# BIOGRAPHICAL SKETCH

NAME: **Kumar, Gajendra**

POSITION TITLE: Assistant Professor (Research)

EDUCATION/TRAINING

| INSTITUTION AND LOCATION | DEGREE *(if applicable)* | Completion Date MM/YYYY | FIELD OF STUDY |
|---|---|---|---|
| All India Institute of Medical Sciences (AIIMS), New Delhi, India. | B. Sc. (Hons.) Human Biology | 06/2005 | Biology |
| All India Institute of Medical Sciences (AIIMS), New Delhi, India. | M. Sc. Pharmacology | 06/2007 | Pharmacology |
| All India Institute of Medical Sciences (AIIMS), New Delhi, India. | PhD Pharmacology | 08/2013 | Pharmacology |
| City University of Hong Kong, Hong Kong | Postdoctoral Fellow | 06/2020 | Neuroscience |

## A. Personal Statement

Electrophysiology, Neuroscience, Neuroelectronic (Brain Computer Interface) and Neurocomputation are major area of my research. I shape my research career by independent development of Electrophysiology, fiber photometry and neurobehavioral facility for rodents at Prof. Eric Morrow's lab to investigate the therapeutic potential of AAV mediated gene therapy in neurodegenerative diseases and dissect the neural circuit. I established optogenetics system synchronized with brain signal recording to decipher the novel neurocircuitry pathway and their role in disease progression. Recently, I developed a computational biology platform to study the brain connectivity and predict the possible brain signal using MATLAB simulation.

In my research, i discovered computation model of Cerebellar ataxia (*Neural Networks* 2023), artificial intelligence and machine learning model to predict the finger kinematics (*Neurocomputing*, 2023), deep brain stimulation to ameliorate the ataxia (*Molecular Neurobiology*, 2022), elucidate the target-specific neural activity and visual function after optic nerve injury (npj *Regenerative Medicine*, 2022; *PNAS*, 2022), dissect the mechanism of glutamatergic system impacts spontaneous motor recovery (npj *Regenerative Medicine*, 2022).

Completed and ongoing research support I would like to highlight include the following:

1.  Health and Medical Research fund (HMRF), Hong Kong (PI: Kumar, Gajendra)       2022 –2025
*Therapeutics potential of low frequency stimulation at pons nuclei (PN) in acute and chronic model of epilepsy in mice (Project was transferred to CHE Ma).*

2.  Innovation and Technology Fund, Hong Kong (Co-PI: Kumar, Gajendra)       2020 – 2022
*Therapeutic Potential of a Novel Deep Brain Stimulation Target Site and Neural Prosthetic Device for Treating Parkinson's disease.*

3.  Innovation and Technology Fund, Hong Kong (Co-PI: Kumar, Gajendra)       2018 – 2020
*Therapeutic potential of neural motor prostheses device for the treatment of spinocerebellar ataxia.*

4.  Applied Research Grant, City University of Hong Kong (Co-PI: Kumar, Gajendra)       2018 – 2019
*Validation of a New Therapeutic Target for Deep Brain Stimulation in Parkinson's Disease*

5. Applied Research Grant, City University of Hong Kong (Co-PI: Kumar, Gajendra)  2017 – 2018
*Development of A Neural Motor Prosthesis Prototype for Restoration of Motor Function in Animal.*


## B. Positions, Scientific Appointments, and Honors

### Positions
| | |
|---|---|
| 2022 – Present | Assistant Professor (Research), Department of Molecular Biology, Cell Biology & Biochemistry, Brown University, Providence, RI |
| 2020 – 2022 | Assistant Professor (Research), Department of Neuroscience, City University of Hong Kong, Hong Kong |

### Honors
| | |
|---|---|
| 2022 | "**Gold Medal**" Invention Geneva Evaluation Days (IGED 2022). AI-based Pharmaco-electroencephalography (EEG) Platform for Drug Screening (Gajendra KUMAR & Dr MA Chi-Him Eddie). |
| 2022 | Hong Kong SciTech Pioneers Award, AniTech Limited (Gajendra KUMAR & Dr MA Chi-Him Eddie). |
| 2022 | IPHatch Hong Kong 2022: IP portfolio Sapphire; Neural Network Circuit offered by Panasonic (Gajendra KUMAR & Dr MA Chi-Him Eddie). |
| 2021 | "**Silver Medal**" Invention Geneva Evaluation Days (IGED 2021). Neural Motor prosthesis Prototype for the Restoration of Motor Function in Spinocerebellar Ataxia (MA Chi-Him Eddie, Gajendra KUMAR, TIN Chung). |
| 2021 | HK Tech 300 (City University of Hong Kong) seed fund awarded for development start-up "AniTech Limited" as pre-clinical contract research organization (CRO) for "Artificial intelligence-based EEG platform for drug development" |
| 2014 | Postdoc top-up funding award: Education Development and Gateway Education (EDGE), City University of Hong Kong, Hong Kong. |
| 2013 | Graduate Teaching Assistant (GTA) fellowship, City University of Hong Kong, Hong Kong. |


## C. Contributions to Science
1. **Discovery of cerebello-thalamo-cortical computational model of spinocerebellar ataxia**
   **Gajendra Kumar#**, Chi Him Eddie Ma. Toward a cerebello-thalamo-cortical computational model of spinocerebellar ataxia. **(Neural Network, 2023, article in press). (#Corresponding author), (IF=9.66).**

2. **Artificial intelligence and machine learning approach to predict the figure movement using EEG and EMG and validation using robotics arms.**
   Tanya Das, Lakhyajit Gohain, Nayan M Kakoty, MB Malarvilib, Prihartini Widiyantic, **Gajendra Kumar[4]#**. Hierarchical Approach for Fusion of Electroencephalography and Electromyography for Predicting Finger Movements and Kinematics using Deep Learning. **Neurocomputing** 2023 March 28; 527:184-195. **(#Corresponding author). (IF=5.71)**

3. **Deep brain stimulation as therapy to ataxia**
   **Kumar G**, Asthana P, Yung WH, Kwan KM, Tin C, Ma CHE. Deep Brain Stimulation of the Interposed Nucleus Reverses Motor Deficits and Stimulates Production of Anti-inflammatory Cytokines in Ataxia Mice. **Mol Neurobiol.** 2022 Jul;59(7):4578-4592. **(IF= 5.59)**

4. **Target specific neural activity exploration for brain connectivity and functional analysis**
   a. Au NPB*, **Kumar G***, Asthana P*, Gao F, Kawaguchi R, Chang RCC, So KF, Hu Y, Geschwind DH, Coppola G, Ma CHE. Clinically relevant small-molecule promotes nerve repair and visual function recovery. NPJ Regen Med. 2022 Oct 1;7(1):50. **(*Co-first author). (IF= 14.4)**
   b. Au NPB, Chand R, **Kumar G**, Asthana P, Tam WY, Tang KM, Ko CC, Ma CHE. A small molecule M1 promotes optic nerve regeneration to restore target-specific neural activity and visual function. Proc Natl Acad Sci U S A. 2022 Nov;119(44):e2121273119. **(IF=14.2)**

5. **List of patents**
   a. Artificial intelligence (AI) and machine learning (ML) based encephalogram (EEG) platform for drug's screening (US patent application No. 63/243; Accepted;14th Sept. 2021). Eddie MA and **Gajendra Kumar**.
   b. Artificial Intelligence (AI) and Machine Learning (ML) Based Encephalogram (EEG) Platform for Drug's Screening (IP license to AniTech Limited). Neurostimulation system and method for modulating abnormal motor movement (EESID: 36425844; US patent application No. 16/454,121): Eddie MA, Chung Tin, **Gajendra Kumar**.
   c. Neurostimulation system and method for modulating abnormal motor movement (EESID: 36425844; US patent application No. 16/454,121): Eddie MA, Chung Tin, **Gajendra Kumar**.

**Complete List of Published Work in My Bibliography:**
https://scholar.google.com/citations?hl=en&user=flJ6ftsAAAAJ&view_op=list_works&sortby=pubdate