Suraj Kumar Pandey

Data Scientist,
NextGen Invent Corporation

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Research Interests

Artificial Intelligence, Generative Machine Learning, Neuroevolution , Cyber-Physical Systems, Bio-inspired algorithms, TinyML, IoT, Embodied Intelligence, Domain Adaptation, Chaotic Systems, Computer Vision, NLP, LLMs, Agentic AI.

Education

Degree/ Certificate	Institute/Board	CPI/CGPA/ Percentage	Year
PhD	Indian Institute of Technology Guwahati	9 (Course Work)	(2018-2024) Thesis Defended
B.Tech.	College of Technology, G B Pant University of Agriculture & Technology	7.281	2010 - 2014

Professional/Research Experience

1. **Data Scientist**

   at **NextGen Invent Corporation**

   (20.09.2023 - Till date)

2. **Research Scholar**

   at **Indian Institute of Technology Guwahati**

   (15.07.2018 - Till date)

3. **Officer (IT)**

   at **Security Printing and Minting Corporation of India Ltd (SPMCIL)**

   (A wholly owned Schedule 'A' Company of the Government of India) (15.12.2016 - 08.07.2018)

4. **Young Professional II**

   at **Indian Agricultural Statistics Research Institute (IASRI), Indian Council of Agricultural Research** (24.08.2015 - 31.08.2016)

Publications

Journals:

1. Pandey, S. K., & Nair, S. B. (2025). RoboDA: A Dataset for Domain Adaptation in Robot Vision. IETE Technical Review, 1–14. https://doi.org/10.1080/02564602.2025.2485900 (**Published**)
2. S. K. Pandey and S. B. Nair, “GADANN: A Virtual-to-Real Knowledge Transfer & Adaptation method for Edge Devices” (**Accepted** at the Elsevier Internet of Things journal)
3. S. K. Pandey and S. B. Nair, “ChaoticImmuneNet: A Chaos-driven Immunity inspired Neural Network paradigm for Embodied Intelligence in Resource-Constrained Devices” (**Communicated** to the ACM Journal on Emerging Technologies in Computing Systems)

Conferences:

4. S. K. Pandey, Sonia, T. Semwal and S. B. Nair, “Smart Patch: An IoT based Anti Child-Trafficking Solution”, 2020 IEEE International Conference on Internet of Things and Intelligence System (IoTaIS), Indonesia, 2020, DOI: 10.1109/IoTaIS50849.2021.9359702 (**Published**)
5. S. K. Pandey and S. B. Nair, “Immuno-inspired Augmentation of Siamese Neural Networks for Multi-Class Classification”, IVCNZ 2022 Image and Vision Computing New Zealand, 24 - 25 November 2022, DOI: 10.1007/978-3-031-25825-1_35. (**Published**) (**CORE2021 Rank: Australasian B**)

6. S. K. Pandey and S. B. Nair, “Enhancing Siamese Neural Networks for Multiclass Classification: An Immuno-inspired approach”, GECCO 2023, The Genetic and Evolutionary Computation Conference, (Hot off the Press Track), 2023, Lisbon, Portugal. July 15-19, DOI: https://doi.org/10.1145/3583133.3595827 (**Published**) (**CORE2023 Rank: A**)

7. S. K. Pandey and S. B. Nair. 2024. “Onboard Class Incremental Learning for Resource-Constrained scenarios using Genetic Algorithm and TinyML”. In Proceedings of the Genetic and Evolutionary Computation Conference Companion (GECCO '24 Companion). Association for Computing Machinery, New York, NY, USA, 299–302. https://doi.org/10.1145/3638530.3654392 (**Published**)(**CORE2023 Rank: A**)

8. S. K. Pandey, “Neuroevolution of a Multi-Generator GAN”, The 38th Annual AAAI Conference on Artificial Intelligence (AAAI-24), AAAI 2024, Vancouver, Canada, February 20-27, 2024, DOI: https://doi.org/10.1609/aaai.v38i21.30493, (**Published**) (**CORE2023 Rank: A***)

9. Mohan, K., Pandey, S.K. (2025). A Deep-Learning Based Real-Time License Plate Recognition System for Resource-Constrained Scenarios. In: Antonacopoulos, A., Chaudhuri, S., Chellappa, R., Liu, CL., Bhattacharya, S., Pal, U. (eds) Pattern Recognition. ICPR 2024. Lecture Notes in Computer Science, vol 15320. Springer, Cham. https://doi.org/10.1007/978-3-031-78498-9_16 (**Published**) (**CORE2023 Rank: B**)

10. H. Bijwe, S. K. Pandey and S. B. Nair, “Decentralized Multi-Robot Foraging using a Cloning Controller” (Under internal review)

Projects

Industrial

- **User review analyses using LLMs (An LLM based user reviews analysis pipeline under NextGen Invent Corporation)**
  Used llama3 for extracting ticket tags and aspect/segment based sentiment from user reviews to automate client process pipelines for the same. Tested around 13 models along with zero and few shot prompting with temperature control of the llama3 model to achieve the best data extraction performance. Secured client privacy by using local llama3 instance. Enhance tagging speed using Groq
- **LLM chatbot (An LLM based chatbot for structured and unstructured data under NextGen Invent Corporation)**
  Created pipelines for extracting data from PDFs and CSVs to be consumed by ChatGPT LLM agents. Used zero and few shot prompting to optimize the extracted data and the performance of the agent as well
- **Recommender System (A transformer based recommender system under NextGen Invent Corporation)**

  Full stack developer role involving mongo db database integration, model integration, embeddings creation and using streamlit framework for API creation.
- **LLM based cold email generator (A “Jurassic 2” LLM based copilot for generating cold emails)**

  Full stack developer role involving data wrangling from excel, model integration, embeddings creation for similarity comparison and using LLM for generative tasks.
- **Multimodal Chatbot**

  This project involved extraction and usage of multimodal embeddings from multiple data sources comprising PDFs, web portal data, etc. Role involved extraction of image embeddings from data sources.
- **PAARDAKSH (An ERP based project under SPMCIL)**
  under Mr Sunil Tiwari, Dy General Manager (IT)-SPMCIL
  Executive role involving administration, development and monitoring of IT infrastructure and its related issues. Central website development.
- **SPMCIL Recruitment Portal (A Java based online recruitment portal of SPMCIL)**
  under Mr Sunil Tiwari, Dy General Manager (IT)-SPMCIL
  Designer and developer
- **ICAR Research Data Repository for Knowledge Management (A data repository based project)**
  under Dr Rajender Parsad, Sr. Scientist-IASRI
  Full stack developer role involving development and designing for the project as per the requirements including central communication (both research and administrative data) portal

for Nodal Officers of ICAR around the globe and handling data repositories

Academic/Research:

- **Multi-Agent System Interface for the Webots Robot Simulator**
  Created an interface for a Multi-Agent System (TARTARUS) for Webots. (https://github.com/surajkumarpandey/Python-Prolog-Socket-Communication-Prolog-based-Webots-control)
- **Real-time intrusion detection under an IoT**
  Establishes an IoT using cloud services to monitor Lab's access and get real-time information remotely using MQTT protocol (https://github.com/surajkumarpandey/Intrusion-Alert-IoT-ESP8266-CloudMQTT-)
- **Gait Mapping**
  Performed basic human gait mapping and analysis using the time series data of the acceleration of the foot for recognizing gestures (https://github.com/surajkumarpandey/Gait-mapping-using-ESP8266-and-MPU6050)
- **Speech-based control of a simulated Robot**
  Created a Hidden Markov Model based speech recognizer for controlling a simulated robot
- **Restricted Boltzmann Machine based Recommender**
  Created a movie recommender system using Restricted Boltzmann Machine

Open Source:

- ***Tartarus*: a Multi-Agent System**
  Added various functionalities to the existing software, such as text-to-speech, software interfaces for sensors & actuators, corresponding documentation and testing.

Personal

- **Android Gaming App**
  Published an Indian mythology based android game on the google play store that holds a 4000+ user base. Presented it as a finalist in the presence of our honourable Prime Minister Shri Narendra Modi at Toycathon 2021, an inter-ministerial initiative organized by Ministry of Education's Innovation Cell with support from All India Council for Technical Education, Ministry of Women and Child Development, Ministry of Commerce and Industry, Ministry of MSME, Ministry of Textiles and Ministry of Information and Broadcasting.

Technical skills

- **Programming languages:** Python, C, C++, Java, MicroPython
- **Robotics Platforms**: Webots, Firebird V
- **Frameworks**: Tensorflow, Tensorflow Lite*, Streamlit*, Chainlit*
- **Web technologies:** HTML, CSS, Jquery*
- **Database management:** MySQL
- **Operating System:** Windows, Ubuntu, Raspbian
- **Microcontroller/ single-board computer and sensors:** Arduino*, Raspberry Pi based applications, ESP8266*, ESP32*, Lego Mindstorms NXT* and respective sensors
- **Miscellaneous:** TinyML*, MQTT, Octave, Drupal, Joomla!, Android programming *, SAP-ERP*

**Elementary proficiency*

Invited Talks/Demonstrations

- **TEQIP-III workshop on Recent Trends in Embedded System for IoT and Mechatronics (RTESTM-2019), National Institute of Technology Arunachal Pradesh,**
  Prof. Shivashankar B. Nair, Suraj Pandey, Divya D. Kulkarni and Menaxi Bagchi
  24.09.2019-28.09.2019
- **ATAL Workshop on IoT and Cyber Security, Indian Institute of Technology Guwahati,**
  Prof. Shivashankar B. Nair, Suraj Pandey, Divya D. Kulkarni and Menaxi Bagchi
  19.08.2019-23.08.2019

- **TEQIP FDP organized by the Dept. of Mechanical Engineering, Indian Institute of Technology Guwahati,**
  Prof. Shivashankar B. Nair, Suraj Pandey, Divya D. Kulkarni and Menaxi Bagchi
  03.2019
- **Course on "Artificial Intelligence in Medical Devices",** conducted for the students of **National Institute of Pharmaceutical Education and Research,**
  Prof. Shivashankar B. Nair, Suraj Pandey, Menaxi Bagchi and Divya D. Kulkarni
  07.2021 – 08.2021

Relevant Courses/Certifications undertaken

- Speech Processing (Indian Institute of Technology Guwahati)
- Artificial Intelligence (Indian Institute of Technology Guwahati)
- Mobile Robotics (Indian Institute of Technology Guwahati)
- Advanced Topics in Artificial Intelligence (Indian Institute of Technology Guwahati)
- Machine Learning (Online: Coursera)
- Neural Networks and Deep Learning (Online: Coursera)
- Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization (Online: Coursera)
- Structuring Machine Learning Projects (Online: Coursera)
- Introduction to Dynamical Systems and Chaos (2020), (Online: Complexity Explorer)
- Introduction to Complexity (Online: Complexity Explorer)
- Convolutional Neural Networks, (Online: Coursera), (Ongoing)

Positions of Responsibility

- Officer (IT), SPMCIL
- President, SPIC MACAY-Pantnagar Chapter (2013-14)
- Teaching Assistant for the following Undergraduate and Postgraduate courses:
  IIT Guwahati: Mobile Robotics, Smart Systems Laboratory, Peripherals & Interfacing Lab, Introduction To Computing, Computing Laboratory
  NIPER: Artificial Intelligence in Medical Devices
- Created and delivered course for an industrial grade robotics simulator-Webots to PhD and Graduate students

Achievements

- Granted scholarship to present research work at the **38th Annual AAAI Conference on Artificial Intelligence (AAAI-24).**
- Volunteered for the **38th Annual AAAI Conference on Artificial Intelligence (AAAI-24).**
- Offered scholarship to attend **The Genetic and Evolutionary Computation Conference, Melbourne,** July 14 - 18, 2024.
- Selected as a **reviewer for The International Conference on Pattern Recognition (ICPR)** 2024, the flagship conference of the International Association of Pattern Recognition and the premier conference in Pattern Recognition, Covering Computer Vision, Machine Learning, Image, Speech, Sensor Pattern Processing etc.
- Selected for attending Google's research symposium '**Research Week with Google, Google Research India**,' (08.02.2022-11.02.2022)
- Nominated for attending "**17th National Frontiers of Engineering (NatFoE) Symposium and IMP 2023**" organised by the Indian National Academy of Engineering & Birla Institute of Technology – Mesra, supported by the Science and Engineering Research Board
- Presented an accessibility **Android application** (NETRA) for the visually challenged in an international technical fest organized by **TimesWorld Group in association with Ministry of Science & Technology**, Government of India and All India Council for Robotics & Automation
- Attended **Gartner Security & Risk Management Summit** 2017 (Mumbai) as a delegate of SPMCIL
- Obtained merit based **Prime Minister's scholarship** for graduate program (2010-2014)
- Obtained **merit based scholarship** for 10+2 education
- Received the **Certificate of Honor from the Vice Chancellor** of the University for leading as the president of SPIC MACAY, Pantnagar Chapter during 2013-14

Extracurriculars

- Actively served as a member of the University's Chapter of an International body, SPIC

MACAY and led as its President for the session 2013-14

- Cyber presence: http://surrealsuraj.blogspot.in/, https://github.com/surajkumarpandey, https://www.youtube.com/channel/UCj7d4-KJ5MgJiOwBcJ27I7Q/about, https://www.instagram.com/13artwists/

Membership

- **AAAI:** Student member
- **IEEE**: Ex-Graduate Student member

I hereby declare that the aforementioned information is true to the best of my knowledge.

Suraj Kumar Pandey 07.11.2024

References:

1. Prof. Shivashankar B. Nair (https://www.iitg.ac.in/cse/internet-pages/sbnair)
2. Prof. P. K. Das (https://www.linkedin.com/in/pkdas2/)