



# Department of Computer Science and Automation

Indian Institute of Science, Bangalore





The Department of Computer Science and Automation (CSA) was created in 1969 and since inception, has been a pioneering academic centre for higher education, research, and innovation in core and key areas of computer science. The vision of the department is to enable India's excellence in the world of computer science and engineering and the driving mission is to advance the frontiers of research in computer science and offer world-class pedagogical and research experience to its students. CSA is recognized as a Centre for Advanced Study by the University Grants Commission and has been awarded a FIST (Fund for Infrastructure in Science and Technology) grant by the Department of Science and Technology, Government of India. The department is ranked highest among all Indian institutions in terms of its publication profile and citations accumulated by the publications (Academic Ranking of World Universities, Source: [csrankings.org](http://csrankings.org)).

CSA researchers contribute to cutting-edge research in topical areas of computer science, and are actively engaged in high-impact collaborative projects. The faculty members have received numerous awards in recognition of their excellence in research, including the ACM and IEEE Fellowships, Fellowships of National Academies, Shanti Swarup Bhatnagar Award, J.C. Bose National Fellowship, Swarnajayanti Fellowship, Infosys Prize, Faculty Awards from global R&D companies, Young Scientist Awards, and Best Paper Awards.

The department attracts talented students from all over India. There are currently 73 Ph.D. students on roll. All graduates of CSA find excellent placements in research-oriented industries, top ranking global companies, and as faculty in prominent national and international institutes and universities.

CSA alumni are at the forefront of research and development in computer science and related fields within India and internationally. The department's alumni include renowned academicians, leaders in computer and IT industry, distinguished scientists, and trendsetting entrepreneurs. Ati Motors, Astrome, Cellstream, Dhiti Technologies, Encore, Integra Microsystems, Ittiam, Mimyk, MyBantu, Niramai, Picopeta Simputers, Polymage Computing, Strand Lifesciences, Stremoid, Suryasoft and a host of other companies have been established by CSA alumni and faculty.

Research is the primary activity and focus of CSA, and our faculty are all active researchers in their respective domains of expertise, leading a variety of projects within the department. In addition, our faculty often collaborate with researchers from other groups and departments on interdisciplinary projects. For instance, CSA faculty are active participants in institute-wide and national interdisciplinary research efforts such as the National Mathematical Initiative (NMI), the DST Centre for Mathematical Biology, the Computational Neuroscience program, the Centre for Infrastructure, Sustainable Transportation and Urban Planning (CISTUP), and the Robert Bosch Centre for Cyber Physical Systems (RBCCPS).

Research within CSA can be broadly grouped into the following three streams:

**Theoretical Computer Science:** Algorithms, complexity theory, graph theory, algorithmic algebra, algorithmic game theory, automata theory, combinatorial geometry, computational geometry, online algorithms, spectral algorithms, approximation algorithms, geometric algorithms and data structures, computational topology, coding theory, cryptology, logic, formal verification, computational biology.

**Computer Systems and Software:** Computer architecture, multi-core systems and programming, parallelization, embedded systems, energy aware computing, operating systems, storage systems, database systems, distributed computing, cloud computing, cyber security, computer systems security, mobile and wireless systems, cyber-physical systems, performance modeling, graphics, visualization, programming languages, compilers, program analysis, software engineering.

**Intelligent Systems:** Pattern recognition, machine learning, Information theory and statistical learning, convex optimization, data mining, information retrieval, bioinformatics, social network analysis, network science, reinforcement learning, stochastic control and optimization, stochastic approximation algorithms, electronic commerce, game theory, auctions and mechanism design, cognitive systems.

In each of the above streams, CSA also enjoys collaboration with leading institutions outside of IISc, including both industrial and academic partnerships, as highlighted below:

**Industry Collaboration:** Accenture, Adobe Labs, Amazon, AMD, Bell Labs, Bosch, Google, IBM, Infosys, Intel, Microsoft Research India, NetApp, Nokia, Philips, SAP, Sonata, SUN, TCS, Xerox, and Yahoo!.

**University Collaboration:** Alberta, Chalmers, CMI, CMU, Grenoble, Harvard, IITB, IITM, INRIA, ISI, Leipzig, MIT, MPI, UCB, UCD, UCSC, Stanford, SUNY, Technion, TIFR, Waterloo, York, and Zurich.

# Research and Computing Laboratories

CSA houses several research and computing laboratories within the department. In addition, CSA faculty and students also conduct research within labs located in sister departments such as Computational and Data Sciences (CDS), Supercomputer Education and Research Centre (SERC), Electrical Communication Engineering (ECE), Electrical Engineering (EE) and the Department of Electronic Systems Engineering (DESE).

*Cognition, Computation and Behavior Lab (CNS)*

*Algorithms and Complexity Theory Lab*

*Approximation Algorithms Group*

*Compiler Lab*

*Computer Architecture and Systems Lab*

*Computer Systems Lab*

*Computer Systems Security Lab*

*Cryptography and Information Security Lab*

*Cryptography, Security and Privacy Group*

*Discrete and Computational Geometry Lab*

*Distributed Computing Lab*

*Game Theory Lab*

*Informatics and Security Lab*

*Statistics and Machine Learning Group*

*Intelligence Systems Lab*

*Machine Learning Lab*

*Multicore Computing Lab*

*Pattern Analysis and Machine Intelligence Lab*

*Programming Languages Lab*

*Software Engineering and Analysis Lab*

*Stochastic Systems Lab*

*Theory Lab II*

*Topic Analysis and Synthesis Lab*

*Visualization and Graphics Lab*

*Database Systems Lab (CDS)*

*High Performance Computing Lab (SERC)*

*Machine and Language Learning Lab (CDS)*



# CSA in Figures

Current Faculty	
Department Faculty	29
Associate Faculty	3
INSA Senior Scientist	1
Adjunct Faculty	2

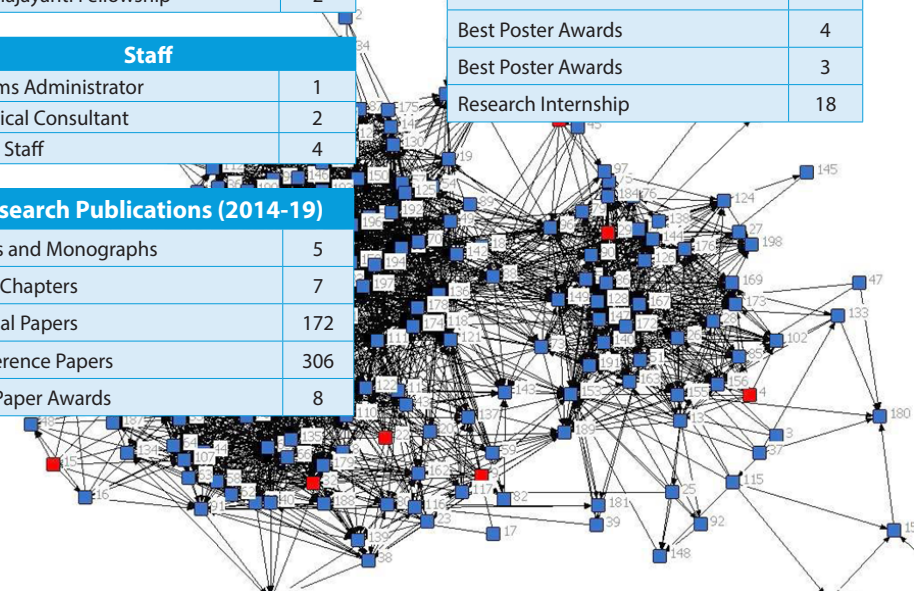
Faculty Distinctions	
Fellows of IEEE	3
Fellows of ACM	2
Fellows of INSA	3
Fellows of IASc	4
Fellows of INAE	9
Fellows of NASI	3
J.C. Bose Fellows	2
S.S. Bhatnagar Award	1
Infosys Prize	1
IISc Research Awards	7
Young Scientist Awards	24
Industrial Faculty Awards	24
Editorial Boards of International Journals	18
ACCS-CDAC Foundation Prize	3
Swarnajayanti Fellowship	2

Staff	
Systems Administrator	1
Technical Consultant	2
Office Staff	4

Research Publications (2014-19)	
Books and Monographs	5
Book Chapters	7
Journal Papers	172
Conference Papers	306
Best Paper Awards	8

Students	
PhD (Regular)	73
MTech (Research)	59
M.Tech (CSE)	113
M.Tech(SSA)	4(jointly with EE)
M.Tech (AI)	38 (Jointly with EE, ECE, ESE)

Student Distinctions (2014-19)	
ACM Doctoral Dissertation Prize:	1
ACM Doctoral Dissertation Prize Honourable Mention:	1
Best Ph.D Dissertation – IEEE Intelligent Transportation Systems Society, New York	1
Google PhD Fellows	2
Google Women in Engineering Awardees	3
IBM PhD Fellows	1
Infosys Fellows	4
MSRI PhD Fellows	5
TCS PhD Fellows	2
Yahoo! Key Scientific Challenge Awards	3
Best Poster Awards	4
Best Poster Awards	3
Research Internship	18



The CSA Department is celebrating its Golden Jubilee from August 01, 2019 to July 31, 2020.

As part of the Golden Jubilee celebrations, the Department is planning several events and initiatives. One of the initiatives is to organize the "CSA Frontier Lecture Series" to introduce the audience to a wide gamut of research themes in computer science. Several workshops on emerging areas of research are also being planned where top researchers worldwide will be visiting the department and the institute for giving lectures and interactions with the faculty and students of the department. In addition there will be events with alumni get-togethers.

As many as 50 startups have been established by the alumni of the department and the EECS division during the course of the last five years. A "MANCH" initiative has recently been launched to bring together the startup founders from amongst our alumni as well as faculty and students of the department and also investors and venture capitalists on a common platform. The MANCH events will be organized as well as part of the Golden Jubilee celebrations.

During the Golden Jubilee year, we are also planning to add new infrastructure to the department. In order to take care of the space requirements of faculty and students, additional second floor construction (on top of the CSA Seminar Hall portion) in a nearly 5,500 square feet area that was not undertaken previously will be started soon. This construction is being entirely supported by the institute. In addition, we would also like to have a CSA Golden Jubilee Auditorium which will have a seating capacity of 120 people. The room that has been identified for this auditorium is on the ground floor of the department and is in the same room where the initial activities of WIPRO had been seeded.

Details on the Golden Jubilee initiatives will regularly be updated on the CSA webpage <https://www.csa.iisc.ac.in>.



## Post-Doctoral/ Research Associate Fellowships

The department has maintained an excellent reputation for high quality degree programs. Entry into all degree programs is highly competitive. All students are offered scholarships during their period of study, subject to satisfactory performance.

The department invites accomplished Ph.D. graduates to apply for post-doctoral fellowships/ research associate positions. Interested and qualified candidates can apply for the highly prestigious Raman Postdoctoral Fellowships that are administered by the institute.

## Research Programs

CSA offers two research programs, M.Tech (Research) and Ph.D., that train a student to become a perceptive and sound researcher. Students are expected to conduct independent research under the supervision of a faculty member, prepare a research proposal, and author a dissertation describing their original work. The anticipated time to earn the Ph.D. and M.Tech (Research) degrees are 4 and 2 years, respectively. Before completion of their programs, students are expected to present and publish their research results at premier international journals and conferences.

## Course Programs

The two course-based masters programs currently offered by the department are structured to provide a solid foundation in core areas of computer science through course work while allowing enough flexibility for the student to pursue an area of specialization in their research projects. The M.Tech (Computer Science and Engineering) is the flagship program of CSA that attracts the best students in the country. The M.Tech (Systems Engineering) jointly offered with the Electrical Engineering Department, is a unique program that blends computer science and systems science towards problem solving. The M.Tech (Systems Engineering) program has now been changed to M.Tech (Artificial Intelligence) and is a division-wide M.Tech program being offered by the Electrical, Electronics and Computer Sciences (EECS) division at IISc. The program is being jointly administered by all four departments of the EECS Division, viz., CSA, EE, ECE and ESE, respectively, and is the first division-wide M.Tech program of IISc. The goal of this program is to impart foundational training to students in machine learning and artificial intelligence. The first batch of students under this program has already arrived while the last batch of M.Tech (SE) is also currently running.

## External Registration Program (ERP)

This program enables graduates working in public or private organizations including educational institutions to pursue a research degree at the department.



# Opportunities@CSA

## Quality Improvement Program (QIP)

This program is meant for faculty members in AICTE affiliated engineering colleges who wish to pursue an M.Tech or a Ph.D. degree in the department.

## Summer Internship Program

The department hosts about 25 undergraduate engineering students during summer towards an exciting research internship program.

## Summer School for UG students

The department hosts about 80 undergraduate engineering students for a week during the summer to provide them exposure to foundational concepts and to convey to them the excitement of pursuing research



# Faculty@CSA

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