

Dr. Sushil Chandra

CONTACT

Department Head of Biomedical Engineering, Institute of Nuclear Medicine and Allied Sciences, Brig. S.K. Mazumdar Marg , Delhi-110054, India

E-mail: sushil.inmas@gmail.com

Phone: 91-9868943125

+91-11-23905222

ABOUT

- 32+ years of experience as a scientist in DRDO working on Cognitive neuroscience, Psychophysiological Tools and methods, Technological and Traditional intervention.
- I have worked on technological intervention such as video gaming and Virtual reality to augment cognition
- I have worked on traditional intervention such as meditation and music to regulate cognition.
- With research, I am passionate about teaching and skilling youth.
- Supervised a cross-functional team including Cognitive neuro-scientists, Information technology Professionals and signal processing experts in development of products for Defence services.
- Enthusiast about implementations of Artificial Intelligence in various fields of Cognition.
- Experience in 360 degree vision, Virtual, Augmented, Mixed reality applications in Defence.
- Validated existing modules of Rajyoga and bharmkumaris with the help of EEG and various NeuroPhysiological measures.
- I have also undertaken knowledge influx sessions as suggested by institute faculty/professors in-order to catalyze their thinking process thereby enabling them to explore new dimensions in their research work related to cognition and Artificial Intelligence.
- Experience in Defence Electronics, Telemedicine, Image compression and processing.
- I have worked on the challenges of neurdevelopmental disorder such as Autism and ADHD.
- Mentored interns in field of Cognitive neuroscience, Development in VR/AR, Signal processing and Artificial Intelligence.
- Completed/Working on Various funded Research Project in the area of Defence communication, Rehabilitation and Neuro-cognition.
- Development and design of obstacle climbing wheelchair and design and development of Robotic Leg (lower extremity prosthesis).
- Authored a chapter Therapeutic Effect of Millimeter Wave Resonance Therapy in Book, "Topics in Electromagnetic Waves" (Edited by J. Behari, © - 2005).
- Well Connected/Partnerships at senior level with various international Organization, NGOs, social Society, Government Department.
- Collaborated a large number of research projects between various professional & educations institutes, Research lab & INMAS.
- Prepared Government Reports for Adaptive Variable Data Rate Modem for High Frequency Communication, Digital Tropo Communication System.
- Visiting Faculty/Advisor/consultancy/Invited Lectures at various engineering colleges for Cognition, Biomedical Engineering, Biomedical Technology, Disaster Management etc.
- Supervised more than 140 Engineering Graduate, 45 Postgraduate and one Ph.D. thesis, currently supervising 2 Ph.D.

WORK EXPERIENCE

Institute of Nuclear Medicine & Allied Sciences, Delhi. India

AUG. 2018 - Present

Scientist 'G'

- Leading the advancement of research and technology tracks to design knowledge in intelligent systems for defence, government, and commercial applications that emulate human decision making in order to make people more prepared, more informed and more capable.
- Envisaging national vision on global corridor for cognitive science and converging technology (Nanotechnology, information technology, cognitive science, Biotechnology)
- Focusing on the human factors and software engineering aspects of integrating such teams while also incorporating artificial intelligence techniques in order to provide intelligent information and interaction capabilities. comprehensive research of spirituality on both mental health and physical health.
- Researching the design and use of computer technology, focused on the interfaces between people and computers

Institute of Nuclear Medicine & Allied Sciences, Delhi. India

JULY 2011 - JULY 2018

Scientist 'F'

- Various paradigms are being designed and are under development regarding their cognitive enhancement.
- Experts on research, technology, and policy related to cognitive science, medical research, and human performance applications.
- Designing a performance-enhancing technology that can accommodate real-world cognitive stressors, such as sleep deprivation, workload, and physical exertion identifying performance matrices for assisting both individual and the team.
- Evaluating cognition performance in network-centric warfare (NCW) settings.
- Developed sophisticated conventional and technological tools such as Meditation techniques, Video games and Virtual reality are being utilized in enhancement of cognitive abilities
- Partnership with: Art of Living, Sparc Wing BrahmaKumaris
- Defence interaction with: DGMT, DG Army Aviation, DG ARTRAC
- common interaction with Tamanna Special School

Institute of Nuclear Medicine & Allied Sciences, Delhi. India

JULY 2004 - JUNE 2011

Scientist 'E'

- Study of Neurocognitive disorders in Defence forces by non-invasive imaging & 2-4 immersion technology.
- Design and Development of Robotic Lower extremity prosthesis.
- Design and Development of Obstacle Climbing Power Wheel Chair.
- Automated Medical image analysis.
- Determination of efficiency of Microwave resonance therapy (MRT) in the treatment of essential hypertension.
- Development of Cholesterol Bio Sensor.
- Monitoring and Technical evaluation of Society for Biomedical Technology (SBMT) projects.

Institute of Nuclear Medicine & Allied Sciences, Delhi. India

JULY 1997 - JUNE 2004

Scientist 'D'

- Development of Cholesterol Bio Sensor.

- Design and Development of Obstacle Climbing Power Wheel Chair
- Design and Development of Robotic Lower extremity prosthesis.
- Development of Rehabilitation Devices for Patients of Spinal Cord Injury Technology Used : Rehabilitation Engineering.
- Government Partnerships with : Ministry of Social Justice and Empowerment, Institute for Physically Handicap, ALMICO, Kanpur
- NGO Partnership with : Indian Spinal Injury Centre, Delhi , P.R. Vadhar Artificial Limb Centre, Bhawnagar

Institute of Nuclear Medicine & Allied Sciences, Delhi. India

JAN. 1993 - JUNE 1997

Scientist 'C'

- Conceptualized & produced a motorized wheel chair (mobility aid).
- Visualized and guided the development of automatic slope-adjusting stretcher.
- Computer controlled animal rotation system.
- Designed & development RF coil of a knee joint for NMR spectroscopy.
- Development of Rehabilitation Devices for Patients of Spinal Cord Injury Technology Used : Embedded System, RF Systems, Mechanical Engineering

Defence Electronics Applications Laboratory,Dehradun. India

JULY 1991 - JAN. 1993

Scientist 'C'

- Worked upon Software-Based Radios, Anti-jam Data Links, Secure Satcom Systems, and Millimetre Wave Communication systems Software Radios, Satellite Communication, Microwave & Millimetre Systems, Image Processing & Analysis.
- Designed and developed adaptive equalizer for tropo-communication
- TOT to BEL, Ghaziabad, India.
- Contributed in development of adaptive variable data rate modern for HF
- Communication / Telemedicine.
- Image compression module for RPV & as spin off medical image
- Technology Used : Tropo Communication, HF Communication, Image Processing
- Government Partnerships with : BEL, Ghaziabad

Defence Electronics Applications Laboratory,Dehradun. India

JULY 1986 - JUNE 1991

Scientist 'B'

- Worked upon Development of Software Based Radios, Anti-jam Data Links, Secure Satcom Systems, and Millimetre Wave Communication systems Software Radios, Satellite Communication, Microwave & Millimetre Systems, Image Processing & Analysis
- Designed and developed adaptive equalizer for tropo-communication
- TOT to BEL, Ghaziabad, India.
- Contributed in development of adaptive variable data rate modern for HF
- Communication / Telemedicine.
- Image compression module for RPV & as spin off medical image
- Technology Used : Tropo Communication, HF Communication, Image Processing
- Government Partnerships with : BEL, Ghaziabad

QUALIFICATIONS

- **Ph.D in Neuro-Cognition**
Netaji Subhas Institute of Technology, New Delhi (2017)
<http://www.nsit.ac.in/>
- **Diploma in Management**
School of Engineering and Technology - IGNOU (1992)
<http://www.ignou.ac.in/>
- **M.Sc. of Engineering (Electrical)**
Aligarh Muslim University, Aligarh-India (1988)
<http://www.amu.ac.in/>
- **Bachelor of Engineering (Electronics)**
Madan Mohan Malviya Engineering College, Gorakhpur-India (1983)
www.mmmec.net

PUBLICATIONS

- Sharma, K., Chandra, S., & Dubey, A. K. (2018). Exploration of Lower Frequency EEG Dynamics and Cortical Alpha Asymmetry in Long-term Rajyoga Meditators. *International Journal of Yoga*, 11(1), 30 – 36
- Sharma, K., Trivedi, R., Chandra, S., Kaur, P., Kumar, P., Singh, K., Dubey, A. K., & Khushu, S (2018). Enhanced white matter integrity in corpus callosum of long term Brahmakumaris Rajayoga meditators. *Brain Connectivity*, 8(1), 49 – 55
- Sharma, G., Kaushal, Y., Chandra, S., Singh, V., Mittal, A. K., & Dutt, V. (2017). Influence of Landmarks on Wayfinding and Brain Connectivity in Immersive Virtual Reality Environment. *Frontiers in Psychology*, 8
- Chandra, S., Jaiswal, A. K., Singh, R., Jha, D., & Mittal, A. P. (2017). Mental Stress: Neurophysiology and its Regulation by Sudarshan Kriya Yoga. *International Journal of Yoga*, 10(2), 67 – 72.
- Chandra, S., Sharma, G., Mittal, A. P., & Jha, D. (2016). Effect of Sudarshan Kriya (meditation) on gamma, alpha, and theta rhythm during working memory task. *International journal of yoga*, 9(1), 72.
- Chandra, S., Sharma, G., Salam, A. A., Jha, D., & Mittal, A. P. (2016). Playing Action Video Games a Key to Cognitive Enhancement. *Procedia Computer Science*, 84, 115-122.
- Chandra, S., Sharma, G., Rizvi, A., Gupta, N., Mittal, A. P., & Jha, D. (2016). Gender Differences with Different Emotions for Brain Functional Connectivity analysis. *International Journal of Scientific Research in Information Systems and Engineering (IJSRISE)*, 2(1).
- Chandra, S., Sharma, G., Sharma, M., Mittal, A. P., & Jha, D. (2016). Workload regulation by Sudarshan Kriya: an EEG and ECG perspective. *Brain Informatics*, 1-13.
- Sharma, G., Salam, A. A., Chandra, S., Singh, V., & Mittal, A. P. (2016). Empirical estimation of cognitive enhancement by training with action video game on the basis of Psychophysiological testing. *International Journal of Scientific Research in Information Systems and Engineering (IJSRISE)*, 2(2), 11-13.
- Gupta, N., Mittal, K., Sharma, G., Chandra, S. (2016). Age related spatial cognition differences. *India International Science Festival- Young Scientists' Meet*. NPL, Delhi.
- Sharma, G., Chandra S., Venkatraman, S., Mittal, A., & Singh, V. (2015). Artificial Neural Network in Virtual Reality: A Survey. *International Journal of Virtual Reality (IJVR)*, 15(02), 44-52.
- Chandra, S., Sharma, G., Mittal, A. P., Jha, D. & Gomes, A. (2015). Estimation of workload using EEG data and classification using linear classifiers.
- Sharma, G., Chandra S., Mittal, A.P., Singh, V. (2015). Ecological Validity of Virtual Reality based cognitive test battery for innovative mental health system, *India International Science Festival- Young Scientists' Meet*. IIT Delhi.
- Chandra, S., Sharma, G., Malhotra, S., Jha, D., & Mittal, A. P. (2015, December). Eye tracking based human computer interaction: Applications and their uses. In *2015 International Conference on Man and Machine Interfacing (MAMI)* (pp. 1-5). IEEE.

- Chandra, S., Sharma, G., Prabhat, M. (2015). Virtual Reality in Rehabilitation of Social Communication in Children with Autism Spectrum Disorder. South Asia International Autism Conference. Delhi.
- Sharma, G., Chandra, S., Kumar, L., Singh, V., Mittal, A.P. (2015). Can Virtual Reality create consciousness through depth of immersion. In consciousness, cognition and culture , Implication of 21st Century. NIAS, Bangalore.
- Abdul Salam, A., Sharma, G., Sharma, K., Chandra, S. (2015). Effect of Varying Presentation Speed in Oddball Paradigm, In 3rd International Conference on Cognition, Brain and Computation. IIT Gandhinagar.
- Srivastava, S., Bhatia, M.S., Bhargava, S.K., Kumari, R., Chandra, S (2015). A Diffusion Tensor Imaging Study Using a Voxel-Based Analysis, Region of Interest Method to Analyze White Matter Abnormalities in First-Episode, Treatment – Naïve Major Depressive Disorder. Journal of Neuropsychiatry and Clinical Neurosciences. In Press
- Kanishka Sharma, Rajesh Kumar, Ashok K Dubey, Sushil Chandra, The soul of Rajyoga meditation: a brain mapping 3d cortex/scalp/electrodes, eeg imaging using loreta (low resolution electromagnetic tomography), SYSCON-2014, AIIMS, New Delhi on December 3rd, 2014.
- Chandra, S., Negi, R.S., Sharma, G. (2014). Emotion detection and classification using physiological signals. In Biosciences and Health Engineering: Current Scenario. DIAT, Pune.
- Chandra, S., Sharma, G., Singh, P. (2014). Figure Perception: Brain and Behavior Conflict with Eye tracking Study.
- Chandra, S., Sharma, K., Sharma, G., Sharma, N. (2014). Playing 3D video game reduces gender difference in a cognitive task. ADMET-2014. Thapar University, Punjab.
- Arora, S., Chandel, S. S., & Chandra, S. (2014, January). An efficient multi modal emotion recognition system:
- ISAMC. In IMPact of E-Technology on US (IMPETUS), 2014 International Conference on the (pp. 6-12). IEEE.
- Bagga, V., Kahol, K., & Chandra, S. (2013, March). Game design for pre-screening patients with mental health complications using ICT tools. In International Conference on Ambient Media and Systems (pp. 16-22). Springer International Publishing.

MEMBERSHIP OF PROFESSIONAL SOCIETIES

- Chartered Engineer (Electronics & Telecommunication) : C. Eng. IETE
- Fellow & Life Member- Institute of Electronics & Telecom. Engineers: FIET
- Fellow & Life Member- Institute of Smart System and Structures (ISSS)
- Society of Nuclear Medicine (Northern Chapter) : Life Member

VISITING/ADJUNCT FACULTY

- Public health Foundation of India
- Thapar Institute of Engineering & Technology, Patiala
- Deenbandhu Choturam University of Science and Technology, Murthal, Sonapat, Haryana
- Institute of Physically Handicapped (IPH), 4, Vishnu Digamber Marg, Delhi
- Netaji Subhas Institute of Technology (NSIT), Azad Hind Fauz Marg, Sector –III , Dwarka , New Delhi
- Amity School of Engineering, Sector – 44, Noida-201303
- Uttar Pradesh Technical University (UPTU), Lucknow
- Rajasthan Technical University (RTU), Jaipur
- Maharishi Dayanand University (MDU), Rohtak

GOVERNMENT REPORTS

- Adaptive Variable Data Rate Modem for High Frequency Communication.
- Digital Tropo Communication System

PROJECT COLLABORATION WITH OTHER INSTITUTES

Coordinated a large no. of the project of a research project between various professional & educational institutes & INMAS (Bio-medical Engg.). This coordination includes besides guidance, vision & planning for the project. Their projects have been innovative & in accordance with the latest research going on in the world. In these projects, there is current/precedent involvement of the specialized faculty members of various institutes.

Some of these projects are:

- Design of Human performance modeling framework. IIT Mandi, Himachal Pradesh
- Designing of real-time Cognitive state classifier IIT Kharagpur, West Bengal
- Design and development of Video games of Cognitive Enhancement. Public Health Foundation of India, New Delhi
- Design and development of Psychological testing and training tools for Cognitive abilities. Delhi University
- Simulation of Speech Process Strategy for Cochlear Implant. Institute of Engg. & Technology, Bundelkhand University, Jhansi, U.P.
- Medical Image Processing, Manipal Institute of Technology, MAHE, Manipal, Karnataka
- Design and Development of Robotic Lower Extremity Prosthesis
- Institute of physically handicapped, Delhi and
- Netaji Subhas Institute of Technology (NSIT) Azad Hind Fauz Marg, Sector –III, Dwarka, New Delhi-45

PROJECTS COMPLETED

- Study of Neurocognitive disorders in Defence forces by non-invasive imaging & 2-4 immersion technology.
- Design and Development of obstacle climbing wheelchair. (Under the funding of Ministry of Social Justice and Empowerment)
- Development of Cholesterol Biosensors [Under the collaboration of National Physics Laboratory (NPL) & INMAS, Funded by Department of Bio-Technology]
- Adaptive Variable Data Rate Modem for High Frequency Communication. [Under the funding of Ministry of Defence (DRDO)]
- Digital Tropo Communication System [Under the funding of Ministry of Defence (DRDO)]
- Design and Development of Robotic Lower Extremity Prosthesis
- Development of Rehabilitation Devices for patients of Spinal Cord Injury
- Conceptualized & Produced a motorized wheel chair
- Visualized and guided the development of automatic slope-adjusting stretcher
- Computer controlled animal rotation system
- Designed & Development RF coil of a knee joint for NMR spectroscopy

PROJECTS ONGOING

- Vision Research in Cognitive Neuroscience.
- Research on Human Machine Teaming.

PLANNED AND VISIONARY PROJECTS

- Human enhancement by means of cognitive augmentation.
- My future work is towards the Human Systems Integration (HSI) domain where we incorporate the human factors that plays a crucial role in developing the systems along with different cognitive descriptors.
- Everything from scenario simulation, cognitive modelling, designing of the virtual worlds, multiple platform integration etc. will be done by me and my multidisciplinary team whom I have managed to stitch together from various institutes and satellite centers throughout the country.
- Augmented cognition: real time cognitive assessment & enhancement.
- Setting up a Real-time Research ecosystem for Cognition and Medication Research.
- Vision of creating a Satellite centers across the country so that work can be shared across the Institutions in order to find suitable and interested Individuals.

TOPICS OF LECTURES

- Neurocognition
- Sprituality
- Artificial Intelligence
- Virtual reality applications
- Augmented reality and applications
- 360 degree vision
- Emotional health
- Latest trends in Biomedical imaging
- Disaster Management
- Robotic in Biomedical Engineering (NSIT)
- E-Health (Confederation of Indian Industries) (CII)

INVITED LECTURES

- "Virtual environment based Situational Awareness training for cognitive enhancement in unmanned ground vehicle operation" in 9th International Conference on applied Human factors and Ergonomics at Florida, USA
- "Rejuvenate-Innovate-Integrate" at 12th SIR conference Cum Meditation Retreat, Bramha kumaris, Gyan sarovar, Mount Abu, Rajasthan
- "Human machine Teaming" at CAIR, Bangalore
- "Technology Advancement and Human Cognition" at IIT, Ropar
- "Cognition 2.0 -Time to upgrade" at BMS Collage, Bangalore
- "Cognitive implications of Virtual Reality" at IIT, Kharagpur
- "Meditation: -Excitement, Expedition & Exploration" at Vichar Kumbh organized by MPCST, Bhopal
- "Advancement in Technology:- Filling the Gaps with importance of Human factors" NIT, Raurkela
- "Emotional Intelligence:- Tool for elevation of performance" at various places
- "Cogniitve and emotional health" at AdMet-2014 held at Thapar University
- "Synapses in Business" at Thapar University
- "Neurocognitive enhancement by non invasive methods" at IIT Patna
- "Sports Cognition" at Netaji Subhash National Institute of Sports", Patiala.
- "Cognitive enhancement" at Thapar University, Patiala

- “Science & Spirituality: Holistic Approach” at Bharatiya Vidya Bhawan
- “Leading Trends in Emerging Technology” in Banasthali Vidyapith.
- “Cognitive Enhancement: Engineering Application” at Babu Banarasi Das Institute. Of Tech, Ghaziabad
- “Horizons in Applied researches of Cognitive science” at IIT-Gandhinagar.
- National Symposium on Instrumentation
Title- Smart systems in health care
- National Symposium on Biomolecular Electronics- Interfacing Physics & Chemistry with Biology
Title- Molecular Electronics: biomedical Applications.
- Continuing Education Programme (CEP) Course, LASTEC, DRDO
Title- Latest Trends in Biomedical Instrumentation
- Continuing Education Programme (CEP) Course, LASTEC, DRDO
Title- Applications of Lasers in Medicine
- Continuing Education Programme (CEP) Course, INMAS, DRDO
Title- Latest Trends in Biomedical Imaging
- Continuing Education Programme (CEP) Course, LASTEC, DRDO
Title- Biomedical Instrumentation

CONSULTANCY FOR OTHER INSTITUTES

- Motilal Nehru National Institute of Technology (MNNIT), Allahabad – 211004 (Chaired the session for the M.Tech Course content finalization)
- Baba Sahib Ambedkar Hospital, Delhi (Waste Management)
- North East Council (NEC) (Tele Medicine- Expert Member)
- P.D.M. Engineering College, Bahadurgarh (Also in college elite panel)
- Chotu Ram State College of Engg. College, Murthal. (Setting up there Biomedical Engg. Department i.e. Course Curriculum and lab set up)
- Thapar University, Patiala (for setting up the Centre for Disability & Rehabilitation Research)
- Lovely Professional University, Phagwada (For International Collaboration)
- Alwar Institute of Engineering & Technology, Rajasthan (for setting up skill development centers in many trades like : Refrigeration & Air conditioning, Retail Management, IT, Auto industry related trades etc and their liaison with industry and community college at U.S. as per Govt. 11th Five Year Plan)