भारतीय
प्रौद्योगिकी
संस्थान
काशी हिन्दू विश्वविद्यालय

IIT INDIAN
INSTITUTE OF
TECHNOLOGY
BANARAS HINDU UNIVERSITY

ABOUT US

संगणक अभियान्त्रिकी विभाग

The Department of Computer Science and Engineering at Indian Institute of Technology (Banaras Hindu University), Varanasi (erstwhile IT-BHU) was established in July 1983. To undergraduates, the department has been offering two courses since 2005-2006, a 4-year course, B. Tech in Computer Science and Engineering, and a 5-year course, Integrated Dual Degree (B. Tech and M. Tech) in Computer Science and Engineering. Ph. D degrees in various specializations of Computer Science and Engineering are also offered. Many of the graduates are pursuing higher studies in top universities of the world.

The department has produced many prominent figures in the computer industry. Alumni from the department are in regular touch and contribute to the development of the department. The faculty members of the department have international experience and training. The department encourages research in various fields like Artificial Intelligence, Parallel Processing, Software Engineering, Image Processing, Computer Vision, Data Mining, Web Mining, Biometrics, Semantic Web, Big Data Analytics, Cloud Computing, Natural Language Processing, and Machine Learning.

RESEARCH AND DEVELOPMENT

NATURAL LANGUAGE UNDERSTANDING

With the developments in NLP blooming at an ever-increasing rate, the CSE department of IIT(BHU) Varanasi is significantly contributing in both natural language comprehension and generation. Under the guidance of faculty members, students here have worked on probabilistic, statistical and neural-based solutions to automatic sarcasm detection, emotional intensity prediction, temporal relation classification and named entity recognition. Areas like cross-lingual information retrieval and multilingual surface realization have also been explored in the department. Project on robustness and interpretability of NLP, feature extractor networks for sequence labelling has been done. A Research paper on word embeddings of one of the students was also published, entitled "Does BERT Make Any Sense? Interpretable Word Sense Disambiguation with Contextualized Embeddings".

CRYPTOGRAPHY

The department's research in the field of cryptography deals in the problem involving the security of database systems and distributed algorithms. Essential applications of homomorphic encryption and blockchain to secure outsourced machine learning models. Students here have also built a suite of property tests which every sane implementation of a new cryptocurrency framework or a blockchain system should satisfy. Students have also worked on Privacy-Preserving Machine Learning using Secure Multiparty Computation for Medical Image Classification.

COMPUTER VISION

With the massive amount of images and videos shared on the Internet, protecting the identity of people in the data becomes crucial. Removing the identity information is often referred to as de-identification. It is a difficult problem because obtaining anonymity implies deteriorating the main face components. On the other hand, analyzing the expressions requires keeping enough information on the face, such as, for instance, the gaze or the corners of the lips. A project on face de-identification and emotion retaining is done.

NETWORK AND PARALLEL COMPUTING

Since the 1960s many breakthroughs in the field of computer networking make it an essential part of computing today. Parallel Computing has become a crucial part of computer science, primarily due to its application in supercomputing. The department aims to contribute to these fields and has thus fostered considerable research over the past few years. Work involving computer science networks, including the detection of Distributed Denial of Service (DDoS) attacks on a centralized network such as the SDN, has been done. Peer recommendation systems in dynamic attributed graphs and parallel implementation of dynamic programming problems are some projects which led to significant development in this field. Students have done projects for generating directed graphs with symmetry.

FACILITIES

Library

To foster and nourish the vision and mission of the department, the department is equipped with an expanding library consisting of journals and books on a variety of subjects concerning Computer Science and Engineering. One can find good literature related to one's area(s) of interest that is beneficial for both coursework and research purposes.

Undergraduate labs I and II

These are general-purpose labs equipped with approximately 50 personal computers and three servers each. These labs are also equipped with microprocessor kits, required software, and other relevant hardware to facilitate general work related to computer science

Operating systems and network lab

This lab serves for the study of various concepts of operating systems' analysis and networking, both of which are an essential part of the course curriculum. The lab provides around 35 personal computers with necessary software, real-time packet analyzer, and LAN/WAN trainer.

Computing and Vision lab

This lab supports the B.Tech/IDD students for carrying out their work related to their Exploratory Projects, UG Projects, and M.Tech Thesis. Associated PhD Research Scholars conduct their research in this lab in the area of Image Processing, Computer Vision, and Machine Learning. The lab is equipped with Benchmark High-Speed Imaging System, Vision Processor, Industrial Cameras, Imaging Computer, Imaging Library and Analysis software, Lens Kit, Zoom Lens, Copy/Camera Stand and Lighting.

Visual Computing and Analytics lab

From a computer vision perspective, the lab aims to develop novel and efficient intelligent algorithms using machine learning and deep learning that can perform important visual perception tasks such as object recognition, scene categorization, integrative scene understanding, human motion recognition, material recognition, video analysis, etc.

Intelligent computing lab

This lab is meant for practical implementation and testing of concepts of intelligent computing and robotics. Workstations with suitable intelligent computing software installed and robotics kits are made available in the lab for this purpose.

Machine vision lab

This lab aims at promoting practical applications of various concepts and developments in the fields of computer vision and image processing. Equipped with 40 personal computers, a workstation, and two servers, the lab is supported by necessary software and open-source software packages/libraries.

NLP lab

The NLP research lab (NLPRL) was set up in 2015 to research this and other related fields. The lab has several ongoing projects and has aided publication of the number of papers at reputed forums. The lab has two internal servers and has more than 11 desktops. One powerful GPU Titan XP was added to the lab in the year 2018 for research purposes which were a donation from NVIDIA. One of the significant projects here was machine translation for the languages spoken in and around Varanasi like Bhojpuri and Maithili to Hindi.

Pattern Recognition Lab

This lab focuses on Generative Adversarial Networks, Gait Analysis, and Person Re-identification. The recently set lab is equipped with four personal computers and one workstation with 64 GB ram, Nvidia 1080TI Graphics card.

Information Retrieval Lab

The lab focuses on research related to text summarization, microblog text analysis, recommender systems and text search on structured and semi-structured documents. The lab is equipped with the server powered by two Intel Xeon processors 64 GB memory and 16 GB graphics memory. It also provides hardware support to meet computing requirements. A GPU server has also been added to this lab. Currently, the lab is focussed on disaster management through social media, recommender systems, Sanskrit text retrieval, Speech retrieval for spoken documents.

Ubiquitous computing lab

This Lab was established to contribute to the relatively new vision of embedding computational capability into everyday objects. Sensor-based research like state detection and smart agricultural solutions for irrigation using IoT devices is done in the Lab. The data collected from this lab is also used for various machine learning-based research projects.

Data Engineering and High-performance Computing Lab

With proper connectivity to Param Shivay Super Computer and High-end systems available in the Institute, the lab focuses on the applications of High-Performance Computing in various fields, which includes Cloud Computing, Image Processing, Parallel Computing. Students are exposed to OpenMP, MPI, CUDA and hybrid programming in this lab.

Dependable and Smart systems Lab

The Dependable and Smart system's lab focuses on the study of Dependable and Smart Software Development for various types of end-users. It intends to cover all kinds of research that can be done in the area of software development with a specific focus on dependability and quality attributes.

Multimedia Lab

The lab is equipped with various types of camera and audio based systems essential for conducting sound and image-based image experiments. Apart from these, problems based on biometrics, cloud monitoring and animations are worked upon here. Many cameras have been set up to collect data for future use. Multimedia security is another developing area of research this lab contributes to.

Networks and Machine Learning Lab

The lab was established in July 2018 and is under the supervision of two faculties. Research is being carried out by research scholars in various fields such as Network Science, Social Networks, Game Theory, Recommendation Systems, etc. The lab is equipped with the server powered by two Intel Xeon processors 64 GB memory. The aim is to explore the fields of Machine Learning and Networks extensively and produce fruitful results that can be utilized for further developments in the respective fields.

Computer unit

The Computer Unit of the institute is a well-established central facility. The various computing facilities available include six servers, storage servers, 15 desktop clients and other peripherals. The facility is also equipped with the latest teaching and research software. Computationally expensive work which would take a lot of time otherwise can be done here by the faculty and students.

Supercomputer

Under the National Supercomputer Mission, supercomputer "PARAM SHIVAY" was established in Indian Institute of Technology (BHU), Varanasi and was inaugurated by the Hon'ble Prime Minister Shri Narendra Modi on 19th February 2019, under National Super Computer Mission. Its primary purpose is to meet the ever-increasing demand for computing power for research and development in different technological fields. It includes one petabyte secondary storage, appropriate open-source system, and application software suite using 223 processor nodes, 384 GB per node DDR4 RAM, parallel file system, including CPU and GPU. Research scholars and students are free to use this technology depending on their needs.

ACHIEVEMENTS

ACM-ICPC

The International Collegiate Programming Contest is a competition for college students to compete in algorithmic programming. Teams of three students representing their university work together to address the most pressing issues, encouraging collaboration, creativity, invention, and the ability to work under pressure. Teams compete against one another in training and competition to raise the bar on what is possible. Simply said, it is the world's oldest, largest, and most prestigious programming competition.

This year, the team that got selected to represent IIT BHU in the world finals had all three students from the CSE Department. The team qualified for ICPC World Finals 2021 secured first rank in Mathura-Kanpur Regionals of ICPC.

Linux Foundation

The Mentorship platform provides new open source developers with a structured remote learning environment. Experienced project maintainers and contributors use the site to mentor newcomers and assist them in becoming open source contributors.

2 students from IIT (BHU) Varanasi got selected in LFX Mentorship 2021 and one of them was from CSE Department.

Google Summer of Code

Google Summer of Code is a global online mentoring initiative aimed at getting new contributors involved in open source software development. With the help of mentors from their open source organisation, GSoC contributors work on a 12-week programming project. Participating contributors are partnered with mentors from open source groups during Google Summer of Code, giving them exposure to real-world software development approaches.

In GSoC 2021, 23 student contributors got selected from IIT (BHU) Varanasi which was the second highest number of contributors from any educational institute in the world. Of these 23 students, 7 were from the CSE Department making it the highest number of students selected in GSoC 2021 from any other department in IIT BHU.

Cyber Security

The team with a student from CSE secured Gold medals in 9th Inter IIT Tech Meet by IIT Guwahati in the Security Hackathon by Saptang Labs.

A team from IIT (BHU) Varanasi made it to the finals of the Cyber Security Awareness Week (CSAW) Capture the Flag 2021 where they competed against the top 15 teams from different regions all over the world. The team also had one student from the CSE Department.

DAAD-WISE Scholarship

The German Academic Exchange Service (DAAD) is the world's largest funding organisation for international student and researcher exchanges. Working Internships in Science and Engineering (WISE) is a DAAD programme for Indian students pursuing a degree in science or engineering who want to perform a research internship at a publicly-funded German university or research facility.

This year, 9 students from IIT (BHU) Varanasi got selected for the internships under DAAD-WISE programme of which 2 were from CSE. They will be researching in the fields of Natural Language Processing during this internship.

FACULTY

Currently, the department has a faculty strength of 19 , having interests spanning almost all areas of Computer Science

Dr Sanjay Kumar Singh
Professor and Head of the Department and Chairman JEE (Advanced)
Areas of Interest: Image and Vedio Processing, Pattern Recognition, Machine Learning, Deep Learning, Data Science, Medical Imaging, Quantum Neural Networks and Biometrics.

Dr Rajeev Srivastava
Professor and Dean (Resource and Alumni)
Areas of Interest: Image Processing, Computer Vision, Pattern Recognition, Machine Learning, Video Surveillance, Medical Image Analysis, and Design and Analysis of Algorithm

Dr Anil Kumar Tripathi
Professor
Areas of Interest: Parallel/Distributed Computing, Software Engineering

Dr Kaushal Kumar Shukla
Professor
Areas of Interest: Artificial Intelligence, Neural Networks, Data Science

Dr Bhaskar Biswas
Associate Professor
Areas of Interest: Data Mining, Web Mining, Social Networks, applications of machine learning and soft computing techniques

Dr Ravi Shankar Singh
Associate Professor
Areas of Interest: Graph Algorithms, High-Performance Computing

Dr Anil Kumar Singh
Associate Professor
Areas of Interest: Natural Language Processing, Computational Linguistics, Information Retrieval

Dr Ruchir Gupta
Associate Professor
Areas of Interest: Peer-to-peer Network, Social Networks, Game Theory

Dr Sukomal Pal
Associate Professor
Areas of Interest: Information Retrieval, Recommender Systems, Data Science, Text Mining

Dr Vinayak Srivastava
Assistant Professor
Areas of Interest: Software Engineering, Software Re-engineering

Dr Ravindranath Chowdary C
Assistant Professor
Areas of Interest: Information Extraction, Recommender Systems, Text Summarization, Web Mining

Dr Lakshmanan Kailasam
Assistant Professor
Areas of Interest: Reinforcement Learning, Optimization

Dr Tanima Dutta
Assistant Professor
Areas of Interest: Multimedia Forensics, Vision and Graphics, Machine / Deep Learning, Human-Computer Interaction, Multimedia Sensor Networks

Dr Hari Prabhat Gupta
Assistant Professor
Areas of Interest: Wireless Sensor Networks, Computer Networks, Ubiquitous Computing and IoT

Dr Amrita Chaturvedi
Assistant Professor
Areas of Interest: Software Architecture and Design Patterns, Ontologies, Artificial Intelligence, Semantic Web, Big Data Analytics and Machine Learning

Dr Pratik Chattopadhyay
Assistant Professor
Areas of Interest: Image and Video Processing, Pattern Recognition, Machine Learning

Dr. Ajay Pratap
Assistant Professor
Areas of Interest: IoT, Fog Computing, Design and Analysis of Algorithms, Cellular Wireless and 6G Networks

Dr. Mayank Swarnkar
Assistant Professor
Areas of Interest: Network Security, IoT Security, Computer Networks and Network Penetration Testing

Dr. Prasenjit Chanak
Assistant Professor
Areas of Interest: Wireless Sensor Networks, IoT, Cyber-Physical Networks(CPN), Consumer Electronics

Contacts

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