

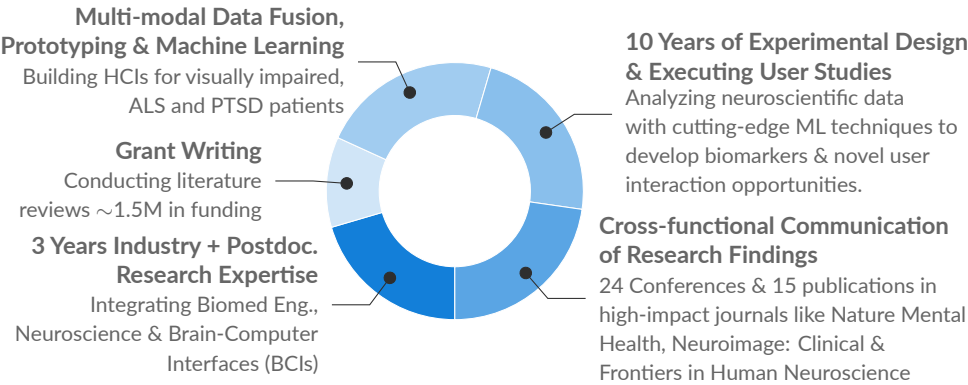
# Dr. Saurabh Bhaskar Shaw

Translational neuroscientist at the intersection of Brain & AI,  
passionate about improving Human-Computer Interactions (HCIs)  
for better quality-of-life

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## TECHNICAL SKILLS



## EXPERIENCE

### Senior Data Scientist

- 📍 Cognixion Inc.    📅 2022 – 2023
- Leveraged foundational expertise in neuroscience at the intersection of brain-computer interfaces, ML theory, selective visual attention, & decision-making to develop & optimize the flagship Brain Computer Interface (BCI) in Augmented Reality (AR) - Cognixion One.
  - Conceptualized, designed & led studies to investigate the impact of technological & spatial factors (e.g. shape/design of stimuli), user fatigue/comfort, prior user expertise, & noise sources in naturalistic user environments (e.g. ventilators for those with Amyotrophic Lateral Sclerosis - ALS) on the visual attention-based BCI performance.
  - Investigated neural & behavioural correlates of visual attention affecting BCI performance in healthy users & those with ALS using Python/MATLAB-based ML tools.
  - Designed customized signal-processing pipelines & AI algorithms that optimized BCI performance under different user states.
  - Collaborated cross-functionally with engineering teams to translate research insights into production, transformative technology prototypes, & demonstrations (e.g. novel BCI paradigms).
  - Drove collaborations with academic research partners to secure funding & test novel applications.

### Adjunct Research Professor

- 📍 Western University    📅 2022 – Ongoing
- Leveraged foundational expertise in neuroscience & designed studies to study altered sensory processing (touch, visual, auditory) in those with PTSD & its subtype.
  - Investigated neural & behavioural correlates of altered sensory processing in those with PTSD using Python/MATLAB-based ML tools for use as clinical biomarkers.
  - Effectively communicated research results through presentations at international conferences & publications in high-impact journals (e.g. Nature Mental Health, Neuroimage: Clinical - see [1], [2], [3]) as first author, contributing author & senior author.
  - Supervised, mentored & collaborated with clinicians, researchers & engineers, including 2 graduate students (PhD).

### MITACS Industrial Post-doctoral Fellow

- 📍 Homewood Research Institute    📅 2020 – 2022
- Designed & executed research/clinical studies to identify neural biomarkers of PTSD & affordable BCI-based therapy for vulnerable populations in naturalistic environments (e.g. Indigenous peoples).
  - Identified novel neural & behavioural correlates of PTSD subtypes using cutting-edge machine learning tools (Python/MATLAB/HPC) & tested affordable BCI-based therapy (neurofeedback).
  - Acquired 1.2M\$ in funding through effective cross-functional partnerships & stakeholder meetings.
  - Effectively communicated research results to stakeholders including publications in high-impact journals (e.g. Nature Mental Health, Neuroimage: Clinical - see [1], [4], [5]) & presentations at international conferences.

## NOTABLE ACHIEVEMENTS

- 🏆 **Designed novel AI algorithms for detecting neural correlates of brain networks & mental states**  
using effective multimodal data fusion (EEG-fMRI, EMG, ECG) to allow the use of EEG-based cost-effective biomarkers in psychiatry & BCIs in AR.
- ⚙️ **Deep understanding & applied experience of AI/ML tools**  
such as classifiers, deep-learning models, transformers, Large Language Models (LLMs) and other generative AI models, implemented through Python, MATLAB, & C-based tools such as TensorFlow, Pytorch to pull out actionable insights from complex multimodal datasets.
- 💓 **Validated clinical applications through numerous user studies**  
testing identified biomarkers & neurofeedback therapy in youth, indigenous communities & PTSD patients, using gold-standard randomized controlled trial (RCT)
- 👥 **Great written & oral interdisciplinary communication skills**  
honed through supervising 21 research & engineering students, hosting neurotech events & delivering conference talks.
- 🧑 **Core member of the global BCI & AI research communities**  
Affiliated with and have active collaborations with global BCI & AI research communities, such as the Vector Institute & NeurotechX (co-founder & lead of NeurotechHA).

## EDUCATION

### Ph.D - Neuroscience

McMaster University    📅 2016 – 2020

### M.A.Sc. - Biomedical Engineering



McMaster University    📅 2014 – 2016

### B.Eng. - Electrical & Biomed. Eng.



McMaster University    📅 2010 – 2014

# EXPERIENCE (CONTD...)

## Doctoral Researcher

-  McMaster University
-  2016 - 2020
- Designed & executed 8 research studies, performing extensive data analysis to identify EEG-based biomarkers of brain networks [6] using complex multimodal datasets, validate them in healthy individuals [7], & use them to assess therapies [8].
  - Supervised & operationally managed a large team of 21 researchers & engineers.

## Founder

-  Serenity Systems
-  September 2013
- Conceptualized & designed a tactile-based HCI for communicating navigation signals to visually impaired users.
  - Performed validation study of device in visually impaired users, assessing efficacy against current competitors in a simulated naturalistic environment (see [9]).

# NOTABLE GRANTS & AWARDS


- Phase 1 & 2 IDEaS Grant - \$1.2M**  
Highly competitive national grant awarded by Defence Research and Development Canada to study problems faced by Canadian Armed Forces, & test possible solutions.
- MITACS Elevate Post-doctoral Fellowship - \$100,000**  
Postdoctoral fellowship designed for collaborative projects bridging industry and academia.
- Vector Postgraduate Affiliate Program Awardee - \$7000/year**  
Awarded by the Vector Postgraduate Affiliates Committee based on the strength of research contributions to the field of artificial intelligence (AI) and machine learning (ML).
- NSERC Alliance Grant (via Cognixion) - \$20,000**  
Highly competitive national grant awarded for collaborations between industry and academia.
- NSERC Discovery Grant - \$ 35,000/year**  
Competitive long-term national grant to support research in science & engineering.
- NSERC Alexander Graham Bell Canada Graduate Scholarship Doctoral (CGS-D) - \$35,000/year**  
Highly competitive national award, offered to the top-ranked applicants engaged in a doctoral program in the natural sciences or engineering.

# SELECT PUBLICATIONS

## Journal Articles

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- S. Shaw, B. Terpou, M. Densmore, *et al.*, "Large-scale functional hyperconnectivity patterns in trauma-related dissociation: An rs-fMRI study of PTSD and its dissociative subtype," *Nature Mental Health*, 2023.
  - M. Chaposhloo, A. A. Nicholson, S. Becker, M. McKinnon, R. Lanius, and S. Shaw, "Investigating differential patterns of hippocampal connectivity in posttraumatic stress disorder (PTSD) via fMRI," *Neuroimage : Clinical*, 2023.
  - B. Kearney, B. Terpou, M. Densmore, *et al.*, "How the body remembers: Examining the default mode and sensorimotor networks during moral injury autobiographical memory retrieval in PTSD," *Neuroimage : Clinical*, 2023.
  - B. Terpou, S. B. Shaw, J. Theberge, M. McKinnon, R. Lanius, and T. Ros, "EEG microstates in PTSD: Identifying resting-state dynamics and classifying PTSD using machine learning," *Neuroimage : Clinical*, 2022.
  - S. B. Shaw, A. A. Nicholson, T. Ros, *et al.*, "Increased top-down control of emotions during symptom provocation working memory tasks following a RCT of alpha-down neurofeedback in PTSD," *Neuroimage : Clinical*, 2023.
  - S. B. Shaw, M. C. McKinnon, J. J. Heisz, A. H. Harrison, J. F. Connolly, and S. Becker, "Tracking the brain's intrinsic connectivity networks in EEG," *bioRxiv*, 2021.
  - S. B. Shaw, M. C. McKinnon, J. Heisz, and S. Becker, "Dynamic task-linked switching between brain networks—a tri-network perspective," *Brain and cognition*, vol. 151, p. 105 725, 2021.
  - S. B. Shaw, Y. Levy, A. Mizzi, *et al.*, "Combined aerobic exercise and neurofeedback lead to improved task-relevant intrinsic network synchrony," *Frontiers in Human Neuroscience*, vol. 16, 2022.
  - A. Bharadwaj, S. B. Shaw, and D. Goldreich, "Comparing tactile to auditory guidance for blind individuals," *Frontiers in human neuroscience*, vol. 13, p. 443, 2019.
  - S. B. Shaw, K. Dhindsa, J. P. Reilly, and S. Becker, "Capturing the forest but missing the trees: Microstates inadequate for characterizing shorter-scale EEG dynamics," *Neural computation*, vol. 31, no. 11, pp. 2177–2211, 2019.
  - D. Kumbhare, S. Shaw, L. Grosman-Rimon, and M. D. Noseworthy, "Quantitative ultrasound assessment of myofascial pain syndrome affecting the trapezius: A reliability study," *Journal of Ultrasound in Medicine*, vol. 36, no. 12, pp. 2559–2568, 2017.
  - D. Kumbhare, S. Shaw, S. Ahmed, and M. D. Noseworthy, "Quantitative ultrasound of trapezius muscle involvement in myofascial pain: Comparison of clinical and healthy population using texture analysis," *Journal of ultrasound*, vol. 23, no. 1, pp. 23–30, 2020.

# SELECT CONFERENCES

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- ## Conference Proceedings
- S.B.Shaw, K. Dhindsa, C. Dematteo, J. Connolly, and M. Noseworthy, "Fractal dimensionality of bold signal as a measure of mild traumatic brain injury (mtbi)," in *Book of Abstracts ESMRMB 2015*, 28(1): MAGMA, 2015, S121–S122.
  - S.B.Shaw, J. Dhillon, D. Shah, E. Lesiuta, and B. Gavrilovic, "Serenity: Tactile navigation system for the visually impaired," in *CNIB Conference 2014*, 2014.
  - S.B.Shaw, A. Akbari, and M. Noseworthy, "Attenuation of contaminating pcr signal in human liver 31p mrs using ferromagnetic mats," in *Book of Abstracts ESMRMB 2013*, 26(1): MAGMA, 2013, pp. 272–273.
  - S.B.Shaw, "Real-time filtering of gradient artifacts from simultaneous EEG-fMRI data," *IEEE PRNI*, 2017.
  - S.B.Shaw, M. McKinnon, J. Heisz, and S. Becker, "Characterization of EEG signatures of DMN, CEN and SN network activity in simultaneously recorded EEG-fMRI during multiple memory tasks," *TAMEG Meeting*, 2018.
  - S.B.Shaw, K. Dhindsa, J. Reilly, and S. Becker, "Capturing the forest but missing the trees: Microstates inadequate for characterizing shorter-scale EEG dynamics," *Canadian Association for Neuroscience (CAN)*, 2019.
  - S.B.Shaw, J. Heisz, M. McKinnon, and S. Becker, "Dynamic switching between brain networks - a tri- network perspective," *Organization of Human Brain Mapping (OHBM)*, 2020.
  - R. Ho, S.B.Shaw, G.Hall, C.DeMatteo, and N.Bock, "Hyperconnectivity of limbic and striatal networks in adolescents with concussion," *Organization of Human Brain Mapping (OHBM)*, 2020.
  - S.B.Shaw, J. Heisz, M. McKinnon, and S. Becker, "Tracking the brain's intrinsic connectivity networks in EEG," *Organization of Human Brain Mapping (OHBM)*, 2022.
  - R. Ho, S.B.Shaw, G.Hall, C.DeMatteo, and N.Bock, "The functional connectivity of the hippocampus in adolescents following concussion," *Organization of Human Brain Mapping (OHBM)*, 2022.
  - R. Ho, S.B.Shaw, G.Hall, C.DeMatteo, and N.Bock, "Dynamic resting state connectivity of the default mode, salience and central executive networks in adolescents with concussion," *International Society for Magnetic Resonance in Medicine (ISMRM)*, 2022.
  - B. Terpou, S.B.Shaw, J. Theberge, *et al.*, "EEG microstates in PTSD: Using machine learning to identify neuromarkers," *50 Years of Microstates*, 2022.
  - B. Jenkins, S. Arbuckle, G. O'Leary, *et al.*, "Development of a microcredential program in neurotechnology," *Society for Neuroscience (SfN)*, 2022.
  - S.B.Shaw, P.Vickers, K.Ritchie, and R.Lanius, "Healing deep intergenerational wounds: Towards a culturally-integrative translational approach to collective recovery," *Boston Trauma Conference*, 2023.

# REFERENCES

Available upon request