Sindhu C M Gowda E-mail: sindhu.gowda@mail.utoronto.ca Phone: +1-647-354-6656

Education

2018 (Ongoing)	Ph.D	University of Toronto	3.8/4.0
2012 - 2017	B.Tech M.Tech Dual Degree	National Institute of Tech. Rourkela	9.4/10.0

Academic Achievements

- Selected as one of 100 **Leaders of Tomorrow** for **GAP summit 2019** at **Broad Institute of MIT and Harvard.**
- Received **MITACS Graduate Fellowship**, **2018-2019**.
- Received **MITACS Globalink Scholarship 2016** to pursue research at the University of Toronto, Canada.
- Received **DAAD WISE Scholarship 2015** to pursue research at Bremen University, Germany.
- Received the **Academic Excellence Award** for exceptional performance for two consecutive academic sessions.
- Placed in the top 10% in the national-level **Astronomy Olympiad**, 2010.
- Secured 22^{nd} place in state, in National Talent Search Exam **(NTSE)**, 2008 to receive scholarship for high school education.

Research Experiences

Centre for Mental Health and Addiction(CAMH)

Student Researcher, University Health Network — Jan '19 - Present

Learning Bio-Markers of Social Cognition in Schizophrenia using fMRI

Adviosr : Prof.Ashish Khisti and Dr.Aristotle Voineskos

- Working on applying machine learning and signal processing to delineate the neural pathophysiology underlying impaired social cognition in people with Schizophrenia Spectrum Disorders(SSD) with the belief that this will inform therapeutic discovery.
- The SPINS study data is one of the largest and most comprehensive dataset collected till date of neuroimaging and social cognitive tasks in subjects with SSD.
- Working on time-resolved functional connectivity networks to identify subgroups of SSD with similar social cognitive brain-behavior relationships using a novel supervised and unsupervised representation learning techniques.
- Implemented a latent variable model to delineate group specific responses from fMRI time series and analysed the data as graphs using signal processing and deep learning architectures.

Li Ka-shing Centre for Healthcare Analytics Research and Training (LKS-CHART)

Research Visitor Student, St.Michael's Hospital — Feb '19 - Present

Early Risk Prediction in the General Internal Medicine (GIM) Ward

Adviosr : Prof.Marzyeh Ghassemi

- Worked as a group of 3 to Model patient data of the first 24 hours of admission for early assessment of ICU transfer/death or discharge.
- Implemented various Deep Learning architectures, without recurrence, with recurrence, and graph neural networks such as GRU-D, Graph CNNs to exploit different possible underlying structure in provided data.
- Proposed a data-driven regularization layer that motivates better patient-embeddings and generalization by incorporating the diagnosis information through the ICD codes into the model training without having to need them during inference.

Indian Institute of Science, India

Project Associate, In collaboration with Nokia Labs — July '17 - May '18

Resource Allocation in Dynamic TDD

Adviosr : Prof.Neelesh B Mehta

- Worked on Dynamic TDD systems, were new interference links are present between BS-BS and UE-UE that are in different transmission modes (uplink, downlink).
- Implemented limited feedback scheme to limit the feedback overhead of CSI of interference links between the uplink and the downlink UEs in adjacent cells.
- Formulated a novel feedback conditioned throughput optimal - discrete rate adaptation policy along with optimal power allocation that showed improved results over other discrete adaptation schemes.

University of Toronto, Canada
Research Intern — May - July '16

Delay Sensitive Error Correction Codes for Streaming Applications
Advisor : Prof. Ashish Khisti

- Analyzed efficiency and structure of existing channel coding techniques for error correction in video streaming applications. Compared these codes through various performance metrics.
- Proposed various convolutional codes with memory as an error correction technique for higher efficiency. Formalized the problem as a Markov decision process and optimized the solution by Dynamic programming.
- Proposed the I-frame resetting convolution code was shown to outperform the conventional reed solomon codes and popular streaming codes.

Bremen University of Applied Sciences, Germany
Research Intern, In collaboration with e-Pholution — May - July '15

Building a Moire Deflectometry
Advisor : Prof. Friedrich Fleischmann.

- Analyzed different measurement techniques for obtaining the power and higher order aberrations map of the Progressive Addition Lenses (PAL) and proposed Moire deflectometry as an effecient technique for lensometry.
- Moire patterns and Talbot effect were studied and simulated in Zemax Optic studio, to analyse the map of ray deflections.
- Conducted experiments to understand various effects that occur in the Moire deflectometry and compared them with the simulation results. Moire deflectometry was successfully built to measure focal length of various ranges.

Publications

- A. K. Mishra, **S. C. M. Gowda** and P. Singh, *Performance Analysis of Bidirectional Multi-User Multi-Relay Transmission Systems with Channel Estimation Error and Hardware Impairments*, IEEE Transcations on Vehicular Technology, 2019.
- A. K. Mishra, **S. C. M. Gowda** and P. Singh, *OOP Analysis of TWR and OWR Systems with RF Impairments and Channel Estimation Error*, IEEE 88^{th} Vehicular Technology Conference (VTC-Fall), Chicago, USA, 2018.
- A. K. Mishra, **S. C. M. Gowda** and P. Singh, *Impact of Hardware Impairments on Two-Way and One-Way Amplify and Forward Relaying Systems with Imperfect Channel Estimates*, IEEE Wireless Communications and Networking Conference (WCNC), San Francisco, California, USA, 2017.
- A. K. Mishra, **S. C. M. Gowda** and P. Singh, *On the Effect of Hardware Impairments on Two-Way Relay Networks with ICE*, IEEE 86^{th} Vehicular Technology Conference (VTC-Fall), Toronto, Canada, 2017.
- A. K. Mishra, **S. C. M. Gowda** and P. Singh, *Outage Performance of Variable-Gain AF Relaying Systems in the Combined Presence of HWI and ICE: Analysis and Comparison*, IEEE 86^{th} Vehicular Technology Conference (VTC-Fall), Toronto, Canada, 2017.

M.Tech Thesis

Effect of hardware impairments on relaying systems with imperfect channel estimates
Advisor : Prof. Poonam Singh — Aug - Dec '16

- Studied the effect of **hardware impairments** on various relaying systems, this makes the system under analysis more **practical and physically realizable**.
- **Channel state information** sensitive **two-way relaying** systems with **imperfect channel estimates** were particularly analysed. The study of various system parameters such as **outage probability and symbol error rate** showed that such impairments affect the channel estimation process and introduce a ceiling on maximum transmittable rate and an irreducible **outage floor.**
- The study also showed that increasing the **pilot length** and not the **pilot power** is the solution to get better system performance.

PhD Coursework

ECE1502H : Information Theory
ECE1505H : Convex Optimization
CSC2541H : Machine Learning for Health
ECE1504H : Statistical Learning
CSC2506H : Probabilistic Learning and Reasoning
JDE1000H : Ethics in Research

Extra-Curricular Involvements

2019 | **Leader of Tomorrow, GAP Summit, Global Biotech Revolution**
Part of Team that focused on the gap Technological Advances to Diagnosis and Management at the Voices of Tomorrow competition at GapSummit 2019 held at Broad Institute of MIT and Harvard.

2013 - 2016 | **Secretary, AASRA, social service wing of NIT Rourkela**

- Volunteered to teach the under-privileged kids of a nearly slum in the city for 2 evenings a week.
- Part of the team that coordinated to conduct health camps in the leprosy colonies.
- Part of the diya project aimed at involving these women in the workforce and redirecting the generated profits to make the workplace sustainable by

  helping them start a small scale industry.
- Planning and execution of various activities that tried to tap the creative side of the children and provide them opportunities and guidance to explore various career paths.

2012 - 2014 | **Member, Clarion, Debating club of NIT Rourkela**

2012 - 2014 | **Member, Cyborg, Robotics club of NIT Rourkela**

2012 - 2014 | **Player, Institute Basketball Team**
Represented institute's Basketball team in Inter NIT sports meet, 2013

Previous | **Music and Dance**
Trained Carnatic singer and Bharathanatyam dancer.