




KULBHUSHAN CHAND

Post Doctoral Fellow,
Technology Innovation Hub,
Indian Institute of Technology Mandi, HP, India – 175075

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Broadly my research areas overlap Human Computer Interaction (HCI), Indian Knowledge System (IKS) and mental healthcare. Specifically, I do research in developing biofeedback systems, validating alternate forms of medications (like biofeedback, music, meditation etc.) for mental stress management, and making biofeedback protocols more engaging through gamification.

EDUCATION

<u>PhD</u> National Institute of Technology Jalandhar Electronics and Communication Engineering CGPA: 9.0	2015 – 2022
<u>MTech</u> Lovely Professional University Electronics and Communication Engineering Graduated with Hons. and University Topper, CGPA: 9.12	2011 – 2013
<u>BTech</u> Guru Nanak Dev University Electronics and Communication Engineering Graduated with Hons., %Marks: 78.05	2006 – 2010

RESEARCH EXPERIENCE

<u>Post Doctoral Fellow</u> Indian Institute of Technology Mandi Technology Innovation Hub Project: Multisensory Human Computer Interaction and Biofeedback; Advisor: Prof. Varun Dutt	Nov 2022 – Present
<u>Pre Doctoral Fellow</u> Indian Institute of Technology Mandi Technology Innovation Hub Project: Multisensory Human Computer Interaction and Biofeedback; Advisor: Prof. Varun Dutt	Jun 2022 – Nov 2022
<u>Project Team Member</u> ISRO Space Technology Incubation Center (S-TIC), National Institute of Technology Jalandhar Project: Strengthening Ridge to Valley based NRM planning under Mission Water Conservation using Geospatially enabled Serious Gaming; Advisor: Prof. Varun Dutt	Apr 2020 – Mar 2024
<u>Doctoral Researcher</u> National Institute of Technology Jalandhar Department of ECE Dissertation: Low cost multimodal biofeedback for mental relaxation; Advisor: Prof. Arun Khosla	Aug 2015 – Apr 2022
<u>MTech Researcher</u> Lovely professional University Department of ECE Dissertation: A new approach for ECG signal denoising using Adaptive Filtering	Jul 2011 – Jun 2013

TEACHING EXPERIENCE

<u>Teaching Assistant</u> National Institute of Technology Jalandhar Department of ECE	Aug 2015 – Jul 2020
<u>Assistant Professor</u> Lovely Professional University Department of ECE	Jul 2013 – Jul 2015
<u>Teaching Assistant</u> Lovely Professional University Department of ECE	Jan 2012 – Nov 2012
<u>Lecturer</u> Lovely Professional University Department of ECE	Dec 2010 – May 2011

PUBLICATIONS (PEER-REVIEWED)

Journals - Peer reviewed research papers

Kumar, Y., Garg, S., Agarwal, P., **Chand, K.**, Bhavsar, A., & Dutt, V. (2025). Affordable ECG Sensing: A Machine Learning-Enhanced Framework for Scalable Human-Machine Interaction in Telehealth. *IEEE Sensors Journal*, 1–1. (SCI, IF: 4.5)

Chand, K., Chandra, S., & Dutt, V. (2024). Raga Bhairavi in virtual reality reduces stress-related psychophysiological markers. *Scientific Reports*, 14(1), 24816. (SCI, IF: 4.3)

Chand, K., Chandra, S., & Dutt, V. (2024). A comprehensive evaluation of linear and non-linear HRV parameters between paced breathing and stressful mental state. *Heliyon*, 10(11). (SCI, IF: 3.9)

Chand, K., & Khosla, A. (2022). BioNES: A plug-and-play MATLAB-based tool to use NES games for multimodal biofeedback. *SoftwareX*, 19, 101184. (SCI, IF: 3.1)

Chand, K., & Khosla, A. (2022). Efficacy of Using Retro Games in Multimodal Biofeedback Systems for Mental Relaxation. *International Journal of Gaming and Computer-Mediated Simulations (IJGCMS)*, 14(1), 1–23. (Scopus)

Chand, K., & Khosla, A. (2022). MATLAB-Based Real-Time Data Acquisition Tool for Multimodal Biofeedback and Arduino-Based Instruments: Arduino Firmata Data Acquisition (AfDaq). *Journal of Information Technology Research (JITR)*, 15(1), 1–20.

Conferences - Peer reviewed research papers/abstracts (*)

Soni, S., **Chand, K.**, & Chowdhury, S. R. (2025). Development of a Wearable fNIRS System for Non-invasive Cerebral Oxygenation Monitoring. 6th International Conference on Frontiers in Computing and Systems (COMSYS 2025), Warsaw University of Technology, Poland. [In Press]

Chand, K., Khosla, A., & Dutt, V. (2025). Towards Affordable Biofeedback System for Mental Relaxation. *Mind, Brain, and Consciousness Conference (MBCC 2025)*, IIT Mandi, India. [In Press]

Chand, K., Chandra, S., & Dutt, V. (2023). Effects of Relaxed and Stressful Mental States on the Heart Rate Variability Parameters. *Mind, Brain, and Consciousness Conference (MBCC 2023)*, India. *

Chandra, S., **Chand, K.**, & Dutt, V. (2023). Impact of Indian Classical Raga in Immersive Environments on Human Psycho-physiological Parameters. *Proceedings of the 16th International Conference on Pervasive Technologies Related to Assistive Environments. PETRA '23*, Corfu, Greece.

Rao, A. K., Fatma, Z., Menon, V. K., Bhavsar, A., Chowdhury, S. R., Chandra, S., Dutt, V., & **Chand, K.** (2023). Prediction of decision-making performance post-longitudinal tDCS administration via EEG features and machine learning. *Proceedings of the 16th International Conference on Pervasive Technologies Related to Assistive Environments. PETRA '23*, Corfu, Greece.

Book Chapters

Jain, B., Khosla, A., **Chand, K.**, & Ahuja, K. (2019). The Pursuit of Zero Food Waste: A Gamified Approach Promoting Avoidance of Dormitory Mess Food Wastage in Educational Institutions. In *Global Initiatives for Waste Reduction and Cutting Food Loss* (pp. 243–267). IGI Global.

Mukherjee, A., Goyal, P., Singh, A., Khosla, A. K., Ahuja, K., & **Chand, K.** (2019). Pursuit of Research: A Gamified Approach Promoting Research Engagement Among Undergraduate Students. In *Fostering Multiple Levels of Engagement in Higher Education Environments* (pp. 132–155). IGI Global.

Padmakar, G. S. V., Khosla, A., & **Chand, K.** (2019). LearnEasy-Android Application as a Technological Intervention for Children With Dyslexia. In *Emerging Trends in the Diagnosis and Intervention of Neurodevelopmental Disorders* (pp. 236–248). IGI Global.

Setia, D., Singh, R., Sharma, A., Khosla, A., Ahuja, K., & **Chand, K.** (2019). Enhancing Tourism and Cultural Experience Through Gamification. In *Positioning and Branding Tourism Destinations for Global Competitiveness* (pp. 152–171). IGI Global.

Manuscripts in Review (*) or Preparation (#)

Chand, K., Khosla, A., & Dutt, V. (2025). Self-Regulation of Mental Stress in External Stressful Environment. #

Chand, K., Chandra, S., & Dutt, V. (2025). Heart coherence under paced breathing and stressful. #

Chand, K., Chandra, S., & Dutt, V. (2025). Effects of listening to Raga Bhairavi on heart coherence. #

Chand, K., & Dutt, V. (2025). Affordable HRV based biofeedback device. #

CONFERENCE PRESENTATIONS (PEER-REVIEWED)

Towards Affordable Biofeedback System for Mental Relaxation <i>Mind, Brain, and Consciousness Conference (MBCC) - 2025</i> <i>Indian Institute of Technology Mandi</i>	Jun 2025
Effects of Relaxed and Stressful Mental States on the Heart Rate Variability Parameters <i>Mind, Brain, and Consciousness Conference (MBCC) - 2023</i> <i>Indian Institute of Technology Mandi</i>	Dec 2023

INTELLECTUAL PROPERTY RIGHTS

Copyrights

Biofeedback Nintendo Entertainment System (BioNES) <i>Registration No.: SW-2025021242 Copyright Office, Government of India</i> <i>Description: MATLAB-based framework for integrating NES games into multimodal biofeedback systems for mental wellness research.</i>	Aug 2025
Realtime arduino based HRV biofeedback system for mental stress assessment <i>Registration No.: SW-2025021178 Copyright Office, Government of India</i> <i>Description: Arduino code for a low-cost HRV-based mental stress assessment device with real-time IBI acquisition, artifact correction, HR, RMSSD, SDNN, and stress percentage estimation.</i>	Aug 2025
Arduino Firmata Data Acquisition (AfDaq) <i>Registration No.: SW-2025021174 Copyright Office, Government of India</i> <i>Description: Open-source MATLAB tool for real-time multichannel data acquisition and visualization from Arduino boards, used in biofeedback systems and device control.</i>	Aug 2025
MCP4251 <i>Registration No.: SW-2025021177 Copyright Office, Government of India</i> <i>Description: Lightweight Arduino library for interfacing with MCP4251 digital potentiometer.</i>	Aug 2025

INVITED TALKS / WORKSHOPS / LECTURES

Invited Talks

Human Motivation and Engagement Analysis using Octalysis Gamification Framework <i>5th Winter School on Cognitive Modeling - 2023</i> <i>Indian Institute of Technology Mandi</i>	Oct 2023
Human Motivation and Engagement Analysis using Octalysis Gamification Framework <i>Winter School on Cognitive Modeling - 2022</i> <i>Indian Institute of Technology Mandi</i>	Oct 2022
Arduino and Open-Source Technologies <i>DAV Institute of Engineering and Technology</i>	Jun 2019
Octalysis <i>AICTE ATAL Sponsored Online Faculty Development Program on Gamification</i> <i>National Institute of Technology Jalandhar</i>	Nov 2020

Lectures

Octalysis Gamification Framework <i>Guest Lecture for undergraduate course Gamification (ECOE-496)</i> <i>National Institute of Technology Jalandhar</i>	Feb 2023
Octalysis Gamification Framework <i>Guest Lecture for undergraduate course Gamification (ECX-488)</i> <i>National Institute of Technology Jalandhar</i>	Sep 2022

Workshops

Arduino workshop for kids <i>Jalandhar</i>	Nov 2017
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GRANTS (*PI, #Co-PI)

Nagarro-NITJ Technology Centre of Excellence for Autism Research, Nagarro, CSR Grant # <i>Status: Under review</i>	2024
AI-Driven Multimodal Fusion Framework for Emotion Recognition of Individuals with Autism in – Unconstrained Environments, <i>Futures First, CSR Grant #</i> <i>Status: Under review</i>	2024
Low-Cost Smartwatch for Autism with AI-Enabled Technologies, NXP Semiconductors, CSR Grant # <i>Status: Under review</i>	2024

HONORS AND AWARDS

Post Doctoral Fellowship <i>Indian Institute of Technology Mandi</i>	2022 – 2025
Pre Doctoral Fellowship <i>Indian Institute of Technology Mandi</i>	2022
Doctoral Fellowship <i>National Institute of Technology Jalandhar</i>	2015 – 2022
UGC NET Qualified with JRF <i>University Grants Commission</i>	2013

GATE – 2013 Qualified <i>Ministry of Education</i>	2013
University Academic Honor <i>Lovely Professional University</i>	2013
Academic Scholarship <i>Lovely Professional University</i>	2011 – 2013
GATE – 2011 Qualified <i>Ministry of Education</i>	2011
University Academic Honor <i>Guru Nanak Dev University</i>	2010
Tech Hunt – 2007, Debugging (3 rd Position) <i>Guru Nanak Dev University</i>	Oct 2007
Academic Scholarship <i>Guru Nanak Dev University</i>	2006 – 2010

ACADEMIC SERVICE

Mind, Brain, and Consciousness Conference (MBCC 2023) <i>Indian Institute of Technology Mandi, Role: Workshop Organizer</i>	Dec 2023
Hackathon 2022 <i>Indian Institute of Technology Mandi, Role: Jury member</i>	Jul 2022
Toycathon 2021 <i>Ministry of Education, Role: Primary Evaluator</i>	Jan 2021
ATAL Online FDP on Gamification <i>National Institute of Technology Jalandhar, Role: Assisted in conduction</i>	Nov 2020
GIAN Course on Autism and Assisted Technologies <i>National Institute of Technology Jalandhar, Role: Assisted in conduction</i>	Dec 2018
Sports Meet – 2008 <i>Guru Nanak Dev University, Role: Event Coordinator (Volleyball)</i>	Sep 2008

MEDIA COVERAGE

Raga Bhairavi can lower stress levels: Study explores impact of Indian classical music <i>The Telegraph India, Print and online newspaper</i>	Nov 2024
Young minds dwell on e-concepts <i>The Tribune India, Print and online newspaper</i>	Nov 2017

PROFESSIONAL DEVELOPMENT

<u>Conference (Attended)</u>	
Mind, Brain, and Consciousness Conference (MBCC 2025) <i>Indian Institute of Technology Mandi</i>	Jun 2025
CHI 2025 <i>Yokohama, Japan</i>	Apr 2025
Mind, Brain, and Consciousness Conference (MBCC 2023) <i>Indian Institute of Technology Mandi</i>	Dec 2023
<u>Short Term Courses/Workshops/Webinars (Attended)</u>	
Evaluating Impact Through Simulation & Games <i>Shri Vaishnav Vidyapeeth Vishwavidyalaya</i>	Aug 2025
Learning from Simulations and Games: Guidance from Theory, Concept and Practice <i>Shri Vaishnav Vidyapeeth Vishwavidyalaya</i>	Nov 2024
The Impact of AI on Gamification and Serious Games <i>Shri Vaishnav Vidyapeeth Vishwavidyalaya</i>	Sep 2024
Development of Simulation Game, “Project PAL” using the SECI Model and Collaborative Learning Methods <i>Shri Vaishnav Vidyapeeth Vishwavidyalaya</i>	Jul 2024
Hands on Training and Showcasing: High Density EEG Devices <i>Indian Institute of Technology Mandi</i>	Mar 2024
Simulation Games: A Bridge between Knowledge and Behaviour <i>Shri Vaishnav Vidyapeeth Vishwavidyalaya</i>	Jan 2024
Machine-Learning advances in Human-Computer Interaction <i>Indian Institute of Technology Mandi</i>	Jul 2022
Innovation, IPR and Start-ups	Jul 2022

<i>National Institute of Technology Jalandhar</i>	
LaTeX for Technical Writing	June 2022
<i>Indian Institute of Technology Mandi</i>	
The Education Factory	Sep 2020
<i>National Institute of Technology Jalandhar</i>	
Machine Learning Using Python	Sep 2020
<i>National Institute of Technology Jalandhar</i>	
Computational Cardiac Engineering - Predictive Modelling and Innovative Sensing Systems	Sep 2020
<i>Rajasthan Technical University</i>	
IP Commercialization & Technology Transfer	Feb 2020
<i>National Institute of Technology Jalandhar</i>	
Recent Trends in Biomedical Signal Processing and VLSI Design	May 2019
<i>National Institute of Technology Jalandhar</i>	
Data Science	May 2019
<i>National Institute of Technology Jalandhar</i>	
Current Avenues of Research in Electronics and Communication Engineering	Mar 2019
<i>National Institute of Technology Jalandhar</i>	
Autism and Assisted Technologies (Gian Course)	Dec 2018
<i>National Institute of Technology Jalandhar</i>	
Brain Science & Technology: Tools and Techniques to understand the Human Brain	Dec 2016
<i>Indian Institute of Technology Delhi</i>	
How to be your Child's Occupational therapist	Sep 2016
<i>SOCH Educational Society</i>	
Biology for Engineers	Jun 2016
<i>Indian Institute of Technology Bombay</i>	
Certifications	
The Recreational UAS Safety Test (TRUST)	Nov 2022
<i>Academy of Model Aeronautics</i>	
The Octalysis Framework - Level 1	Dec 2017
<i>The Octalysis Group</i>	
MOOC Courses (with certificates)	
IITM – Finland – Certificate course on Mastering VR : Fundamentals to Practice	Oct 2024
<i>Indian Institute of Technology Madras</i>	
DRONE01x: Drones for Agriculture: Prepare and Design Your Drone (UAV) Mission	Sep 2022
<i>Wageningen University & Research</i>	
Statistics in Medicine	Mar 2020
<i>Stanford University</i>	
Computer Science 101	Mar 2020
<i>Stanford University</i>	
Introduction to CAD: Learn Fusion 360 in 90 minutes	Sep 2019
<i>Autodesk</i>	
Vital Signs: Understanding What the Body Is Telling Us	May 2018
<i>University of Pennsylvania</i>	
Advanced MATLAB for Scientific Computing	Dec 2017
<i>Stanford University</i>	
Introduction to Game Development	Mar 2017
<i>Michigan State University</i>	
Calculus One	May 2013
<i>The Ohio State University</i>	
Image and video processing	Mar 2013
<i>Duke University</i>	

PROFESSIONAL MEMBERSHIP

Association for Computing Machinery (ACM)	Aug 2023 – Jul 2024
<i>Professional Member</i>	

EDITORIAL AND PEER REVIEW ROLES

Editorial Review Board

IGI Global: *International Journal of Gaming and Computer-Mediated Simulations (IJGCMS)*; *International Journal of Game-Based Learning (IJGBL)*; *International Journal of Distance Education Technologies (IJDET)*

Ad-Hoc Reviewer

Springer Nature: *Discover Psychology*; *Signal, Image and Video Processing*

Cell Press: *iScience*; *Heliyon*

Elsevier: *SoftwareX*; *HardwareX*; *Biomedical Signal Processing and Control*

Mary Ann Liebert, Inc.: *Games for Health Journal*

IGI Global: *International Journal of Gaming and Computer-Mediated Simulations (IJGCMS)*; *International Journal of Game-Based Learning (IJGBL)*; *International Journal of Distance Education Technologies (IJDET)*

INDUSTRY EXPERIENCE

T4A Labs Pvt Ltd., Incubated in NITJ Technology Business Incubator <i>Role: Co-Founder, Works on technologies for autistic kids and autism.</i>	Apr 2022 – Present
JCT Limited, Filament Unit, Hoshiarpur (Punjab) <i>Role: Industrial Trainee</i>	Jan 2010 – Jun 2010
JCT Limited, Filament Unit, Hoshiarpur (Punjab) <i>Role: Industrial Trainee</i>	Jun 2008 – Jul 2008

SKILLS

Programming: Assembly, C, C++, R, Lua, MATLAB, Python, Visual Basic, Pure Data

Applications: NI Multisim, KiCad, Unity3D, RStudio, JASP, Jamovi, Autodesk Fusion 360

Operating Systems: Windows, Ubuntu

Others: Octalysis-Level1 Gamification Expert, Heart Rate Variability (HRV) Analysis

PROJECTS

Curricular Projects and Teaching Tools

Arduino Workshop for Kids E-Book <i>National Institute of Technology Jalandhar</i>	2022
Gamification (ECX-488) Course E-Book, 3 Credits <i>National Institute of Technology Jalandhar</i>	2021
Classroom Gamification, Software Tool, 3 Credits <i>National Institute of Technology Jalandhar</i>	2018
Gamification (ECX-488), Course, 3 Credits <i>National Institute of Technology Jalandhar</i>	2016

Open-Source Tools and Software

AfDaq: A plug and play MATLAB based tool for biofeedback and arduino based instruments https://github.com/kulbhushanchand/AfDaq	2021
BioNES: A plug-and-play MATLAB based tool to use NES games for multimodal biofeedback https://github.com/kulbhushanchand/BioNES	2021
MCP4251: Arduino library for MCP4251 Digital Potentiometer https://github.com/kulbhushanchand/MCP4251	2021
classroom-gamification: Tool to gamify your classroom with an online leaderboard https://github.com/kulbhushanchand/classroom-gamification	2018

SUBJECTS TAUGHT

Teaching Assistant (PhD Student) <i>National Institute of Technology Jalandhar</i>	2015 – 2020
Gamification, ECX-488	Spring 2020
Scientific Computing Lab, ECPC-351	Spring 2020
Gamification, ECX-488	Fall 2019
Scientific Computing Lab, ECPC-351	Fall 2019
Gamification, ECX-488	Spring 2019
Electronics for Chemists Lab, CY-592	Spring 2019
Gamification, ECX-488	Fall 2018

Analysis and Synthesis of Networks Lab, ECX-211	Fall 2018
Gamification, ECX-488	Spring 2018
Electronics for Chemists Lab, EC-636	Spring 2018
Gamification, ECX-488	Fall 2018
Analysis and Synthesis of Networks, ECX-201	Fall 2018
Analysis and Synthesis of Networks Lab, ECX-211	Fall 2018
Gamification, ECX-488	Spring 2017
Basic Electronics Lab, ECX-102	Spring 2017
Gamification, ECX-488	Fall 2016
Analysis and Synthesis of Networks Lab, ECX-211	Fall 2016
Gamification, ECX-488	Spring 2016
Basic Electronics Lab, ECX-102	Spring 2016
Basic Electronics Lab, ECX-102	Fall 2015
<u>Assistant Professor</u>	2013 – 2015
<i>Lovely Professional University</i>	
Digital Signal Processing, ECE300	Spring 2015
Digital Signal Processing Laboratory, ECE324	Spring 2015
Analytical Skills-II, PEA302	Spring 2015
Adaptive Signal Processing, ECE531	Fall 2014
Signal and Systems, ECE220	Fall 2014
Basic Simulation Laboratory, CSE222	Fall 2014
Electronic Devices and Circuits, ECE206	Summer 2014
Digital Signal Processing, ECE300	Spring 2014
Probability and Stochastic Processes, ECE256	Spring 2014
Digital Signal Processing Laboratory, ECE324	Spring 2014
Electronic Devices and Circuits, ECE206	Fall 2013
Basic Electrical Engineering, ECE133	Fall 2013
Analog and Linear Integrated Circuits Laboratory, ECE317	Fall 2013
Basic Electrical Engineering Laboratory, ECE134	Fall 2013
<u>Teaching Assistant (MTech student)</u>	2011 – 2013
<i>Lovely Professional University</i>	
Introduction to Practical Electronics, ECE100	Fall 2012
Electrical and Electronics Workshop, ECE130	Spring 2012
<u>Lecturer</u>	2010 – 2011
<i>Lovely Professional University</i>	
Microcontroller and Applications, ECE310	Spring 2010
Introduction to Practical Electronics, ECE100	Spring 2010
Unified Electronics Laboratory – II, ECE208	Spring 2010

SPORTS ACTIVITIES

Annual Faculty Sports Meet, 100 mt. (Gold), 200 mt. (Gold)	2015
<i>Lovely Professional University</i>	
Annual Faculty Sports Meet, 200 mt. (Bronze), 400 mt. (Silver)	2014
<i>Lovely Professional University</i>	
Annual Faculty Sports Meet, 100 mt. (Gold)	2011
<i>Lovely Professional University</i>	

LANGUAGES

English – Proficient (Speak, Read, Write, Listen)

Hindi – Native-equivalent (Speak, Read, Write, Listen)

Punjabi – Native (Speak, Read, Write, Listen)

REFERENCES

Prof. Varun Dutt

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varun@iitmandi.ac.in
Professional Engagement: Post Doctoral Supervisor

Prof. Arun Khosla

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Professional Engagement: PhD Supervisor

Prof. Mamta Khosla

Professor, Department of ECE, Dr B R Ambedkar National Institute of Technology, Jalandhar, India – 144011
khoslam@nitj.ac.in
Professional Engagement: Former Head of Department

Gaganpreet Singh

Senior Software Developer, Microsoft India
gagsin@microsoft.com
Professional Engagement: Former coworker