEARCH EXPERIENCE

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### Technical University of Munich (TUM)

Munich, Germany

*Research Internship, Chair of Circuit Design*

*Feb 2023 - April 2023*

#### ◦ Miniaturized Impedimetric Electrochemical Ion Sensor

[paper]

- \* Developed an electrical equivalent circuit model for electrochemical impedimetric ion sensor through experimentally measured data, to estimate the sensor's response to the ion solution
- \* Conducted FEM simulations using *COMSOL Multiphysics* to design and investigate the performance of ion sensor under varied membrane composition and electrode design
- \* Published findings in **Biosensors (2024)**, contributing a theoretical framework to enhance miniaturized sensor performance in interdisciplinary applications.

### 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 including *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]

- \* 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

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- Electrochemical Impedance Spectroscopy for Ion Sensors with Interdigitated Electrodes: Capacitance Calculations, Equivalent Circuit Models and Design Optimizations, Eva-Maria Korek, **Reva Teotia**, David Herbig, Ralf Brederlow, Biosensors 2024 [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]
- CNN and LSTM based Ensemble Learning for Human Emotion Recognition using EEG Recordings, Abhishek Iyer, Srimrit Sritik Das, **Reva Teotia**, S. Maheshwari, Rishi Raj Sharma, Multimedia Tools and Applications [paper]

## TEACHING EXPERIENCE

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- **ELEC 203: Basic Circuit Analysis:** Managing lab sessions, grading assignments and exams on topics including Kirchhoff's Laws, DC circuits, operational amplifiers, and phasors.
- **ELEC 391: Electrical Engineering Design Studio II:** Assisting students in project design and implementation, covering electronics, control systems, and motors/machines.
- **ELEC 302: Electronic Circuits for Electromechanical Design:** Supervising lab work and grading assignments on semiconductor fundamentals, power supplies, waveform generators, and active filters.

## ACADEMIC PROJECTS

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- **Fabrication and Characterization of Solid State VOC Sensor** [presentation]  
*Dr. Arnab Hazra, Dept. of EEE, BITS Pilani* Sept 2022 - Dec 2022
  - Fabricated  $MoS_2$  quantum dot decorated  $TiO_2$  nanotubes sandwiched between Au and Ti electrode based solid state sensor for volatile organic compound (VOC) sensing
  - Studied the sensor response for various VOCs at different temperatures to get the most sensitive response
  - Characterizing 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 transimpedance 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

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- **Softwares and Programming languages:** MATLAB, COMSOL Multiphysics, LEdit, LTspice, Gamry Echem Analyst, Python(Libraries: Pytorch, TensorFlow, Keras, numpy)
- **Laboratory Instruments:** Impedance Analyzer, Laser Doppler Vibrometer, LCR meter
- **Laboratory Experience:** ISO 5 Cleanroom, Wetbench, Mask-less Aligner, Thin-film Deposition

## SCHOLASTIC ACHIEVEMENTS

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- Recipient of Mitacs Globalink Graduate Fellowship Award 2023 for pursuing graduate studies in Canada
- 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

## RELEVANT COURSES

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- **Electrical Engineering:** Sensors and Actuators in Microsystem, Advanced Microsystem Design, Micro and Nanofabrication Technologies, Green Nanoelectronics, 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:** Wearable Healthcare Devices, 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,

## EXTRA CURRICULAR AND VOLUNTARY WORK

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- **Volunteer**, ECE Graduate Student Association UBC Vancouver (2024-2025 session)
  - Coordinated and facilitated a variety of social, academic, and professional development events aimed at fostering a strong sense of community and collaboration among graduate students
  - Volunteered and organized sports activities and mental health support programs to enhance the social well-being of graduate students, promoting physical health, stress relief, and a supportive community
- **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