# GOWDHAM PRABHAKAR P G

**Creative Technologist** | HCI Researcher | XR | AI | Music Technology | Robotics

Assistant Professor — Department of Design, IIT Kanpur

Email: gowdhampg@iitk.ac.in Web: Profile Scholar: Google Scholar LinkedIn: LinkedIn Web: Scopus

**30+** Publications — **9+** Patents — **9+** Invited Talks — **2×** Best Paper Awards — **Rs.185L+** Funded Research

## Professional Summary

Interdisciplinary researcher and creative technologist shaping the future of **Human–Computer Interaction, Extended Reality, AI-driven interfaces, Music Technology, Robotics, and Assistive Systems**. Leads **HIVE Lab at IIT Kanpur** — founded with the conviction that India needed a serious home for Music Technology research and a lab that refuses to stay inside a single discipline. Research spans all five human senses; treats every sensor, headset, and algorithm as a tool in service of a human experience worth having.

Focus areas: **Human-AI Collaboration, Multimodal Interaction, Immersive Media, Neuroadaptive Systems, Musical Interfaces, Sound Design, and Inclusive Design**.

## Current Role

**Assistant Professor — IIT Kanpur (Department of Design)** **2022 – Present**

- Founder & Director of **HIVE Lab** — spanning HCI, XR, AI, Robotics, Music Technology, Accessibility, and New Media Art
- PI / Co-PI on **Rs.185+ Lakhs** in funded research (government, institute, and industry)
- Supervise work in Human-AI systems, immersive installations, embodied interaction, neuroadaptive interfaces, and assistive technology
- Drive international collaborations, patents, exhibitions, research publications, and public-facing innovation
- Build creative-technology prototypes merging engineering, art, music, and storytelling

## Education & Career

| | |
|---|---|
| **2022–Present** | **Assistant Professor**, Dept. of Design, IIT Kanpur. Founder & Director, HIVE Lab. |
| **2021–2022** | **Postdoctoral Researcher**, Multi-Sensory Devices Group (MSD), UCL, London. Multisensory interaction across all five senses. |
| **2021** | **Associate Research Engineer**, S.L. Kirloskar Groups, Bangalore. AI for Industrial Automation. |
| **2016–2021** | **PhD — HCI**, I3D Lab, CPDM, IISc Bangalore. Thesis: *Interaction Design and Distraction Detection of Drivers in Automotive*. Supervisor: Prof. Pradipta Biswas. Industry collaborations: TATA Elxsi (8 months), Faurecia (1 year), Stancebeam (3 months). |
| **2014–2016** | **M.Des — Electronic Systems**, IIITDM Kancheepuram |
| **2009–2013** | **B.E. — Electronics & Communication Engineering**, Anna University (CEG, Red Building) |

## Funded Research & Grants

| Project | Role | Amount |
|---|---|---|
| CARE Grant | Co-PI | Rs.80 Lakhs |
| Institute Special Grant | PI | Rs.80 Lakhs |
| Lab Startup Grant | PI | Rs.25 Lakhs |
| Intelligent Dashboard Control System (Faurecia) | Co-PI | Rs.57.3 Lakhs |
| **Total** | | **Rs.185+ Lakhs** |

## Flagship Research Projects (HIVE Lab, 2022–Present)

### Human-AI, XR & Cognitive Systems

- **Mouth Interface for XR** — Enabling disabled artists to navigate XR environments; published CHI 2026
- **CAVE-E** — VR-based virtual earthquake environment for disaster training and rescue robot evaluation
- **HUX AI** — Always-on cognitive augmentation platform; Human-AI co-creative systems
- **Focused Clarity & Gaze Flow** — Attention and cognitive interaction platform; gaze-based adaptive HCI
- **Phantom Vision** — Perception-altering XR installation; AI-driven new media art
- **PRANA** — Multi-sensory immersive experiential installation with physiological feedback

### Music Technology & Expressive Interfaces

- **GraviTone** — Gravity-based tangible musical interface; NIME 2025, Canberra
- **Swarings** — Ring-based expressive wearable MIDI controller; UIST 2025, Busan
- **Music Glove / Tabla Glove** — Wearable Indian classical percussion interface via gestural sensing
- **Digital Theremin & Musical Haptics** — Touchless expressive instrument; tactile music perception platform
- **Hand Dance & Dream Weaver** — Gesture-driven music performance; AI-assisted music composition

### Healthcare, Neurotech & Accessibility

- **ICU/CCU Patient Interaction & Eye-Gaze HUD** — Communication for non-verbal ICU patients via eye tracking and AAC
- **PathBuddy** — Assistive navigation platform
- **Tourette's Syndrome Assistive System** — Interaction design for diverse neurologies
- **Non-Invasive Vagus Nerve Stimulation Device** — Neurostimulation and physiological feedback

### Robotics, Embodied Interaction & XR

- **Serpentine Synergy** — Dual soft continuum manipulator and snake robot for search & rescue
- **VIPER** — Versatile inspection probe for post-earthquake rescue operations
- **Dual-Robot Teleoperation via Meta Quest 3** — Immersive XR-based robot control
- **Kinetic Arts & BluePrint** — Electronics-driven motion sculptures; interactive exhibition platform
- **HMI Horizon** — Annual public showcase of student HMI prototypes (2023, 2024, 2025)

## Awards & Recognition

- **Institute Gold Medal** — IISc Bangalore, AI4AI event, 2025
- **Best Paper Award** — IEEE ICICICT 2017 (Laser Pointer as Pointing Device in Automotive)

- **Best Paper Award** — IEEE ICCICCT 2016 (Three Hand Tracking Sensors as Cursor Controllers)
- **ACM Travel Grant** — Automotive UI 2017, Doctoral Consortium
- **Runner-up** — Research in Product Design (RPD 2019), CPDM, IISc Bangalore
- **Runner-up** — KALPANA 2015, Tata Center, IIT Bombay (Dynarack housing system)
- **Best RC Aircraft Design** — Skyfi Labs, Bangalore, 2015
- **Finalist** — Shaastra 2012, IIT Madras (autonomous line-tracking robot)
- **Runner-up** — VISION 2011, CEG, Anna University

## Invited Talks & Keynotes

- MIT Media Lab, Cambridge, USA (2024)
- Stanford HCI Group, USA (2024)
- Imperial College London — Dyson School (2025)
- University of the Arts London (2025)
- Brunel University London (2024)
- ZHdK — Zurich University of the Arts (2023)
- Virginia Tech — Mind Machine Music Lab (2024)
- TH Ingolstadt (THI), Germany (2023)
- IISc Bangalore — CiSTUP (2022)

## Courses Taught

| | | |
|---|---|---|
| **DES 638** | Human Machine Interaction — Prototype and exhibit HMI systems; culminates in HMI Horizon showcase | IIT Kanpur |
| **DES 634** | Electronics for Designers — Arduino, sensors, IoT, PCB; practice-based for design students | IIT Kanpur |
| **DES 648** | Music Technology: Sound Design & Musical Interfaces — Psychoacoustics, Max/MSP, AI music, NIME; public concert finale. Past works | IIT Kanpur |
| **School Connect** | Game Tech Explorers: Understanding Humans, Machines & Play. Video | IIT Madras |

## Technical & Creative Skills

**Programming:** Python · C · C++ · C# · P5.js · Verilog HDL

**XR & Creative Tools:** Unity3D · Unreal Engine · TouchDesigner · Blender · Fusion 360 · MATLAB · Logic Pro X · FL Studio · Max/MSP

**Hardware & Embedded:** Arduino · ESP32 · Raspberry Pi · FPGA

**Sensors & Interaction:** Tobii Eye Tracker · Leap Motion · XSENS IMU · OptiTrack · Azure Kinect · EEG (EMOTIV)

**AI & Vision:** PyTorch · OpenCV · MediaPipe · RunwayML · Stable Diffusion · LLMs/VLMs

**Creative Practice:** Music Composition · Sound Design · Film Scoring · Interactive Arts · Media Production

## Academic Leadership & Service

- **Chair** — UK-India Future Networks, Applications Track
- **Organiser** — ICORD, AutomotiveUI, Diversity & Inclusion Workshops
- **Industry Workshops** — Ashok Leyland, Honeywell
- **Volunteer** — Smart India Hackathon

## Music Production

Original compositions bridging technical expertise with musical expression. Tamil productions and covers spanning classical and contemporary styles.

- **Iyal** — Debut album. Listen on SoundCloud
- **Poovil Thenai** — First single. Watch on YouTube
- **New York Nagaram** — AR Rahman cover. Watch on YouTube

## Press & Media

Featured in: NDTV · The Hindu · Deccan Herald · Gates Cambridge · CiSTUP (IISc) · CPDM (IISc) · IIITDM Kancheepuram

## Publications, Books & Patents

**13+ Journal Articles | 16+ Conference Papers | 1 Book | 9+ Patents**

Published at: CHI · UIST · NIME · ISMAR · MobileHCI · IndiaHCI · AutomotiveUI · IEEE · ACM

### Journal Articles (Selected)

1. **Rajashekhar, V.S., & Prabhakar, G.** (2026). From preparedness to action: Synthesising insights on robot usage in post-earthquake search operations. *Resilient Cities and Structures* (Elsevier). In Press. DOI
2. **Sukanth, K., Sudhiksha, K.R., Rajashekhar, V.S., Prabhakar, G.** (2024). Heads Up eXperience (HUX): Always-On AI Companion for Human Computer Environment Interaction. *arXiv*. Link
3. **Rajashekhar, V.S., Rajesh, A., Athaaillah, M.I.A., & Prabhakar, G.** (2024). Serpentine Synergy: Design and Fabrication of a Dual Soft Continuum Manipulator and Soft Snake Robot. *arXiv*. Link
4. **Moora, R.V., & Prabhakar, G.** (2024). Tactile Melodies: A Desk-Mounted Haptics for Perceiving Musical Experiences. *arXiv*. Link
5. **Prabhakar, G., & Biswas, P.** (2021). A Brief Survey on Interactive Automotive UI. *Transportation Engineering*. DOI
6. **Prabhakar, G., Rajkhowa, P., Harsha, D., Biswas, P.** (2021). A Wearable Virtual Touch System for IVIS in Cars. *J. Multimodal User Interface*, Springer. DOI
7. **Prabhakar, G., Mukhopadhyay, A., Murthy, L., et al.** (2020). Cognitive Load Estimation Using Ocular Parameters in Automotive. *Transportation Engineering*. DOI
8. **Prabhakar, G., Ramakrishnan, A., et al.** (2019). Interactive Gaze & Finger Controlled HUD for Cars. *J. Multimodal User Interface*, Springer. DOI
9. **Biswas, P., & Prabhakar, G.** (2018). Detecting Drivers' Cognitive Load from Saccadic Intrusion. *Transportation Research Part F*. DOI
10. **Prabhakar, G., Biswas, P.** (2018). Eye Gaze Controlled Projected Display in Automotive and Military Aviation. *Multimodal Technologies and Interaction*. DOI

See Google Scholar for full list.

### Conference Papers (Selected)

1. **Jain, P., Sharma, A., Chaudhary, S., Rawat, V., Bhagat, A.K., Jain, K., Bayerlein, C., Salter, C.L., & Prabhakar, G.** When Assistive Technologies Become Provocations: Unpacking Access in HCI Practices Using Crip Technoscience, Mouth Interfaces, and XR. **CHI 2026**. DOI
2. **Kumar, S., Dev, S.K., Srinath, L., Kumar, A., Jain, K., Bhagat, A.K., Mukherjee, P., & Prabhakar, G.** (2025). Swarings: Exploring expressive freedom through ring-based musical interaction. **UIST 2025**, Busan. DOI

3. **Rajashekhar, V.S., & Prabhakar, G.** (2025). Exploring the trapped-in-debris experience: Behavioural and verbal analysis in XR earthquake simulations. **ISMAR 2025** – NeuroXR Workshop. Link
4. **Rajashekhar, V.S., & Prabhakar, G.** (2025). From Awareness to Action: XR Systems for Earthquake Preparedness, Evacuation, and Rescue. **MobileHCI 2025** – Doctoral Consortium. DOI
5. **Botev, J., Biswas, P., Rao, A.K., Ray, R.K., Prabhakar, G., & Niknam, S.** (2025). NeuroXR: Neurophysiological Signals, Affective Computing and Cognition in XR. **ISMAR 2025** Workshop. Link
6. **Jain, K., Williams, A., Bhagat, A.K., et al.** GraviTone: A Tangible Musical Interface using Gravity Well. **NIME 2025**, Canberra. PDF
7. **Rajashekhar, V.S.** (2025). Key Dimensions for Human-Robot Interaction in XR for Rescue Robots. **IndiaHCI 2024**. Link
8. **Rajashekhar, V.S., Aravind, S., et al., Prabhakar, G.** (2024). To Show or Hide – Investigating the Effect of Cursor Visibility in Gaze-controlled Interfaces. **CHI 2024**. DOI
9. **Rajashekhar, V.S., Prabhakar, G.** (2024). Multi-Modal Interaction for Soft Continuum Robots during Post-Earthquake Search Operations. **IUI 2024 Workshops**. PDF
10. **Gao, L., Irani, P., Subramanian, S., Prabhakar, G., et al.** (2023). DataLev: Mid-air Data Physicalisation Using Acoustic Levitation. **CHI 2023**. DOI
11. **Prabhakar, G., Biswas, P.** (2017). Evaluation of Laser Pointer as Pointing Device in Automotive. **IEEE ICICICT 2017**. **[Best Paper Award]** DOI
12. **Prabhakar, G., Rajesh, J., Biswas, P.** (2016). Comparison of Three Hand Movement Tracking Sensors. **IEEE ICCICCT 2016**. **[Best Paper Award]** DOI

### Book / Monograph

1. **Rajashekhar, V.S., Prabhakar, G.** (2023). Developments and Trend Maps for Soft Continuum Manipulators and Soft Snake Robots. *Now Publishers*. DOI

## Patents (9+)

*HIVE Lab Era (IIT Kanpur, 2022–Present):*

1. **Prabhakar, G., Bhagat, A.K., Tony, L., Balasubramani, P.P.** Real-time visual feedback system for minimizing risk of jaywalking or distracted walking. App No.: 202511070920
2. **Dev, S.K., Kumar, S., Srinath, L., Mukherjee, P., Kumar, A., Bhagat, A.K., Jain, K., Prabhakar, G.** A musical instrument (Swarings 2). App No.: 202511072744
3. **Mukherjee, P., Dev, S.K., Kumar, S., Srinath, L., Kumar, A., Bhagat, A.K., Jain, K., Prabhakar, G.** Wearable musical device for simulating Indian classical percussion audio (Music Glove). App No.: 202511071234
4. **Jain, K., Bhagat, A.K., Williams, A., Rajesh, A., Prabhakar, G.** GraviTone. (Application: Under Process)
5. **Pandey, M., Samnekar, D., Kumar, R., Agrawal, H., Kar, S.K., Singh, A., & Prabhakar, G.** (2025). Non-Invasive Vagus Nerve Stimulation Device with Physiological Feedback. (Indian Patent Application, filed)
6. **Pandey, M., Samnekar, D., Kumar, R., Agrawal, H., Kar, S.K., Singh, A., & Prabhakar, G.** (2025). An Ear Device for Nerve Stimulation. App No.: 202511002159

*IISc Era (2016–2021):*

1. **Prabhakar, G., Biswas, P.** Wearable Laser Pointer for Automotive UI. App No.: 201741035044 · PCT/IB2018/057 WO2019069249
2. **Prabhakar, G., Mukhopadhyay, A., Biswas, P., et al.** System and Method for Monitoring Cognitive Load of a Driver. Indian No.: 201941052358 · PCT/IB2020/062016. WO2021124140

3. **Biswas, P., Deshmukh, S., Prabhakar, G., et al.** A System for Man-Machine Interaction in Vehicles. Indian No.: 201941009219 · PCT/IB2020/050253 · US 17/437,003. WO2020183249

Last updated: April 2026 — home.iitk.ac.in/~gowdhampg