GUIDELINES FOR PREPARING THE INTERNAL REVIEW REPORT OF AN ACADEMIC UNIT FOR THE ACADEMIC REVIEW

1. Curriculum

1.1 List of degree programmes offered - UG + PG - and enrollment.

Name of Programme	Current Enrollment
B.Tech (UG)	267
Dual Degree (PG)	171
M.Tech (PG)	105
M.S.(R) (PG)	5
Ph.D. (PG)	47

1.2 Consistency of curricula with academic vision of the department.

The emphasis in the curricula is on system architecture, algorithms, networking, performance issues, and tools for applications development. The stress is more on design, methodology, analysis, and good software practices. As part of graduation requirements, each undergraduate student is expected to complete a two semester project which may involve developing a subsystem that typically contributes to fulfilling the objectives of some research project. For the dual degree and M.Tech. programme, the students are expected to undertake a project which has significant research component.

1.3 Quality of programmes:

(a) Periodicity of curriculum review UG and PG (relevant documents).

Once every 10 years. Course structure updated in a continuous manner.

(b) Mechanism for review at UG and PG level (relevant documents).

The course structure is currently under revision and the revised UG curriculum is enclosed in Annexure A. Curriculum review documents are attached.

(c) Coursework for each UG, PG and PhD programme - Core / Elective.

(Note: this is the curriculum which was followed in the last 5 years, updated curriculum for UG is attached).

M.Tech

Category	Core	Program Elective	Open Category
Credits	40	14	6

Program Core:

Course No.	Course Title	Course Credit Structure
CSD 745	Minor Project	0-1-6 (4)
CSD893	Major Project Part 1	0-0-12 (6)
CSD894	Major Project Part 2	0-0-24 (6)
CSL630	Data Structures and Algorithms	3-0-2 (4)
CSP701	Software Systems Laboratory	0-0-6(3)
CSL765	Introduction to Logic & Functional Programming	3-0-2(4)

Program Electives:

Course No.	Course Title	Course Credit Structure
CSL632	Introduction to Data Base Systems	3-0-2 (4)
CSL633	Resource management in Computer Systems	3-0-2 (4)
CSL671	Artificial Intelligence	3-0-2 (4)
CSL672	Computer Networks	3-0-2 (4)
CSL705	Theory of Computing	3-0-0(3)
CSL718	Architecture of High Performance	3-0-2(4)

	Computers	
CSL719	Synthesis of Digital Systems	3-0-2 (4)
CSL724	Advanced Computer Networks	3-0-2 (4)
CSL728	Compiler Design	3-0-3 (4.5)
CSL730	Modern Parallel Programming	3-0-2 (4)
CSL732	Virtualization and Cloud Computing	3-0-2 (4)
CSL740	Software Engineering	3-0-2 (4)
CSL750	Foundations of Automatic Verification	3-0-2 (4)
CSL758	Advanced Algorithms	3-0-2 (4)
CSL771	Database Implementations	3-0-2 (4)
CSL781	Computer Graphics	3-0-3 (4.5)
CSL783	Digital Image Analysis	3-0-3 (4.5)
CSL812	System Level Design and Modelling	3-0-3 (4.5)
CSL821	Reconfigurable Computing	3-0-0 (3)
CSL830	Distributed Computing	3-0-0 (3)
CSL831	Semantics of Programming Languages	3-0-0 (3)
CSL832	Proofs and Types	3-0-3 (4.5)
CSL840	Computer Vision	3-0-2 (4)
CSL847	Distributed Algorithms	3-0-0 (3)
CSL851	Algorithmic Graph Theory	3-0-0 (3)
CSL852	Computational Geometry	3-0-2 (4)

CSL853	Complexity Theory	3-0-0 (3)
CSL854	Approximation Algorithms	3-0-0 (3)
CSL855	Models of Computation	3-0-0 (3)
CSL856	Mathematical Programming	3-0-0 (3)
CSL858	Advanced Computer Networks	3-0-2 (4)
CSL859	Advanced Computer Graphics	3-0-2 (4)
CSL860	Special Topics in Parallel Computation	3-0-2 (4)
CSL861	Special Topics in Hardware Systems	3-0-0 (3)
CSL862	Special Topics in Software Systems	3-0-0 (3)
CSL863	Special Topics in Theoretical Computer Science	3-0-0 (3)
CSL864	Special Topics in Artificial Intelligence	3-0-0 (3)
CSL865	Special Topics in Computer Applications	3-0-0 (3)
CSL866	Special Topics in Algorithms	3-0-0 (3)
CSL867	Special Topics in High Speed Networks	3-0-0 (3)
CSL868	Special Topics in Database Systems	3-0-0 (3)
CSL869	Special Topics in Concurrency	3-0-0 (3)
CSS799	Independent Study	0-3-0 (3)

CSV880	Special Module in Parallel Computation	1-0-0 (1)
CSV881	Special Module in Hardware Systems	1-0-0 (1)
CSV882	Special Module in Software Systems	1-0-0 (1)
CSV883	Special Module in Theoretical	1-0-0 (1)
CSV884	Special Module in Artificial Intelligence	1-0-0 (1)
CSV886	Special Module in Algorithms	1-0-0 (1)
CSV887	Special Module in High Speed Networks	1-0-0 (1)
CSV888	Special Module in Database Systems	1-0-0 (1)
CSV889	Special Module in Concurrency	1-0-0 (1)

B.Tech (pre-revised) The revised curriculum from 2013 Entry Onwards at Annexure A.

Undergraduate Core(UC)	Undergraduate Electives(UE)		
Category	Credits	Category	Credits
DC	66	DE	24
BS	24	HM	14
EAS	20	OC	31
HU	1		
Total	111	Total	69

Course No.	Course Title	**Course Credit**

		Structure
CSL101	Introduction to Computer Science and Programming	3-0-2 (4)
CSL102	Introduction to Computer Science	3-0-0 (4)

Departmental Core(DC)		
Course No.	**Course Title**	**Course Credit Structure**
CSC410	Colloquium (CS)	0-3-0 (2)
CSD411	Major Project Part 1(CS)	0-0-8 (4)
CSD412	Major Project Part 2(CS)	0-0-16 (8)
CSL105	Discrete Mathematical Structures	3-1-0 (4)
CSL201	Data Structures	3-0-4 (5)
CSL211	Computer Architecture	3-1-2 (5)
CSL302	Programming Languages	3-0-4 (5)
CSL356	Analysis and Design of Algorithms	3-1-0 (4)
CSL373	Operating Systems	3-0-4 (5)
CSL374	Computer Networks	3-0-3 (4.5)
CSN110	Introduction to Computer Science & Engineering	0-0-4 (2)
CSP301	Design Practices in Computer Science	0-1-4 (3)
CST410	Practical Training (CS)	0 credits
Department Electives(DE)		
CSD310	Mini Project	0-0-6 (3)
CSL303	Logic for Computer Science	3-0-2 (4)
CSL316	Digital Hardware Design	3-0-4 (5)
CSL332	Introduction to Database Systems	3-0-3 (4.5)
CSL333	Artificial Intelligence	3-0-2 (4)

CSL361	Numerical and Scientific Computing	3-1-2 (5)
CSL362	Simulation and Modeling	3-0-2 (4)
CSL705	Theory of Computation	3-1-0 (4)
CSL719	Synthesis of Digital Systems	3-0-2 (4)
CSL728	Compiler Design	3-0-3 (4.5)
CSL740	Software Engineering	3-0-2 (4)
CSL750	Foundations of Automatic Verification	3-0-2 (4)
CSL771	Database Implementations	3-0-2 (4)
CSL781	Computer Graphics	3-0-3 (4.5)
CSL783	Digital Image Analysis	3-0-3 (4.5)
CSP315	Embedded System Design Laboratory	0-1-6 (4)
CSR310	Professional Practices (CS)	0-1-2 (2)
CSS310	Independent Study (CS)	0-3-0 (3)

B.Tech and M.Tech. Dual Degree Program (Pre-Revised)

Undergraduate Core(UC)	Undergraduate Electives(UE)		
Category	Credits	Category	Credits
DC	54	DE	24
BS	24	HM	14
EAS	20	OC	31
HU	1		
Total	99	Total	69

Program Core(UC)	Program Electives(UE)		
Category	Credits	Category	Credits
PC	32	PE	16

Engineering Arts and Sciences Core (EAS)		
Course No.	Course Title	**Course Credit Structure**
CSL101	Introduction to Computer Science and Programming	3-0-2 (4)
CSL102	Introduction to Computer Science	3-0-0 (4)

Departmental Core(DC)		
Course No.	**Course Title**	**Course Credit Structure**
CSC410	Colloquium (CS)	0-3-0 (2)
CSL105	Discrete Mathematical Structures	3-1-0 (4)
CSL201	Data Structures	3-0-4 (5)
CSL211	Computer Architecture	3-1-2 (5)
CSL302	Programming Languages	3-0-4 (5)
CSL356	Analysis and Design of Algorithms	3-1-0 (4)
CSL373	Operating Systems	3-0-4 (5)
CSL374	Computer Networks	3-0-3 (4.5)
CSN110	Introduction to Computer Science & Engineering	0-0-4 (2)
CSP301	Design Practices in Computer Science	0-1-4 (3)
CST410	Practical Training (CS)	0 credits
Department Electives(DE)		
CSL303	Logic for Computer Science	3-0-2 (4)
CSL316	Digital Hardware Design	3-0-4 (5)
CSL332	Introduction to Database Systems	3-0-3 (4.5)
CSL333	Artificial Intelligence	3-0-2 (4)

CSL361	Numerical and Scientific Computing	3-1-2 (5)
CSL362	Simulation and Modeling	3-0-2 (4)
CSL705	Theory of Computation	3-1-0 (4)
CSL719	Synthesis of Digital Systems	3-0-2 (4)
CSL728	Compiler Design	3-0-3 (4.5)
CSL740	Software Engineering	3-0-2 (4)
CSL750	Foundations of Automatic Verification	3-0-2 (4)
CSL771	Database Implementations	3-0-2 (4)
CSL781	Computer Graphics	3-0-3 (4.5)
CSL783	Digital Image Analysis	3-0-3 (4.5)
CSP315	Embedded System Design Laboratory	0-1-6 (4)
CSR310	Professional Practices (CS)	0-1-2 (2)
CSS310	Independent Study (CS)	0-3-0 (3)
Program Electives (PC)		
CSD851	Major Project Part 1(CO)	0-0-12 (6)
CSD852	Major Project Part 2(CO)	0-0-28 (14)
CSD853	Major Project Part 1(CO)	0-0-8 (4)
CSD854	Major Project Part 2(CO)	0-0-32 (16)
CSD893	Major Project Part 1(MT)	0-0-12 (6)
CSL758	Advanced Algorithms	3-1-0 (4)
CSL718	Architecture of High Performance Computers	3-0-2(4)
Program Electives (PE)		
CSL719	Synthesis of Digital Systems	3-0-2 (4)
CSL728	Compiler Design	3-0-3 (4.5)
CSL730	Parallel Programming	3-0-2 (4)
CSL740	Software Engineering	3-0-2 (4)
CSL750	Foundations of Automatic Verification	3-0-2 (4)

CSL771	Database Implementations	3-0-2 (4)
CSL781	Computer Graphics	3-0-3 (4.5)
CSL783	Digital Image Analysis	3-0-3 (4.5)
CSL812	System Level Design and Modelling	3-0-3 (4.5)
CSL821	Reconfigurable Computing	3-0-0 (3)
CSL830	Distributed Computing	3-0-0 (3)
CSL831	Semantics of Programming Languages	3-0-0 (3)
CSL832	Proofs and Types	3-0-3 (4.5)
CSL840	Computer Vision	3-0-2 (4)
CSL847	Distributed Algorithms	3-0-0 (3)
CSL851	Algorithmic Graph Theory	3-0-0 (3)
CSL852	Computational Geometry	3-0-2 (4)
CSL853	Complexity Theory	3-0-0 (3)
CSL854	Approximation Algorithms	3-0-0 (3)
CSL855	Models of Computation	3-0-0 (3)
CSL856	Mathematical Programming	3-0-0 (3)
CSL858	Advanced Computer Networks	3-0-2 (4)
CSL859	Advanced Computer Graphics	3-0-2 (4)
CSL860	Special Topics in Parallel Computation	3-0-2 (4)
CSL861	Special Topics in Hardware Systems	3-0-0 (3)
CSL862	Special Topics in Software Systems	3-0-0 (3)
CSL863	Special Topics in Theoretical Computer Science	3-0-0 (3)
CSL864	Special Topics in Artificial Intelligence	3-0-0 (3)
CSL865	Special Topics in Computer Applications	3-0-0 (3)
CSL866	Special Topics in Algorithms	3-0-0 (3)
CSL867	Special Topics in High Speed Networks	3-0-0 (3)
CSL868	Special Topics in Database Systems	3-0-0 (3)
CSL869	Special Topics in Concurrency	3-0-0 (3)
CSP315	Embedded System Design Laboratory	0-1-6 (4)

CSP601	Software Systems Laboratory (MT)	0-0-6 (3)
CSR310	Professional Practices (CS)	0-1-2 (2)
CSS310	Independent Study (CS)	0-3-0 (3)
CSS799	Independent Study	0-3-0 (3)
CSV880	Special Module in Parallel Computation	1-0-0 (1)
CSV881	Special Module in Hardware Systems	1-0-0 (1)
CSV882	Special Module in Software Systems	1-0-0 (1)
CSV883	Special Module in Theoretical Computer Science	1-0-0 (1)
CSV884	Special Module in Artificial Intelligence	1-0-0 (1)
CSV886	Special Module in Algorithms	1-0-0 (1)
CSV887	Special Module in High Speed Networks	1-0-0 (1)
CSV888	Special Module in Database Systems	1-0-0 (1)
CSV889	Special Module in Concurrency	1-0-0 (1)

(d) Pre PhD courses offered (*in last 5 yrs*).

Course Number	Course Name	Semester Offered
CSL 854	Approximation algorithms	SemI – 2010, SemII-2012
CSL 851	Algorithmic Graph Theory	SemI-2013
CSL865	Special topics in Computer Applications – optimization	SemI, 2007-08
CSL854	Approximation Algorithms	SemI, 2008-09
CSL854	Approximation Algorithms	SemI, 2010-11
CSL863	Special Topics in Theoretical Computer Science: Game Theory	SemI, 2011-12
CSL866	Special Topics in Algorithms: Quantitative methods in OR	SemII, 2012-13
CSL851	Algorithmic Graph Theory	SemI, 2013-14
CSL858	Advanced Computer Networks	
CSL867	Special Topics in High Speed	

	Networks: Internet Architecture	
SIL769	Internet Traffic: Measurement, Modeling, and Analysis	
SIV861	Information and Communication Tech for Development	
CSL759	Cryptography and Computer Security	Semester-II 2012-13
CSL633	Resource Management in Computer Systems	SemII 2009-10, SemII 10-11, 2nd Semester 2011-12, SemII 2012-2013, SemII 2013-14
CSL857	Randomized Algorithms	Semester-II 2011-12
CSL866	Cryptography	Semester-II 2010-11
CSL 860	Special Topics in Software Systems	Spring 2013
CSL 861	Special Topics in Hardware Systems	Spring 2012, Spring 2011
CSL 868	Special Topics in Database Systems	II semester
CSL 761	Artificial Intelligence	
CSL 765	Logic and Functional Programming	
CSL724	Advanced computer networks	Sem I, 2011-12
CSL838	Wireless networks	Sem II, 2011-12, Sem I, 2013-14
CSL867	Spl. Topics in high speed networks	Sem II, 2007-08
CSL 863	Spl Topics in TCS (Cryptography)	2007-08 II Sem
CSL 852	Computational Geometry	2010-11 I Sem
CSL812	SYSTEM LEVE DESIGN & MODELING	2011/2012
CSV881	SPECIAL MODULE IN HARDWARE DESIGN	2008/2009
CSL868	SPECIAL TOPICS IN DATA BASE SYSTEMS	
CSV880	SPECIAL MODULE IN PARALLEL COMPUTATION	
CSL632	INTRODUCTION TO DATA BASESYSTEMS	
CSL859	Advanced Computer Graphics	II, 2012-13

(e) New advanced Masters / Pre-PhD courses introduced in last 5 yrs.

Course Number	Course Name	Semester Offered
CSL863	Special Topics in Theoretical Computer Science: Game Theory	SemI, 2011-12
CSL866	Special Topics in Algorithms: Quantitative methods in OR	SemII, 2012-13
SIV861	Information and Communication Tech for Development	
SIL769	Internet Traffic: Measurement, Modeling, and Analysis	
CSL732	Virtualization and Cloud Computing	SemI 2010-11, SemI 2011-12 (under CSL862 Spl. Topics number)
SIL765	Networks and System Security	SemII 2009-10 (under CSL865 Spl. Topics number)
CSL862	Special Topics in Computer Systems: Advanced Operating Systems	SemI 2012-13
CSL862	Special Topics in Computer Systems: Advanced Software Systems (Compilers/OS)	SemI 2013-14
CSL759	Cryptography and Computer Security	Semester-II 2012-13
CSL 818	Principles of Multiprocessor Systems	Spring
CSL 771	Database Implementation (course modified)	I semester
CSL838	Wireless Networks	Sem II, 2011-12, Sem I, 2013-14

(f) Overlap between courses (c) and (d) & (e), including opening latter to UG.

(g) Seminar series (weekly/regular) held each semester (*provide list*).

List of seminars is given under section 2.13

(h) Placement details (*as per format at Annexure-1*).

	2009-10	2010-11	2011-12	2012-13
B.Tech	35	34	42	45
Dual	18	17	23	20
M.Tech.	7	21	30	27
Ph.D.	3	3	3	4

(i) Relevance of UG and programmes to recruiters, potential and on-campus recruiters (*as per format at Annexure-2*).

(j) Benchmarking of curriculum (*as per format at Annexure-3*).

Benchmarking information given in section 8.

2. Teaching environment

2.1 Student-Teacher ratio separately and total for UG, PG, PhD (based *on gross numbers and on class size basis*)

UG (including dual degree): 4.07:1
PG: 2:1
PhD: 1.9:1

2.2 No. of students graduated in each programme, incl. PhD, (*data for 5 yrs*)

	2008-09	2009-10	2010-11	2011-12	2012-13
B.Tech	41	40	38	42	50
Dual	18	21	19	18	20
M.Tech.	14	19	25	41	32
Ph.D.	4	3	3	3	4

2.3 Student-T.A. (or student-hours/T.A.) ratio

roughly 20:1

2.4 No. of skilled technical staff: 6

2.5 Gross laboratory space; break-up of lab space for core UG / PG teaching

Digital Hardware Design Lab: This laboratory supports the training and project needs of the students in the area of digital hardware design. Facilities include microprocessor based system design and FPGA based design.

General Computing Lab: This laboratory supports the general purpose computing needs of most students. It houses more than 70 workstations and provides full email and internet access. The servers provide the software required for laboratories in most of the department courses.

Advanced Networking Laboratories : Besides providing access to ERNET and internet services, the laboratory supports development of multimedia communications and applications, ATM protocol stack, wireless and mobile communications, network security and simulation studies in high-speed networks.

Vision & Graphics Lab: The laboratory supports development efforts in two areas, namely real-time vision and graphics. The facilities include latest graphics workstations, robot manipulators, Computing clusters, Virtual reality and other state-of-the art equipment.

Philips VLSI Design Lab: The Laboratory, established in 1996 with support from Philips Semiconductors as part of VLSI Design, Tools and Technology programme houses a state-of-the art CAD facility consisting of several servers and workstations. P4 clients, Xterminals, plotter and VLSI design software. The CAD facility features in-house, commercial and public domain software (including Cadence and Synposys) for VLSI synthesis and simulation.

FPGA Lab: This lab was created in 1997 to house the FPGA based design activity which started in Digital Hardware Design Lab, and grew substantially. Facilities to work with reconfigurable hardware in hardware software co-design environment have been added subsequently. The laboratory has specialized coprocessor boards for implementing designs upto the complexity of six million gates. AI & Database Lab: This Laboratory features a server supporting ORACLE and several access machines. Verification Lab: This laboratory hosts several workstations supporting various specialized model checking and verification tools.

Lab Name	Dimensions(sq. ft)	Area (sq. ft.)
General Computing Lab (UG + PG Teaching+Server room)	37x43 46x37	1591 1702
Graphics & Vision Lab	27x37	999
Wireless & Networks Lab	29x37	1073
Digital Hardware Design Lab	27x37	999
VLSI Design Lab	24x37	888
Computer Architecture Lab	18x28	504
Assistive Technology Lab (Smart Cane)	17x28	476
Database Lab	28x22	616
Verification Lab	24x22	528

2.6 Laboratory modernization performed in last 5 years for (i) UG core, (ii) PG core, (iii) elective courses (*attach data before and after modernization),*

(i) DHD laboratory (CSL316 lab) as well as Embedded systems lab (CSP315) has been completely revamped and modernized in the last 5 years. This includes FPGA kits as well as microcontroller kits, sensors etc.

(ii) Hardware upgrades in all Labs esp General Computing lab, all Computer Hardware replaced every five years. Software and systems are continually upgraded.

2.7 Course files for each course for last 5 years

Course Number & Name	Semester	Course Web-site (or any other information)

CSL 201, Data-structures	SemI-2013, SemII-2012	http://www.cse.iitd.ac.in/~amitk/cs201
CSL 361, Numerical and Scientific Computing	Sem II-2010, SemII-2011	http://www.cse.iitd.ac.in/~amitk/SemII-2011/csl361
CSL 105, Discrete Mathematics	Sem I-2011	http://www.cse.iitd.ac.in/~amitk/SemI-2011/csl105
CSL 356, Algorithms	SemI-2010	http://www.cse.iitd.ac.in/~amitk/SemI-2010/csl356
CSL 854, Approximation algorithms	SemI-2010, SemII-2012	http://www.cse.iitd.ac.in/~amitk/csl854
CSL758, Advanced Algorithms	II, 2008-09	www.cse.iitd.ac.in/~naveen/CSL758/
CSL356, Analysis and Design of Algorithms	II, 2009-10	www.cse.iitd.ac.in/~naveen/CSL356/
CSL854, Approximation Algorithms	I, 2010-11	www.cse.iitd.ac.in/~naveen/CSL854/
CSL863, Special Topics in Theoretical Computer Science: Game Theory	I, 2011-12	www.cse.iitd.ac.in/~naveen/CSL863/
CSL201, Data Structures	II, 2011-12	www.cse.iitd.ac.in/~naveen/CSL201/
CSL105, Discrete Mathematics	I, 2012-13	www.cse.iitd.ac.in/~naveen/CSL105/
CSL866, Special Topics in Algorithms: Quantitative methods in OR	II, 2012-13	www.cse.iitd.ac.in/~naveen/CSL866/
Data Structures and Algorithms	I, 2013-14	www.cse.iitd.ac.in/~naveen/CSL630/
Algorithmic Graph Theory	I, 2013-14	www.cse.iitd.ac.in/~naveen/CSL851/
CSL858, Advanced Computer Networks		act4d.iitd.ernet.in
CSL102, Introduction to Computer Science	I, 2012-2013	www.cse.iitd.ac.in/~suban/CSL102
CSL100, Introduction to Computers and Computer Science	I, 2013-2014	www.cse.iitd.ac.in/~suban/csl100 http://www.cse.iitd.ernet.in/~sak/courses/ics/2013-14.index.html
CSL361, Numerical and Scientific Computing	II, 2012-2013 II, 2013-2014	www.cse.iitd.ac.in/~suban/csl361
CSL840, Computer Vision	II, 2012-2013	www.cse.iitd.ac.in/~suban/vision
CSL867, Special Topics in High Speed Networks: Internet Architecture		act4d.iitd.ernet.in

SIL769, Internet Traffic: Measurement, Modeling, and Analysis		act4d.iitd.ernet.in
SIV861, Information and Communication Tech for Development		act4d.iitd.ernet.in
CSP301, Design Principles in Computer Science		act4d.iitd.ernet.in
CSL374, Introduction to Computer Networks		act4d.iitd.ernet.in
CSL373 / CSL633 : Operating Systems and Resource Management in Computer Systems	2nd Semester 2009-10, 2nd Semester 2010-11, 2nd Semester 2011-12, 2nd Semester 2012-2013, 2nd Semester 2013-14	www.cse.iitd.ernet.in/~sbansal/os
CSL862 (now CSL732): Virtualization and Cloud Computing	1st Semester 2010-11	http://www.cse.iitd.ernet.in/~sbansal/csl862-virt/2010/
CSL862 (now CSL732): Virtualization and Cloud Computing	1st Semester 2011-12	http://www.cse.iitd.ernet.in/~sbansal/csl862-virt/2011/
CSL865 (now SIL765)	2nd Semester 2009-10	http://www.cse.iitd.ernet.in/~sbansal/csl865/
CSL105	Semester-I 2013-14	http://www.cse.iitd.ac.in/~rjaiswal/2013/csl105/
CSL759	Semester-II 2012-13	http://www.cse.iitd.ac.in/~rjaiswal/2013/csl759/
CSL356	Semester-I 2012-13	http://www.cse.iitd.ac.in/~rjaiswal/2012/csl356/
CSL857	Semester-II 2011-12	http://www.cse.iitd.ac.in/~rjaiswal/2012/csl857/
CSL356	Semester-I 2011-12	http://www.cse.iitd.ac.in/~rjaiswal/2011/csl356/
CSL866	Semester-II 2010-11	http://www.cse.iitd.ac.in/~rjaiswal/2011/csl866/
CSL201	Semester-I 2010-11	http://www.cse.iitd.ac.in/~subodh/courses/CSL201/
CSL 211 computer architecture	Fall 2013	http://www.cse.iitd.ac.in/~srsarangi/csl-211-2013/index.html
CSL 860 – Special topics in software systems	Spring 2013	http://www.cse.iitd.ac.in/~srsarangi/csl860/csl860.html
CSL 211 – Computer	Fall 2012	http://www.cse.iitd.ac.in/~srsarangi/csl211-

Architecture		2012/main.html
CSL 211 – Special topics in hardware systems	Spring 2012	http://www.cse.iitd.ac.in/~srsarangi/csl861/
CSL 211 – Computer Architecture	Fall 2011	http://www.cse.iitd.ac.in/~srsarangi/cs211/main.html
CSL 861 – Special topics in hardware systems	Spring 2011	http://www.cse.iitd.ac.in/~srsarangi/ft.html
Introduction to Computers and Programming (CSL101)	Sem I, 2009-10, Sem II, 2009-10, Sem I, 2010-11, Summer 2011	
CSL724 Advanced computer networks	Sem I, 2011-12	http://www.cse.iitd.ernet.in/~vinay/courses/CSL724_s14.html
CSL838 Wireless networks	Sem II, 2011-12, Sem I, 2013-14	http://www.cse.iitd.ernet.in/~vinay/courses/csl838_f13.html
CSL 374	Sem I, 2012-13; Sem II 2012-13	http://www.cse.iitd.ernet.in/~vinay/courses/csl374.html
CSC410	Sem I, 2010-11; Sem I 2012-13; Sem I 2013-14	
CSL 101 Intro to Computers and Programming	2008-09 I	http://www.cse.iitd.ernet.in/~ssen/csl101/admin101.html
CSL 863 Spl topics in TCS	2008-09 II	http://www.cse.iitd.ernet.in/~ssen/csl863/admin863.html
CSL 356 Design and Analysis of Algorithms	2009-10 I	
CSL 705 Theory of Computation	2009-10 II	
CSL 852 Computational Geometry	2010-11 I	http://www.cse.iitd.ernet.in/~ssen/cs852/admin852.html
CSL 705 Theory of Computation	2010-11 II	
CSL 630 Advanced Data Structures and Algorithms	2012-13 I	http://www.cse.iitd.ernet.in/~ssen/csl630/admin630.html
CSL 705 Theory of Computation	2012-13 II	
CSL 356 Algorithms	2013-14 I	http://www.cse.iitd.ernet.in/~ssen/csl356/admin356.html
CSL 705 TOC	2013-14 II	http://www.cse.iitd.ernet.in/~ssen/csl705/admin705.html
Introduction to Computers and	Sem I, 2009-	

Programming (CSL101)	10, Sem II, 2009-10, Sem I, 2010-11, Summer 2011	
CSL724 Advanced computer networks	Sem I, 2011-12	http://www.cse.iitd.ernet.in/~vinay/courses/CSL724_s14.html
CSL838 Wireless networks	Sem II, 2011-12, Sem I, 2013-14	http://www.cse.iitd.ernet.in/~vinay/courses/csl838_f13.html
CSL 374	Sem I, 2012-13; Sem II 2012-13	http://www.cse.iitd.ernet.in/~vinay/courses/csl374.html
CSC410	Sem I, 2010-11; Sem I 2012-13; Sem I 2013-14	
CSL 783 Digital Image Analysis (3-0-3)	Sem I 2009-10 Sem I 2010-11 Sem I 2011-12 Sem I 2012-13 Sem I 2013-14	www.cse.iitd.ac.in/~pkalra/csl783
CSL781 Computer Graphics (3-0-3)	Sem II 2010-11 Sem II 2011-12 Sem I 2012-13 Sem I 2013-14	www.cse.iitd.ac.in/~pkalra/csl781 www.cse.iitd.ac.in/~subodh/
CSL859 Adv Comp Graphics	Sem II 2012-13	www.cse.iitd.ac.in/~pkalra/csl859
SIV864, Special Module on Media Processing	Sem I 2009-10 Sem I 2010-11 Sem I 2011-12 Sem I 2012-13 Sem I 2013-14	www.cse.iitd.ac.in/~pkalr/siv864
SIV895 Sepcial Module on Intelligent Information Processing	Sem II 2009-10 Sem II 2010-11 Sem II 2011-12 Sem II 2012-13 Sem II 2013-14	www.cse.iitd.ac.in/~pkalr/siv895
CSL840 Computer Vision	Sem II 2009-10 Sem II 2010-11 Sem II 2011-12 Sem II 2012-13	www.cse.iitd.ac.in/~suban/

2.8 Study materials (monographs, notes, books, videos, web-based materials, etc.) prepared, course-wise,

1. For many post-graduate courses, students were asked to scribe the lectures notes which were then out on the course-page.
2. Course materials for CSL 858, CSL 867, SIL 769, SIV 861, CSL 373, CSL 862, CSL865 are available online.
3. Course slides for CSL 105, CSL 759, CSL 356 are available.

4. Complete course notes for CSL316 – that is circulated to the student at the beginning.
5. NPTEL courses developed on Computational geometry, data-structures.
6. Saroj Kaushik published books on "Introduction to Logic and Prolog Programming" and “Artificial Intelligence”.
7. Preeti Panda published a book on “Power-efficient System Design” (with A. Shrivastava, B. V. N. Silpa, G. Krishnaiah), Springer, 2010
8. Video Course on Media Processing (SIV 864) with Prof Huzur Saran and other faculty members from EE, and CARE
9. Video Course on Parallel Programming by Subodh Kumar
10. Lecture notes on Introduction to Computer Science by Subhashis Banerjee and S. Arun-Kumar.
11. PDF slides for Introduction to Computer Science by S. Arun-Kumar.

2.9 Research and Innovations in teaching-learning processes

1. Naveen Garg developed a new course on “Algorithmic Game Theory” which is taught as a Special-Topics-course in Theoretical Computer Science (CSL865). Over 50 students registered for this advanced course.
2. Naveen Garg developed a new course on “Quantitative methods in Operations Research” and have taught this twice – once as a special-topics-course in Compute Applications and another as a special-topics-course in Algorithms.
3. Aaditeshwar Seth developed a new course on information and communication technologies for development.
4. Aaditeshwar Seth developed new assignments on computer networks, using mobile devices and simulators.
5. Aaditeshwar Seth introduced ongoing paper reviews and presentations by students using HotCRP, to increase engagement and learning.
6. Smruti Sarangi introduced ARM assembly language in the computer architecture course
7. Smruti Sarangi developed a complete design oriented approach to teaching computer architecture. Students built an entire processor from the transistor level.
8. Vinay Ribiero designed and taught the course of Wireless Networks.
9. M. Balakrishnan coordinated the online video based teaching of PG students in Ethiopia under an agreement between IIT Delhi and Addis Ababa University.
10. Huzur Saran designed and taught a new course on Network & Systems Security.
11. Sorav Bansal developed and taught a new course in Virtualization and Cloud Computing.
12. Kolin Paul developed an Advanced Embedded Systems Course and taught it as a Special Topics Course.
13. Amitabha Bagchi developed a java teaching module in collaboration with an online cloud-based java training platform called javaladders.com and introduced a class of 300+ CSL201 students to java using this module and the cloud-based system.
14. Subodh Kumar developed a course on Modern Parallel Programming

2.10 No. of students (UG and PG separately) who have spent at least a semester at another university/institute (overseas or Indian).

UG 20 PG 2

2.10.1 No. of students from overseas universities who have taken classes, done project work or internship, UG & PG separately, in the department.

UG 10 PG 2

2.11 Course feedback.

UG Courses

Year	No. of Courses	Average Class size	Min. and max. scores	Average score
2013-1st	11	124.27	1.40, 4.28	3.39

2012-2nd	11	113.36	2.85,4.57	3.56
2012-1st	8	157.75	3.42,4.84	4.02
2011-2nd	11	106.73	2.78,4.51	3.75
2011-1st	9	110.78	2.75,4.38	3.66
2010-2nd	8	121.12	3.60,4.32	3.97

PG Courses

Semester	No. of Courses	Average Class size	Min. and max. scores	Average score
2013-1st	18	40.56	2.90,4.83	4.04
2012-2nd	19	24.26	3.00,4.78	4.25
2012-1st	15	46.07	3.08,4.73	3.92
2011-2nd	16	21.94	2.67,4.95	4.10
2011-1st	14	16.86	2.56,5.00	3.78
2010-1st	12	36.33	3.36,4.73	4.10

2.12 Industry experts who have delivered lecture(s), seminars, discussions as part of a core/elective course – UG and PG separately.

2009 Seminars/lectures

Dr. Animesh Pathak	INRIA, France	9th January
Dr. Vineet Goyal	MIT	9th January
Prof. Sanjay Kumar Madria	Missouri University of Science and Technology	13th January
Prof. Daniel Granot	UBC, Canada	15th January
Dr. Arun Swami	Google	15th January
Dr S. Keshav	University of Waterloo	20th January
Dr. Sujata Banerjee	HP Labs, Palo Alto	29th January
Dr. Niranjan	UMIACS	2nd February
Prof. Hanan Samet	Univ of Maryland	5th February
Prof. Sanjiv Singh	Carnegie Mellon Univ	16th February
Dr. Sorav Bansal	IITD Alumunus	23rd February
Prof. Ramesh Raskar	Media Lab, MIT	4th March
Dr. Rahul Jain	USC	24th March
Prof. David Kotz	Dartmouth	25th March
Dr. Joydeep Sen Sarma	Facebook	2nd April
Jyoti V. Sinha	iRobot	1st April

Prof. Eugene Fiume	University of Toronto	8th April
Dr. Rajiv Raman	MPI-Informatik	9th April
Dr. Vikram Sharma	MPI- Informatik	24th April
Dr. Karan Sher Singh	Visiting Prof. IITD	8th May
Prof. Chandrajit Bajaj	Computational Visualization Center	8th May
Satyadev Nandakumar	Iowa State University	29th May
Dr. Animesh Nandi	MPI-SWS	1st June
Dr. Nisheeth K. Vishnoi	Microsoft Research (Bangalore)	8th June
Nick Feamster	Georgia Tech	July 6
Vaishali Sadaphal	TCS	August 7
Kaleem Siddiqi	McGill University	August 7
Kanav Kahol	Arizona State University	August 11
Sharad Malik	Princeton University	August 13
Peter Marwedel	TU Dortmund + ICT, Germany	August 13
Nayantara Bhatnagar	UC Berkeley	August 20
Sanjeev Khanna	University of Penn- sylvania	August 24
Amarjeet Singh	UC Los Angeles	August 26
Maya Gaur	University of Lethbridge	September 10
Krishna Singh	IBM	September 15
Anindya Banerjee	IMDEA Software, Madrid	September 21
Rajiv Khemani	Cavium Networks	September 24
J. K. Aggarwal	UT Austin	October 9
Ashish Darbari	University of Southampton	October 16
Carlo Tasso	University of Udine, Italy	October 21
Indrajit Bhattacharya	IBM IRL	October 28
Vijay Kumar		October 30
Nataraj Nagaratam	IBM India Software Lab	17 November
Ramesh Krishnamurthy	Simon Fraser University	19 November
Rajarshi Gupta	Qualcomm Inc	4 December
Ragesh Jaiswal	Columbia University	7 December
Vijay Sivaraman	University of New South Wales , Australia	17 December
Puneet Sharma	HP Labs	21 December
Deepak Kapur	University of New Mexico	22 December

2010 Seminars/lectures

Surendra Baswana	IIT Kanpur	4 January
Yogeshwer Sharma	Cornell University	11 January
Nisheeth Vishnoi	MSR India	12 Januray
Sharma Chakravarthy	University of Texas	15 January
Praveen Kumar	University of Missouri	15 January

Rahul Garg	IBM Watson	21 January
Uday Khedkar	IIT Bombay	8 February
P. Anandan	MSR India	15 February
Vivek Sharma	ST Microelectronics India	20 February
Bhaskaran Raman	IIT Bombay	23 February
Pankaj Gupta and Jinen Kamdar	Twitter	25 February
Pradeep Dubey	Intel Labs	11 March
Abhideep Singh and Google Team		12March
Pushmeet Kohli	MSR Cambridge	25 March
Judith Bishop	MSR	26 March
Devdatt Dubashi	Chalmers University	30 March
Vinod Agarwal	India Science Lab	9 April
Ashwini Nanda	HPC Links India and HPC Research USA	16 April
Pravesh Kothari	IIT Kanpur	14th May
Dr. Smruti Sarangi	IBM Research Lab	7th July
Gaurav Sharma	University of Rochester	12th July
Shyam Kapur	Founder and CEO of TipTop Technologies	5th August
Dr. Bryan Ford	Yale University	9th August
Dr. Mausam	University of Washington	11th August
Prof. Arvind	MIT	12th August
Prof. Gopalan Nadathur	University of Minnesota	13th August
Jó Ágila Bitsch Link	Aachen University	13th August
Dr. Aditya Akella	University of Wisconsin	25th August
Dr. Akash Lal	Microsoft Research India	25th August
Palanivel Kodeswaran	University of Maryland	25th August
Dr. Kirill Levchenko	University of California San Diego	26th August
Prof. Sanjeev Khanna	Univ. of Pennsylvania	26th August
Dr. Bill Thies	Microsoft Research Bangalore	26th August
Dr. Chandu Thekkath	Microsoft Research	31st August
Prof. Samarjit Chakraborty	Institute for Real-Time Computer Systems, Munich	31st August
Dr Manish Gupta	Director, IBM Research India	8th Spetember
Dr. Dhruba Borthakur	Open SourceApache Hadoop	10th November
Youmna Borghol	tional ICT Australia	7th December
Dr Siddhartha Srinivasa	Intel Pittsburgh	7thDecember
Dr. Sebastien Ardon	NICTA, Australia	8th December
Prof. Rabi Mahapatra	Texas A&MUniversity	8th December
Shivaram Kalyanakrishnan	University of Texas-Austin	10th December
Dr. Raghav Bhaskar	MSR India	10th December
Dr. Rashina Hoda	Victoria Univerity of Wellington	13th December

Dr. Charles E. Perkins	WiChorusdivision of Tellabs	13th December
Prof. Gregory Guthrie	Maharish iUniversity of Management, IOWA State	16 th December
Prof. Vineet Bafna	Univ. California	17th December

2011 Seminars/lectures

Prof Arun Somani	IIT Delhi(Visiting)	4th Jan
Prof. Deepak Kapur	University of New Mexico	7 th Jan
Dr. RikSarkar	Technischeand Freie Universities in Berlin	10th Jan
Dr. P. A. Subrahmanyam	StanfordUniversity	11th Jan
Dr. Aviral Shrivastava	Arizona StateUniversity	12th Jan
Dr. Anoop Gupta	Microsoft Research	17th Jan
Dr. Nisheeth Vishnoi	Microsoft Research	25th April
Sunil Bharti Mittal	Bharti EnterprisesLtd	25th April
Steve Ballmer	Microsoft Corporation	26th May
Prof. Kaleem Siddiqi	McGill University, Montreal, CA	3rd August
Prof. Sanjay Madria	Missouri Univer-sity of Science & Technology	5th August
Prof. Chandrajit Bajaj	The Universityof Texas at Austin	5th August
Dr. Sheldon Levy	Ryerson University	5th August
Ashwin Karkala	Oracle	6th August
Dr. Ed Cutrell	Microsoft Research India	10th August
Prof. Dinesh Manocha	University of North Carolina	12th August
Dr. Sourav Chakraborty	Chennai Mathematical Institute	30th August
Prof. Ashish Goel	Stanford University	12th September
Dr. Sorav Bansal	IIT Delhi	5th October
Soshant Bali	IIIT Delhi	14th October
Nisheeth Vishnoi	Microsoft Research, Bangalore	18th October
Elisa Celis	University of Washington	18th October
Dr. Yuvraj Agarwal	UC San Diego	1st November
Dr. Saurabh Amin	Massachusetts Institute of Technology	1st November
Amit Merchant	IBM	14th November
Subhojit Roy		14th November
Dr. Anirban Dasgupta	Yahoo! Labs	1st December
Dr. Roopak Sinha	INRIA, France	7th December
Lasse Kliemann	Univ of Kiel	21st December
Rohit Chadha	LSV, Ecole Normale Superieur, France	22nd December

2012 Seminars/lectures

Ankit Sharma	CMU	10th January
Raj Saxena	Enterprise force	11th January
Prof. Ioannis A. Kakadiaris	Depts. Of Computer Science and ECE, Univ of Houston	17th January
Prof Robert Meersman	VUB STAR Lab Brussels, Belgium	18th January
Dr. Victor Hayes	Delft University	27th January
Dr. Gene Frantz	TI	30th January
Sharad Goel	Yahoo Research	6th February
Prof. Michael Werman	Department of Computer Science, Hebrew University	10th February
Dr. Leo Liberti	LIX, Ecole Polytechnique, France	13th February
Nirman Kumar	UIUC	21st February
Dr. Simon Kramer	University of Luxembourg	7th March
Dr. Amitabh Trehan	Information Systems, Faculty of IE & M, Israel	14th March
Prof. Rakesh Verma	University of Houston	16th March
Prof. Aviral Shrivastava	Arizona State University	23rd March
Shweta Agrawal	UCLA	16th April
Prof. Satyajit Mayor	NCBS	20thApril
Prof. Madhu Mutyam	IIT Madras	26th April
Dr. Julian M. Bass	Robert Gordon University, Aberdeen, UK	8th June
Sumeet Agarwal	Oxford University	13th June
Prof. Krishnendu Chakrabarty	Duke University	5th July
Prof. Inderjit Dhillon	UT Austin	26th July
Saikat Guha	MSRI	7th August
Dr. Ramesh Hariharan	Strand Genomics	8th August
Prof. Chandrajit Bajaj	The University of Texas at Austin	9th August
Dr. Steve Scott	CTO for Tesla business, NVIDIA	9th August
Prof. Kaleem Siddiqi	McGill University	13th August
Akshay Sundararaman	IRISA Rennes, France	14th August
Prof. Abhijit Chatterjee	School of Elect & Comp Engg, Georgia Tech	16th August
Prof. Richard Anderson	University of Washington	27th August
Dr. Balaji Raman (VERIMAG	France	27th August
Dr. Mausam	University of Washington, Seattle	6th September
Dr. Vidit Jain	Yahoo	10th October
Raman Grover	UC Irvine	10th October
Dr. Nitin Saxena	Hausdorff center, Bonn	16th October
Prof. Uday Khedkar	IIT Bombay	16th October
Prof. Anita Schoebel	Gottingen University	17th October
Dr. Anand Haridas	IBM	29th October
Rijurekha Sen	IIT Bombay	2nd November

Dr. Ajit Rajwade	Dhirubhai Ambani Institute of Information and Occupation Communication Technology (DA-IICT)	9th November
Prof Amitav Patra	IndianAssociation for the cultivation of Science	15th November
Dr. Chetan Arora	Hebrew University, Jerusalem	21st November

2013 Seminars/lectures

Dr. Parthasarathi Roop	Univof Auckland, New Zealand	1st Jan
Dr. Cristina M. Pinotti University of Perugia	Italy	2nd Jan
Dr. Indrajit Roy	HP Labs	3rd Jan
Dr. Sunil Simon	CWI Amsterdam	7th Jan
Manish Gupta	University of Illinois	8th Jan
Prof. Umesh Vazirani	U.C. Berkeley	10th Jan
Prof Suyash Awate	Institute at the University of Utah	11th Jan
Prof Mark Reynolds	University of Western Australia	17th Jan
Prof Hema Sharda	University of Western Australia	17 th Jan
Prof. R. Ravi	Carnegie Mellon University	17th Jan
Dr. John Kampfner	Google	28th Jan
Dr. Luiz DeRose	Cray Inc	30th Jan
Prof. Tracy Camp	Colorado School of Mines	18th Feb
Dr. Rupesh Nasre	UT Austin	21st Feb
Dr. Bruce Wile	IBM System & Tech-nology Group	26th Feb
Dr. Partha Pratim Talukdar	CarnegieMellon University	4th March
Dr. Sayan Ranu	IBM Research	8th March
Dr. Anand Kashyap	Symantec Labs	13st March
Dr. Hugh Durrant	NICTA	21st March
Prof. Magda El Zarki	University of California, Irvine	1st April
Dr. Rajat Mittal	Univ. of Waterloo	1st April
Dr. Shashi Mittal	Amazon Research	9th April
Dr. Vivek Singh	MIT Media Lab	15th April

2.13 Industry exposure to students – course-related visits to factories, sites, industry exhibitions, field trips, etc. – UG and PG separately.

3. Research

3.1 No. of Masters and Ph.D. students supported –

(i) by Institute Assistantship : 42 per year,

(ii) on sponsored projects/consultancies : average of 3-4 per year

(iii) others sources: 8 industry fellowships (TCS, Microsoft, IBM) for PhD

students.

(iv) sponsored by external organizations: 4 per year from Defence Services, and 2-3 per year from QIP.

3.2 No. of Ph.D.s enrolled, graduated per faculty for last 5 years:

Enrolled in last 5 years: 47 (1.9 per faculty)
graduated in last 3 years: 10 (0.2 per faculty)

3.3 Areas of research (e.g. areas listed in Prospectus, and others) by (i) Volume (quantifiable parameters), (ii) Breadth, and (iii) Years these have been research areas (*as per format at Annexure-4*).

Algorithms and Complexity Theory:

Faculty: Amitabha Bagchi, Naveen Garg, Ragesh Jaiswal, Amit Kumar, S. N. Maheshwari, Sandeep Sen, Shweta Agrawal.

Ph. D students: Current: 5. Recently graduated: 3.

Research: Research focuses on design and analysis of efficient algorithms for a variety of problems, broad range of domains including biology, geometry, operations research, optimization, networks,graph theory, cryptography.

Artificial Intelligence and Natural Language Processing:

Faculty: K.K. Biswas, Saroj Kaushik, Parag Singla, Mausam

Ph. D students: Current: 2. Recently graduated: 2.

Research: Machine Translation, Analysis of sentences at semantic and discourse levels, Natural language interfaces to databases, paragraph comprehension,UNL representation. Genetic algorithms,Representations for Content Based Retrieval and Fuzzy logic.

Databases and Data Analytics:

Faculty: Amitabha Bagchi, S. K. Gupta, Maya Ramanath.

Ph. D students: Current: 3. Recently graduated: 1.

Research: Intention mining: A new paradigm for specifying mining requirements, which makes mining structured, re-usable and efficient. Architecture and incremental algorithms for knowledge discovery and management. Policy driven databases: Privacy policy specification and implementation.
Information Retrieval, Information dissemination in social networks

Architecture and Embedded Systems:

Faculty: M. Balakrishnan, Anshul Kumar, Preeti Ranjan Panda, Kolin Paul, Smruti Sarangi.

Ph. D students: Current: 10. Recently graduated: 8

Research: Hardware-Software Co-design: Application specific processors, Coprocessors and Hardware accelerators, Clustered VLIW, Memory synthesis
• Embedded Systems Design: Design space exploration, Power estimation
• Reconfigurable Computing: Architectures and Algorithms
• Fault-Tolerant Computing: Hardware and Software Techniques
• Hardware Implementations: High performance image processing, Cache compression
• Temperature Aware Architectures: Algorithms for floorplanning, and lifetime reliability tradeoffs

Graphics and Vision

Faculty: Prem Kalra, Subodh Kumar, Subhashis Bannerjee
Ph. D students: Current: 5. Recently graduated: 3
Research:
Graphics: Image based modeling and rendering, Character animation, Visualization
Vision: 3D reconstruction, Object detection and recognition, Activity monitoring, Surveillance and Traffic analysis, Image and Video processing: Segmentation and Super-resolution.

Computer Networks and Systems

Faculty: Huzur Saran, Sanjiva Prasad, Amitabha Bagchi, Vinay Ribeiro, Aaditeshwar Seth

Ph. D students: Current: 7. Recently graduated: 1
Research:
Mesh Networks: for disaster managment and military
4G LTE/WiMAX: campus testbeds for performance optimization
Cognitive Radio: for white-space spectrum usage in rural areas
Cellular Measurement: evaluate 2G/3G data transfer performance
Indoor Positioning: inertial navigation systems to complement GPS
Random Graph: modeling of networks

Programming Languages, Semantics and Verification

Faculty: S. Arun-Kumar, Sorav Bansal, Sanjiva Prasad.
Ph. D students: Current: 1. Recently graduated: 2
Research:
Compiler Design
Theory and Practice of Concurrent Systems:
Models for Synchronous and Asynchronous computations
Timed Automata
Systematic Testing of Concurrent Programs
Dynamic Runtime Code Optimizations inside VMM

Information and Communication Technologies for Development

Faculty: Aaditeshwar Seth, Vinay Ribeiro, Huzur Saran, Sanjiva Prasad
Ph. D students: Current: 3.
Research:

Rural content distribution: YouTube for the Bottom of the Pyramid
Rural network measurements: State of Internet connectivity
Community radio: Effective information dissemination using IVR systems
Health: Decision and analytics support systems for rural clinicians

3.4 Publications per faculty (average per year for last five years) in academic journals.

3.5 Publications (journal and conference) total and per (a) Ph.D. student, (b) Masters student, (c) UG student.

Total Publications by students: 152

3.6 Best papers in last 5 years: (i) Individual best 3, (ii) department/centre best 10; and brief justifications.

Amit Kumar

Title	Authors	Journal/Conference details
Clustering with Spectral Norm and the k-means Algorithm	Amit Kumar and Ravi Kannan	Proc. IEEE Foundations of Computer Science(FOCS), 2010
The Power of Deferral: Maintaining a Constant-Competitive Steiner Tree Online	Albert Gu, Anupam Gupta and Amit Kumar	Proc. ACM Symposium on Theory of Computing (STOC), 2013
Resource Augmentation for Weighted Flow-time explained by Dual Fitting	S. Anand, Naveen Garg and Amit Kumar	Proc. ACM-SIAM Symposium on Discrete Algorithms (SODA), 2012

Naveen Garg

Title	Authors	Journal/Conference details
Resource augmentation for weighted flov explained by dual fitting	S. Anand, N. Garg, A. Kumar	23rd Annual ACM-SIAM Symposium on Discrete Algorithms, 2012: 1228-1241
A 3-Approximation for Facility Location with Uniform Capacities	A. Aggarwal, L. Anand, M. Bansal, N. Garg, N. Gupta, S. Gupta, S. Jain	Mathematical Programming, DOI 10.1007/s10107-012-0565-4, June 2012:1-21 and Integer Programming and Combinatorial Optimization, 2010: 149-162

A competitive algorithm for minimizing weighted flow time on unrelated machines with speed augmentation	J.S. Chadha, N. Garg, A. Kumar, V. N. Muralidhara	41st Annual ACM Symposium on Theory of Computing 2009: 679-684

A Seth

Title	Authors	Journal/Conference details
A Personalized Credibility Model for Recommending Messages in Social Participatory Media Environments	A. Seth, J. Zhang, and R. Cohen	WWW Journal 2013
Design and Implemeration of the KioskNet System	A. Seth, S. Guo, M. Derakhshani, M. Falaki, U. Ismail, R. Luk, E.A. Oliver, S. Ur Rahman, M. Zaharia, and S. Keshav	Computer Networks, 2010
First Impressions on the State of Cellular Data Connectivity in India	Z. Koradia, G. Mannava, A. Raman, G. Agarwal, V. Ribeiro, S. Triukose, S. Ardon, A. Mahanti, and A. Seth	ACM DEV-4 2013

Sorav Bansal

Title	Authors	Journal/Conference details
Fast Dynamic Binary Translation for the Kernel	Piyus Kedia, Sorav Bansal Bansal	ACM Symposium on Operating Systems Principles (SOSP), November 2013
Efficient Virtualization on Embedded Power Architecture Platforms	Aashish Mittal, Dushyant Bansal, Sorav Bansal Bansal, Varun Sethi	Architectural Support for Programming Languages and Operating System (ASPLOS), March 2013
Variable and Thread Bounding for Systematic Testing of Multithreaded Programs	Sandeep Bindal, Sorav Bansal Bansal, Akash Lal	International Symposium in Software Testing and Analysis (ISSTA), June 2013

Ragesh Jaiswal

Title	Authors	Journal/Conference details
A Simple D2-Sampling Based PTAS for k-Means and Other Clustering Problems	Ragesh Jaiswal Jaiswal, Amit Kumar, and Sandeep Sen	Algorithmica, 2013, DOI: 10.1007/s00453-013-9833-9.
Bounded Independence Fools Halfspaces	Ilias Diakonikolas, Parikshit Gopalan, Ragesh Jaiswal Jaiswal, Rocco Servedio, Emanuele Viola	SIAM Journal on Computing, 39(8): 3441-3462, 2010.
Uniform Direct Product Theorems: Simplified, Optimized, and Derandomized	Russell Impagliazzo, Ragesh Jaiswal Jaiswal, Valentine Kabanets, Avi Wigderson	SIAM Journal on Computing, 39(4): 1637-1665, 2010.

Preeti Panda

Title	Authors	Journal/Conference details
Compressing Cache State for Postsilicon Processor Debug	Preeti Ranjan Panda, M. Balakrishnan, Anant Vishnoi	IEEE Trans. Computers 60(4): 484-497 (2011)
Rank based dynamic voltage and frequency scaling fortiled graphics processors	B. V. N. Silpa, Gummidipudi Krishnaiah, Preeti Ranjan Panda	Intl. Symposium on Hardware/Software Codesign and System Synthesis, (CODES+ISSS), 2010: 3-12
Online cache state dumping for processor debug	Anant Vishnoi, Preeti Ranjan Panda, M. Balakrishnan	Design Automation Conference (DAC), 2009, 358-363

Huzur Saran

Title	Authors	Journal/Conference details
NFC based secure mobile healthcare system	Divyashikha Sethia, Daya Gupta, Tanuj Mittal, Ujjwal Arora, Huzur Saran	COMSNETS 2014
RODMAC: A RObust and Distributed MAC protocol for efficient use of white spaces	Eshan Nanda, Udit Joshi, Vinay Ribeiro, Huzur Saran	COMSNETS 2013
Design and Implementation of the Workflow of an Academic Cloud	Abhishek Gupta, Jatin Kumar, Daniel J. Mathew, Sorav Bansal, Subhashis Banerjee, Huzur Saran	DNIS 2011: Aizu-Wakamatsu, Japan

Sanjiva Prasad

Title	Authors	Journal/Conference details
ReKonf: A Reconfigurable Adaptive ManyCore Architecture.	Rajesh Kumar Pal, Kolin Paul, Sanjiva Prasad	ISPA 2012, Madrid, Spain.
Universal rich presence framework for intelligent call management	Abhishek Prateek, Hridayesh Gupta, Sanjiva Prasad	ICUIMC 2010. Suwon, Seoul, South Korea

An Operational Model for Multiprocessors with Caches	Salil Joshi, Sanjiva Prasad	IFIP TCS 2010, Brisbane, Australia.

Smruti Sarangi

Title	Authors	Journal/Conference details
Space Sensitive Cache Dumping for Post Silicon Validation	Sandeep Chandran, Smruti R. Sarangi, Preeti R. Panda	Date, 2013, Grenoble, France
A Survey of Checker Architectures	Rajshekar K. and Smruti R. Sarangi	ACM Computing Surveys, Vol 45, issue 4, No. 48, 2013
Lock-free and Wait-free Slot Scheduling Algorithms	Pooja Aggarwal and Smruti R. Sarangi	IPDPS, 2013, Boston, USA

Saroj Kaushik

Title	Authors	Journal/Conference details
Scalable Method for k Optimal Meeting Points (k-OMP)	Shivendra Tiwari, Saroj Kaushik	DNIS 2013 (Databases in Networed Information Systems) 2013 , Aizu-Wakamatsu, Japan, March 25-27, 2013, Volume 7813.Lecture Notes in Computer Science@Springer-Verlag Berlin Heidelberg 2013
Fusion of Navigation Technology and E-Learning Systems for On-the-spot Learning	Shivendra Tiwari, Saroj Kaushik	Kuala Lumpur, Malaysia, October 2012, ISBN: 978-1-84919-550-8 IEL/IEEE. - awarded with the 'Best Paper Award'
Extracting Region of Interest (ROI) Details using LBS Infrastructure and Web-databases	Shivendra Tiwari, Saroj Kaushik	IEEE MDM 2012: 13th International Conference on Mobile Data Management held during July 23-26, 2012, Bengaluru, India

S K Gupta

Title	Authors	Journal/Conference details
Analyzing Travel Patterns for Scheduling in a Dynamic Environment	Sonia Khetarpaul, S. K. Gupta, L. Venkata Subramaniam	CD-ARES 2013, Lecture Notes in Computer Science Volume 8127, 2013, pp 304-318
Mining GPS traces to recommend common meeting points	Sonia Khetarpaul, S. K. Gupta,L. Venkat Subramaniam, Ullas Nambiar	

		IDEAS '12 Proceedings of the 16th International Database Engineering & Applications Sysmposium Pages 181-186 ACM New York, NY, USA ©2012
Exhaustive Verification of Weak Reconstruction For Self Complementary Graphs	S. K. Gupta, Sahil Singla, Akash Khandelwal, Apurv Tiwari, Srilekha	CoRR abs/1012.5995 (2010)

Subodh Kumar

Title	Authors	Journal/Conference details
Vote based correspondence for 3D point-set registration.	Neeraj A. Kulkarni, Subodh Kumar	ICVGIP 2012
Accurate and efficient rendering of detail using directional distance maps	Ravish Mehra, Subodh Kuma	ICVGIP 2012
Efficient Analytical Integration of Single Scattering Function	Umashankar Pradhan, Subodh Kumar	GRAPP 2011

Vinay Ribeiro

Title	Authors	Journal/Conference details
Overhearing packet transmissions to reduce preamble overhead and improve throughput in IEEE 802.11 networks	Shantanu Shrivastava, Vinay J. Ribeiro	COMSNETS 2014
A Case for Robust Semi-Experiments	H. Gupta, Vinay J. Ribeiro, A. Mahanti	IEEE MASCOTS 2010
Strap-down pedestrian dead-reckoning system	P. Goyal, Vinay J. Ribeiro, H. Saran, A. Kumar	IPIN 2011

S Sen

Title	Authors	Journal/Conference details
Linear time approximate clustering in	Amit Kumar, Yogish	Journal of the ACM Vol. 57,

any dimension	Sabharwal, Sandeep Sen	No.2, Jan 2010, pp. 1 – 32
Fully dynamic maximal matching in O(log n) update time	S. Baswana, Manoj Gupta, Sandeep Sen	Proc of IEEE FOCS 2011, pp. 383-392
Improvements on the Johnson bound for Reed Solomon Codes	V. Muralidhara, Sandeep Sen	Discrete Applied Mathematics, Vol. 157, Issue 4, 28 February 2009, pp. 812 – 818.

M. Balakrishnan

Title	Authors	Journal/Conference details
System-Level Design Space Exploration Methodology for Energy-Efficient Sensor Node Configurations: An Experimental Validation	SonaliChouhan, M. Balakrishnan, Ranjan Bose	IEEE Trans. on CAD of Integrated Circuits and Systems, Vol. 31, No.4, 2012, pp. 586-596
Compressing Cache State for Post-Silicon Processor Debug	P Panda, M Balakrishnan and A. Vishnoi	IEEE Transactions on Computers, Vol. 60, No. 4, April 2011, pp 484-497
A Framework for Energy Consumption Based Design Space Exploration for Wireless Sensor Nodes	SonaliChouhan, Ranjan Bose, M. Balakrishnan	IEEE Trans. on CAD of Integrated Circuits and Systems, Volume 28, Issue 7, July 2009, pp. 1017 - 1024
Impact of Inter-cluster Mechanisms on ILP in Clustered VLIW Architectures	AnupGangwar, M. Balakrishnan and Anshul Kumar	ACM TODAES, Vol. 12, No. 1, Jan 2007, pp. 1-29. (Best Paper Award for ACM TODAES 2007)

Maya Ramanath

Title	Authors	Journal/Conference details
RDF XPress: A Flexible Expressive RDF Search Engine	Shady Elbassuoni, Maya Ramanath,Gerhard Weikum	SIGIR 2012
NaturalLanguage Questions for the Web of Data	M. Yahya, K. Berberich, S. Elbassuoni, M. Ramanath, V. Tresp and G. Weikum	Proc. of EMNLP-CoNLL, 2012
Polarity Classification of Political Quotations (short paper)	Rawia Awadallah, Maya Ramanath and Gerhard	Proc. of CIKM, 2012

	Weikum	
Opinions Network for Politically Controversial Topics	Rawia Awadallah, Maya Ramanath and Gerhard Weikum	Proc. of Workshop on Politics, Elections and Data (PLEAD)@CIKM, 2012

Parag Singla

Title	Authors	Journal/Conference details
Scaling-up Quadratic Programming Feature Selection	Yamuna Prasad, K.K. Biswas and Parag Singla	Late-Breaking Track at Twenty-Seventh Conference on Artificial Intelligence (AAAI), 2013. Bellevue, WA.
Markov Logic: Theory, Algorithms and Applications	Parag Singla	18th International Conference on Management of Data (COMAD), 2012
Constraint Propagation for Efficient Inference in Markov Logic	Tivadar Papai, Parag Singla and Henry Kautz	Seventeenth International Conference on Principles and Practice of Constraint Programming, 2011 (pp. 691 - 705). Perugia, Italy.
Abductive Markov Logic for Plan Recognition	Parag Singla and Raymond J. Mooney	Twenty-fifth National Conference on Artificial Intelligence, 2011 (1069 - 1075). San Fransisco, CA.

Kolin Paul

Title	Authors	Journal/Conference details
p-QCA: ``A Tiled Programmable Fabric Architecture Using Molecular Quantum-Dot Cellular Automata"	Rajeswari Devadoss, Kolin Paul and M. Balakrishnan	ACM Journal on Emerging Technologies in Computing Systems 7(3): 13 2011
``GAGM: Genome Assembly on GPU using Mate pairs",	Ashutosh Jain, Anshuj Garg and Kolin Paul	20th Annual International Conference on High Performance Computing (HiPC 2013), Bangalore 2013

``Android on Mobile Devices: An Energy Perspective"	Kolin Paul and Tapas Kumar Kundu	CIT 2010: 2421-2426

Amitabha Bagchi

Title	Authors	Journal/Conference details
Spatio-Temporal and Events-based Analysis of Topic Popularity in Twitter	Sebastien Ardon, Amitabha Bagchi, Anirban Mahanti, Amit Ruhela, Aaditeshwar Seth, Rudra Mohan Tripathy, Sipat Triukose.	22nd ACM International Conference on Information and Knowledge Management (CIKM '13)
Hierarchical neighbor graphs: A topology control mechanism for data collection in heterogenour wireless sensor networks.	Amitabha Bagchi, Adit Madan, Achal Premi and Surabhi Sankhla	Ad Hoc Sens. Wirel. Ne. (Accepted but not yet appeared)
Optimal radius for connectivity in duty-cycled wireless sensor networks.	Amitabha Bagchi, Cristina M. Pinotti, Sainyam Galhotra, Tarun Mangla	16th ACM International Conference on Modeling, Analysis and Simulation of Wireless and Mobile Systems (MSWIM '13)

Subhashis Banerjee, Prem Kalra

Fast Approximate Inference in Higher Order MRF-MAP Labeling Problems	Chetan Arora, Subhashis Banerjee, Prem Kalra and Sachin Maheshwari	CVPR 2014
An Efficient Graph Cut Algorithm for Computer Vision Problems	Chetan Arora, Subhashis Banerjee, Prem Kalra, S. N. Maheshwari	ECCV 2010, pp. 552--565, September, 2010
Space-time super-resolution using graph-cut optimization	Uma Mudenagudi, Subhashis Banerjee and Prem Kalra	IEEE Transactions on Pattern Analysis and Machine Intelligence., Vol. 33 No. 5, pp. 995-1008, May 2011

Unsupervised discovery of activity correlations using latent topic models	Tanveer A. Faruquie, Subhashis Banerjee, Prem K. Kalra.	The Visual Computer 27(12), 1071-1082, Springer, 2011.
Generic Cuts: An Efficient Algorithm for Optimal Inference in Higher Order MRF-MAP.	Chetan Arora, Subhashis Banerjee, Prem Kalra, S. N. Maheshwari	ECCV (5) 2012: 17-30.
Unsupervised Discovery of Activities and their Temporal Behaviour	Tanveer A. Faruquie, Subhashis Banerjee, Prem K. Kalra.	IEEE International Conference on Advanced Video and Signal Based Surveillance (AVSS), 2012.
High Resolution Point Cloud Generation from Kinect and HD Cameras using Graph Cut	Suvam Patra, Brojeshwar Bhowmick, Subhashis Banerjee, Prem Kalra	VISAPP (2) 2012: 311-316.

3.7 Average citation per department/center.

3.8 Changes, modifications, etc. done to improve the quality of (i) M.Tech., and (ii) Ph.D. graduates.

Movement from M.Tech. to PhD: Significant policy changes piloted include facilitating enrolment of project staff in masters and PhD programmes, easy changeover from masters to PhD and provision of admission of our UG students to PG programmes with advance standing.

3.9 Sponsored projects - (i) individually, (ii) with another faculty of the group/section of the department, (iii) with another faculty of the department but from another group/section of the department (iv) with another faculty of another dept/center.

Amit Kumar

Individually:

Project No. and Title	Duration	Funding Agency	Total funding	Current Status
RP02360, Microsoft Faculty Research Grant	June'10-March'14	Microsoft Research	Rs 2 Lakh	In progress.
MI00377, IBM Faculty Award	March'05-March'14	IBM	Rs 14,26288	In progress.

MI00785, Workshop on Data Analysis and Operation Research	October 2010	IBM India Research Lab	Rs 1.07 lakhs	Completed

With another faculty of the group/section of the dept.

Project No. and Title	Duration	Funding Agency	Total Funding	Status	Jointly with
RP01783, Approximation Algorithms	July 2005-Dec 2010	Max-Planck Institute fur Informatik (MPI), Germany	Rs 38.7 Lakhs	Completed	Naveen Garg

Naveen Garg

Individually:

Project No. a Title	Duration	Funding Agency	Total funding	Current Status
Partner Group on Approximation Algorithms	Jan 2005-Dec 2010	Max-Planck-Society, Germany	EUR 100,000	completed
IBM Faculty Award	Started Jan 2007 and ongoing	IBM, USA	USD 10,000	ongoing

With another faculty of the group/section of the dept.

Project No. an	Duration	Funding Agency	Total Funding	Status	Jointly with
Indo-German Max-Planck Center for Computer Science (IMPECS)*	5 years till Dec 2015.	DST, Max-Planck-Society and German Ministry of Education & Research	624.75 Lakhs (DST)+ 2 Million EUR (MPG+BMBF)	ongoing	All faculty of the Algorithms and Complexity group.

The Indo-German Max-Planck Center for Computer Science (IMPECS) is a virtual center for collaborative research between Indian and German scientists. I and Prof Kurt Mehlhorn are the co-directors for IMPECS. The research is carried out by groups around the country in collaboration with researchers at MPI-Informatik and MPI-Software systems. The groups in India are: Algorithms and Complexity (IIT Delhi, IIT Kanpur, IMSc Chennai, IIT Madras, TIFR), Databases and Information Retrieval (IIT Bombay, IIT Delhi), Program Analysis and Verification (IISc Bangalore), Computer Graphics (IIT Delhi) and Online Social Networks (IIT Kharagpur and IIT Delhi).

Preeti Panda

Individually:

Project No. and Title	Duration	Funding Agency	Total funding	Current Status
MI00599 - IBM Faculty award	2009-2014	IBM	480000.00	Ongoing
RP01794 - Fast Data Dump for Processor Debug	2005-2009	Intel	1300000.00	Completed
RP01947 - Component and System Level Design Techniques for Mobile Platform Power Reduction	2007-2010	Intel	1200000.00	Completed
RP01964 - Task Migration in Multicore Systems: Power Modelling and Optimisation	2007-2011	Intel	2600000.00	Completed
RP02064 - Accurate Energy Modelling of the Cache Sub-System	2007-2009	Semicondoctor Research Corporation (Freescale Semiconductor)	1438125.00	Completed
RP02385 - System Level Optimization for Energy Efficient Computing	2010-2015	IBM	1810673.00	Ongoing
RP02674 - Compiler Optimizations targeting Low Power	2012-2017	Calypto Design Systems	500000.00	Ongoing
RP02669 - Computer Resource Adaptation in Power Constrained Environments	2011-2016	Intel	10,00,000.00	Ongoing

With another faculty of the group/section of the dept.

Project No. and Title	Duration	Funding Agency	Total Funding	Status	Jointly with
MI00599 - IBM Faculty award	2009-2014	IBM	480000.00	Ongoing	MI00599 - IBM Faculty award
RP01794 - Fast Data Dump for Processor Debug	2005-2009	Intel	1300000.00	Completed	RP01794 - Fast Data Dump for Processor Debug
RP01947 - Component and System Level Design Techniques for Mobile Platform Power Reduction	2007-2010	Intel	1200000.00	Completed	RP01947 - Component and System Level Design Techniques for Mobile Platform Power Reduction
RP01964 - Task Migration in Multicore Systems: Power Modelling and Optimisation	2007-2011	Intel	2600000.00	Completed	RP01964 - Task Migration in Multicore Systems: Power Modelling and Optimisation

A Seth

Individually:

Project No. and Title	Duration	Funding Agency	Total funding	Current Status
Document the state of consumer Internet in rural and urban India	2012-2014	Ford Foundation	US $150,000	Ongoing

With another faculty of the group/section of the dept.

Project No. and Title	Duration	Funding Agency	Total Funding	Status	Jointly with
Communication frameworks in flaky Internet environments	2011-2012	Intel India	US $25,000	Completed	Huzur Saran
Semantic social network based systems for rural areas	2011-2013	DST	US $60,000	Completed	Huzur Saran, Vinay Ribeiro
Rural content distribution infrastructure	2010-2013	DEITY	US $150,000	Completed	Huzur Saran, Vinay Ribeiro

Sorav Bansal

Individually:

Project No. and Title	Duration	Funding Agency	Total funding	Current Status
RP02598 : Multiprocessor Virtual Machine Record/Replay	May 2012-June 2014	NetApp Inc.	12.5 lacs	ongoing
RP02552 : Performanc	Jan 2012-Dec 2014	Freescale Inc.	15 lacs	ongoing

e Optimizations in KVM for PowerPC				
MI01088 : IBM Faculty Award	Dec. 2013-Dec.2018	IBM	USD 10000	ongoing
MI00898 : IBM Shared University Research Award	Oct. 2011-Oct.2016	IBM	USD 15000	ongoing

With another faculty of the group/section of the dept

Project No. and Title	Duration	Funding Agency	Total Funding	Status	Jointly with
RP02595 : Creation of Common Computing Infrastructure	April 2012-April 2017	Ministry of HRD	Rs. 40 crore	Ongoing	Huzur Saran, Subhashis Banerjee,

Ragesh Jaiswal

Individually:

Project No. and Title	Duration	Funding Agency	Total funding	Current Status
MI00744: Streaming Algorithms for Clustering	June-2010 to Dec-2011	IIT Delhi	1 Lakh	Completed
PLN6R/BCSE: Clustering in Batch and Streaming setting using non-uniform sampling, Equipment grant to new faculty	Nov-2011 to Nov-2012	IIT Delhi	6.7 Lakh	Completed

With another faculty of the group/section of the dept.

Project No. and Title	Duration	Funding Agency	Total Funding	Status	Jointly with
RP02605: Advanced Information	April-2012 to April-2014	NTRO	1,22,40,948	Ongoing	PI: Huzur Saran Co-PIs: Sanjiva Prasad, Kolin Paul,

System Security Laboratory – Phase-II					Ragesh Jaiswal Jaiswal

Smruti

Individually:

Project No. and Title	Duration	Funding Agency	Total funding	Current Status
RP02550, BhartiSim: An advanced micro-architectural simulator	3 years	Ministry of Information Technology	61 lakhs	active
RP02672, Lock free algorithms for slot schedulers	1.5 years	Netapp India Private Limited	13 lakhs	active

S K Gupta

Individually:

Project No. and Title	Duration	Funding Agency	Total funding	Current Status
Advance Information System Security Laboratory	2006-2010	NTRO	4 Crore	Ongoing PI Prof. Huzur Saran

With faculty of another dept.

Project No. and Title	Duration	Funding Agency	Total Funding	Status	Jointly with
Advance Information System Security Laboratory	2006-2010	NTRO	4 Crore	Ongoing PI Prof. Huzur Saran	Prof. R.K. Sharma Prof. M. P. Gupta

Vinay Ribeiro

With another faculty of the group/section of the dept.

Project No. and Title	Duration	Funding Agency	Total Funding	Status	Jointly with
SPARC: SPectrum-Aware Rural Connectivity (RP02565)	Mar. 2012 - Aug. 2014	DeitY	Rs. 1.42 crore	Ongoing	Manish Sharma, Huzur Saran
LTE Performance Evaluation and Application Development (RP2564)	Mar. 2012 - Dec. 2014	Cisco India	Rs. 31.2 lakhs	ongoing	Huzur Saran
Design and development of a rapidly deployable Wimax mesh network (RP2770)	Dec. 2008 - June 2012	DeitY	Rs. 97 lakhs	completed	Huzur Saran
Medium Access Layer Scheduling in IEEE 802.11 and IEEE 802.16 Wireless Networks	Aug. 2008 - Dec. 2012	Marvell India	Rs. 24 lakhs	completed	Huzur Saran
Managing Secured Documents	June 2007 – Sept. 2011	National Institute for Smart Government, Govt. of India	Rs. 11 lakhs	Completed	B. N. Jain
Tracking Human Motion via Sensor Fusion	Apr. 2013-Apr. 2014	C S R Technology(India) Pvt. Ltd.	Rs. 12.24 lakhs	Ongoing	H. Saran
Structured Sharing of Networks and Computer Resources in a Community & Devices	July 2013 – July 2016	Intel USA	Rs. 40.27 lakhs	Ongoing	S. Sarangi, H. Saran
Design and Implementation of Content Distribution Architecture for Rural and Remote Areas	Jan. 2011 - Dec 2013	DST	Rs. 24.5 lakhs	Completed	A. Seth, H. Saran
India -UK	Sept.	DST	Rs. 25.5 lakhs	Ongoing	Huzur Saran

advanced technology centre (IU-ATC Phase - 2) of excellence in Next generation networks systems and service	2012 – May 2015				
Medium Access Layer Scheduling in IEEE 802.11 and IEEE 802.16 Wireless Networks	Aug. 2008 - Dec. 2012	Marvell India	Rs. 24 lakhs	completed	Huzur Saran
Managing Secured Documents	June 2007 - Sept. 2011	National Institute for Smart Government, Govt. of India	Rs. 11 lakhs	Completed	B. N. Jain
Tracking Human Motion via Sensor Fusion	Apr. 2013-Apr. 2014	C S R Technology(India) Pvt. Ltd.	Rs. 12.24 lakhs	Ongoing	H. Saran
Structured Sharing of Networks and Computer Resources in a Community & Devices	July 2013 – July 2016	Intel USA	Rs. 40.27 lakhs	Ongoing	S. Sarangi, H. Saran

With faculty of another dept.

Project No. and Title	Duration	Funding Agency	Total Funding	Status	Jointly with
Production of High Value Tehrapeutic Proteins using Pichia System	Apr. 2011 – Mar. 2016	Industrial Research and Development Unit, I.I.T. Delhi	Rs. 1 crore	ongoing	Prof. S. Mishra, Dr. V. Sahai, Prof. A. K. Srivastava, Dr. A. Rathore, Dr. J. Gomes, Dr. V. Ribeiro
Cross-layer protocols for enhanced quality of user experience in broadband wireless networks	Mar. 2011 - Mar 2014	DST	Rs. 41 lakhs	ongoing	Swades De, H. M. Gupta

S Sen

Individually:

Project No. and Title	Duration	Funding Agency	Total funding	Current Status
RP2606 Models and algorithms for computing in presence of uncertainties	April 12 – April 14	DST-DFG Indo-German project	11 lacs	Ongoing

With another faculty of the group/section of the dept.

Project No. and Title	Duration	Funding Agency	Total Funding	Status	Jointly with
RP02432 Algorithms and Complexity		DST			Naveen Garg (PI)

With another faculty of the dept. but from another group

Project No. and Title	Duration	Funding Agency	Total Funding	Status	Jointly with
Large scale data Processing and Visualisation	Nov 08-Nov 10	Naval Research Board	50 lacs		Subodh Kumar, Sandeep Sen, Niloy Mitra , Kolin Paul

M. Balakrishnan

1	Affordable Refreshable Braille Displays based on Shape Memory Actuation	M Balakrishnan PVM Rao Kolin Paul (Along with Saksham Trust,	WELLCOME TRUST, UK	Total >600 lakhs (approx. 160 Lakhs	Expected Apr. 2014 - Mar. 2016

		Phoenix Medical, KritiKal Solutions)		(IITD))	
2	ePSD: Personal Safety Device	M. Balakrishnan Kolin Paul	DeITY	48.0 lakhs	Aug. 2013 to Nov. 2014
3	Development of a Low-cost Electronic Braille Display for the Visually Impaired	PVM Rao M Balakrishnan	TIDE, DST	47.5 Lakhs	Sep. 2013 to Aug. 2015
4	Design and development of an Assistive Device for Public Bus Access for the Visually Impaired	M Balakrishnan PVM Rao	TIDE, DST	42.00 Lakhs	Sep. 2013 to Feb.. 2015
5	Development of Smart Cane - An Affordable knee-above Obstacle Detection and Warning System for the Visually Impaired	M Balakrishnan PVM Rao Kolin Paul (Along with Saksham Trust, Phoenix Medical)	WELLCOME TRUST, UK	Total >300 lakhs (163 Lakhs (IITD)	Dec. 2010 - Mar. 2014
6	Characterization of Multi-core Processors for Power-Estimation at System-Level (CoMPESys).	M Balakrishnan SmrutiSarangi (Prof. Wolfgang Nebel, Olenburg Uni., Germany)	DST-DFG	15.5 Lakhs	Oct 2010 – Oct 2013
7	Virtual FPGA and Digital Design lab	M Balakrishnan Kolin Paul	MHRD	39.0 Lakhs	April 2009- Mar 2014

Maya Ramanath

Project No. and Title	Duration	Funding Agency	Total funding	Current Status
RP02741 (with Srikanta Bedathur, IIIT-	until May, 2018	DST/MPG	Rs. 3810000	ongoing

Delhi)				
RP02742 Trend Identification on Twitter (with Amitabha Bagchi)	until May, 2014	Yahoo! Labs	Rs. 420000	ongoing
RP02787 Mining Opinions from News sources for defense applications (with Parag Singla)	until Aug, 2014	DRDO	Rs.989000	ongoing

Parag

Individually:

Project No. and Title	Duration	Funding Agency	Total funding	Current Status
Mining Opinions from News Sources for Defense Applications			989000	In Pipeline

Amitabha Bagchi

With another faculty of the dept. but from another group

Project No. and Title	Duration	Funding Agency	Total Funding	Status	Jointly with
Measuring the scalability of server systems	1.11.2010 to 31.5.2012	Netapp	Rs 12 Lakhs	Completed	Sorav Bansal
Characterizing Web 2.0 workloads and their impact on storage architectures	1.1.2009 to 1.6.2010	Netapp	Rs 12 Lakhs	Completed	Anirban Mahanti

Sanjiva Prasad

Individually:

Project No. and	Duration	Funding	Total funding	Current Status

Title		Agency		
RP01744. HelpNets: Wireless Network Architectures using Asynchronous Messages for Supporting Development Activities in Severely Underserved Communities	31-03-2014	Microsoft Research	Rs.1730000	In progress.

With another faculty of the group/section of the dept.

Project No. and Title	Duration	Funding Agency	Total Funding	Status	Jointly with
RP02231. Software Agents for SIP-based Presence and Location Aware Mobility Services	31-07-2014	Avaya Labs, USA	Rs.1264800	In Progress.	Huzur Saran
RP02597. Foundations for Trusted and Scalable 'Last Mile' Healthcare	14-04-2014	Department of Electronics & Information Technology, Govt of India	Rs.11040000	In Progress.	Kolin Paul
RP02605. Advanced Information System Security Laboratory (Phase - II)	14-04-2014	National Technical Research Organization (NTRO)	Rs.12240948	In Progress.	Huzur Saran

Subhashis Banerjee

Individually

Similarity measures and their optimization for video analysis and editing	2012 - 2014	DST (Indo-Israel Project)	Rs. 5,00,000	Ongoing	P. J. Narayanan (IIIT Hyderabad), Shmuel Peleg (Hebrew University, Jerusalem) and Michael Werman (Hebrew University, Jerusalem).

With other faculty members of IITD

Creation of central computing infrastructure for universities	2012 - 2014	MHRD (NMEICT).	Rs. 40 Crores	Ongoing	Sorav Bansal, Huzur Saran, R. S. Mani (NIC).
Visual enhancemnt, manipulation and retargeting of videos	2008-2010	Naval Research Board	Rs. 25,40,000 (Rs. 8,00,000 for IITD)	Completed	P J Narayanan (IIIT Hyderabad), Uma Mudenagudi (BVB College, Hubli) and Prem Kalra

Prem Kalra

Individually:

Project No. and Title	Duration	Funding Agency	Total funding	Current Status
MI00569 Video Support to courses to Adis Ababa University Ethiopia (Project MIOO568)	2008-2013	Ethiopia	140 L	On going (Was Pi till 2011). It is a project for developing and providing infra structure for synchronous distance teaching. This is executed at Educational Technology

				Services Centre (ETSC)
MI00703 Virtual Class Rooms at IITs Over National Knowledge Network (NKN)	2009-2012	National Informatics Centre (NIC) and National Informatics Centre Services Inc. (NICSI)	155 L	Completed. This is executed at Educational Technology Services Centre (ETSC)

With another faculty of the group/section of the dept.

Project No. and Title	Duration	Funding Agency	Total Funding	Status	Jointly with
RP02162 Large Scale Data Processing and Visualization	2008-11	Naval Research Board	39 L	Completed	Subodh Kumar (PI)
RP 02263 Quantum and Nano Computing Systems Virtual Centre (QANCENTRE)	2009-14	MHRD	25 L	On going	Huzur Saran (CSE), BR Mehta (PH), A Ganguli (CH) (all Co-PIs)
RP02362 Acquisition, Representation, Processing and Display of Digital Heritage Sites	2010-14	DST	57 L	On going	Subodh Kumar , Subhashis Banerjee (both Co-PIs)
RP02347 Immersive Environment for Teleoperation	2010-15	BRNS	153 L	On going	Subodh Kumar , Subhashis Banerjee (both Co-Pis)
RP02431 Exploratory Visualization in 3D Virtual Environments	2010-13	DST	40 L	On going	Subodh Kumar , Subhashis Banerjee (both Co-Pis)
RP02571 Acquisition, Modeling and Display of Animated Object	2012-17	DST (IMPECS)	77 L	On going	Subodh Kumar , Subhashis Banerjee (both Co-Pis)
RP02569 Recognizing Novel Objects in Images	2012-14	DST	14 L	On going	K K Biswas (PI)

With another faculty of the dept. but from another group: RP02263 as above

With faculty of another dept.: RP02263 as above, RP02347 is a project under a larger project RP02346 which has faculty involved from EE and ME and is of

interdisciplinary nature

3.10 Industry consultancies

Amit Kumar

Project Title	Duration	Funding Agency	Total Amount	Status	Jointly with
Review of Match Engine Design	April 2008-Nov 2008	High Mark Credit Information Services Pvt. Ltd	Rs 1,00,113	Completed	Prof. Jayadeva
Optimal Block Aggregation	Dec 2007-July 2009	HP Billiton Innovation Ptv. Ltd., Australia	Rs 8,66,680	Completed	Prof. Naveen Garg

Prem Kalra

Project Title	Duration	Funding Agency	Total Amount	Status	Jointly with
Training on Computer Graphics and Advanced Concepts on Computer Graphics	2 days each in Feb 2009 June 2009, June 2010 and Sep 2010	Adobe, Noida and Bangalore	**5 L (approx.)**	completed	Subodh Kumar

Samsung	June 2013 – June 2014	Samsung	**7.5 L**	On-going	Subodh Kumar

Naveen Garg

Project Title	Duration	Funding Agency	Total Amount	Status	Jointly with
Training on Advanced Algorithms	Jan 20-April 28, 2011	Mentor Graphics, Noida	375,000	completed	
	Feb 13-April 19, 2012		300,000	completed	
	April 2-25, 2013		320,000	completed	

Ragesh Jaiswal

Project Title	Duration	Funding Agency	Total Amount	Status	Jointly with

FT/05/1717/2013: Feasibility study of parallelization of a clustering algorithm on a multi-core parallel platform	Sep-2013 to Feb-2014	Intel	2,32,585	Active	PI: Sandeep Sen Co-PI: Ragesh Jaiswal Jaiswal

Vinay Rebiero

Project Title	Duration	Funding Agency	Total Amount	Status	Jointly with
Expert report on violation of Blackberry SDK terms & conditions	Sept 2011 – Feb 2012	Research in motion	Rs. 10 lakhs	Completed	R. K. Mallik

Huzur Saran

Project Title	Duration	Funding Agency	Total Amount	Status	Jointly with
Development of Dynamic Whitelisting Technology	Dec 2003 – Dec 2009	Solidcore Inc	Rs. 1.4 Crore	Completed	

S Sen

Project Title	Duration	Funding Agency	Total Amount	Status	Jointly with
FT/05/1717/2013 Feasibility Study of parallelization of a clustering algorithm on a multicore parallel platform	Sept 1 2013 (6 months)	Intel Technology India Pvt Ltd	2.3 lacs	ongoing	Ragesh Jaiswal Jaiswal

M. Balakrishnan

Both the WELLCOME TRUST projects are technology transfer projects. Also associated with KritiKal Solutions and KritiKal Securescan our start-ups thru TBIU. NO separate consultancy in this period.

3.11 New areas of research which are different from the faculty's PhD thesis area.

Naveen Garg

Scheduling, Facility location, Network Design.

A Seth

Community media, Technologies for health care, Internet measurements.

Ragesh Jaiswal

1. Sampling based algorithms for clustering.
2. Study of properties of Boolean functions.
3. Secure aggregation of information on mobile networks.
4. Private key reconstruction using Cold-boot attacks.\

Smruti Sarangi

1. Lock free and wait free algorithms
2. Operating systems jitter aware architectures
3. Checker architectures

Saroj Kaushik

1. Case-Base Retrieval of Childhood Leukaemia Patients Using Gene Expression Data, University of Technology, Sydney, Australia, 2013
2. Translation Rules, ANN and Case Base Reasoning Integrated Model for English to Sanskrit Machine Translation, BHU, 2011
3. An Intelligent Approach For Spoken Hindi Paired Word Recognition, Department of Electrical Engineering, Indian Institute of Technology, Roorkee Aug, 2011
4. Enhancing Accuracy of Recommender Systems through Various Approaches to Local and Global Similarity Measures, School of Computers and Systems Sciences, JawaharLal Nehru University, New Delhi, India, Dec 2011.
5. Self-Organization of Speech Sound Inventories in the Framework of Complex Networks, Computer Science and Engineering, IIT Kharagpur, 2009.
6. Peer Enterprises: Extending the Power of Peer-to-Peer Computing Across Organizations, Department of Computer Science and Engineering, NIT , Hamirpur, 2009.
7. Evolutionary Algorithms Approach to Automated Discovery of Censored Production Rules with Fuzzy Hierarchy, Jawahar Lal Nehru University, New Delhi, India, 2008.

Huzur Saran

Computer Systems & Networking, Cloud Computing and Systems Security.

S K Gupta

Data Mining (Intention Mining).

Amitabha Bagchi

Random graphs and their applications to wireless networks

Social networks and complex networks

Data mining of text corpora

Vinay Ribeiro

Design and development of WiMax mesh networks, Indoor navigation and positioning, WiFi efficiency improvement, applications for disaster management, managing secured documents etc.

M. Balakrishnan

Initiated PhD in “Mobility of Visually Impaired” with Prof. PV Madhusudan Rao, Mech Engg. New registered student is Mr. Piyush Chanana

Sanjiva Prasad

1. mHealth: Mobile Healthcare
2. Security
3. Network architectures and protocols
4. Systems Biology

Subhashis Banerjee

Large scale 3D reconstruction, topic discovery using machine learning.

3.12 Methodology for (i) identifying obsolescence in research areas, and (ii) identification of new areas for future research.

3.13 Number of large interdisciplinary projects (within department's areas, and across the institute).

Title	People Involved	Details
A Model For Developing Optimized Body Measurement Charts From Anthropometric Data	Naveen Garg and Deepti Gupta (Textile Engg.)	Ministry of Information Technology, 15.38 Lakhs, 25 Oct 2005 to 12 April 2008
Technologies for community media	Gram Vaani, industry collaborator	Knight Foundation, $200,000 grant. Rising Stats, $50,000 grant.
Affordable Refreshable Braille Displays based on Shape Memory Actuation	M Balakrishnan PVM Rao Kolin Paul (Along with Saksham Trust, Phoenix Medical, KritiKal Solutions)	WELLCOME TRUST, UK Total >600 lakhs (approx. 160 Lakhs (IITD)) Expected Apr. 2014 - Mar. 2016
Design and development of an Assistive Device for Public Bus Access for the Visually Impaired	M Balakrishnan PVM Rao	TIDE, DST 47.5 Lakhs Sep. 2013 to Aug. 2015
Development of Smart Cane - An Affordable knee-above Obstacle	M Balakrishnan PVM Rao Kolin Paul (Along with Saksham Trust,	WELLCOME TRUST, UK Total >300 lakhs (163 Lakhs (IITD)

Detection and Warning System for the Visually Impaired	Phoenix Medical)	Dec. 2010 – Mar. 2014
Development and deployment of a Cloud computing platform for IITD.	Sorav Bansal Huzur Saran Subhashis Banerjee Naresh Kalra Gopal Kishen	CSC, IIT Delhi
RP02779 - Centre for Excellence in Low Power Design on Nanoscale Devices, Circuits and Systems	Preeti Panda, M. Jagadesh Kumar et al.	2012-2017, Rs. 1,00,00,000 Sponsor: MHRD
Design and Development of a Unified Modelling System for Seamless Weather and Climate predictions of	Subodh Kumar, Prof. OP Sharma (CAS), Prof. PMV Subbarao (Mechanical)	
Development of an Indian Human Body Finite Element Model for use in Impact, Textile and Medical Applications	Subodh Kumar, Prof. Anoop Chawla (Mech)	Development of an Indian Human Body Finite Element Model for use in Impact, Textile and Medical Applications
Position and Personalize Advanced Human Body Models for Injury Prediction,	Subodh Kumar, Prof. Anoop Chawla (Mech)	Position and Personalize Advanced Human Body Models for Injury Prediction,
Immersive Environment for Tele-operation	Subodh Kumar, Prof. Santanu Choudhury (Electrical), Prof. Subir Saha (Mechanical), Prof. Sudipto Mukherjee (Mechanical)	Immersive Environment for Tele-operation
Neurosurgical Skills training and Evaluation	Subodh Kumar, Prof. Ashish Suri (AIIMS)	Neurosurgical Skills training and Evaluation

4. Innovation, Design and Development

4.1 No. of students who have been funded for innovating (TePP, PRISM, etc.).

4.2 Technology developed (*give list and brief information*).

Title	Faculty Involved	Details
Measurement suite for rural Internet measurements	Aaditeshwar Seth	
Automation for community radio stations	Aaditeshwar Seth	In collaboration with Gram Vaani, GRINS deployed in over 35 locations in India and Africa
vAutomate suite of technologies	Aaditeshwar Seth	In collaboration with Gram Vaani deployed for over 30 organizations across India
Rapidly deployable Wimax based mesh network for disaster management	Vinay Ribeiro	
Pedestrian dead reckoning system for indoor navigation	Vinay Ribeiro	
Refreshable Braille Cell	M. Balakrishnan	Affordable electronic tactile display
Smartcane	M. Balakrishnan	Obstacle detection for the visually impaired
INCODE board	M. Balakrishnan	FPGA based educational kit

4.3 Technology transferred (*give list and brief information*).

Details given above.

4.4 Number of patents filed and patent granted as a fraction of patents filed.

Title	Faculty Involved	Details
Cane-Mounted Waste Above Obstacle Detection & Warning System	M. Balakrishnan	1354/DEL/2007, 22nd June 2007
User Triggered Bus Identification & Building Navigation System	M. Balakrishnan	1355/DEL/2007, 22nd June 2007

A System for Generating refreshable tactile text and graphic	M. Balakrishnan	1669/DEL/2012, 31st May 2012 and PCT/IN2013/000347 dated 31st May 2013
Discovering Social Relationships From Personal Photo Collections	Parag Singla (along with Jiebo Luo, Henry Kautz, Andrew C. Gallagher)	
Using Joint Communication and Search Data	Parag Singla (along with Matthew R. Richardson)	

4.5 Innovations of products, processes, designs, etc. in the department.

A large number of innovative projects in the course CSP315. Some of these have now developed into products and many more are in the pipeline.

4.6 Availability and access to students' workshops, "tinkering laboratories" so that they may pursue their own ideas.

Students are encouraged to experiment in the various labs. They have significant freedom on access to equipment and any special needs are addressed.

4.7 No. of students/teams who have competed in national / international competitions, and outcome.

Student/team	**Award**	**Events**
Deeksha Gautam, Sudhanshu Shekhar, Madhulika Mohanty, Nitish Varshney	Grand Prize Winner for "Polarizer" which classifies controversial comments into pro and con	Yahoo Hack u
Amit Ruhela	Best presentation in the COMSNETS 2012	online social networks and Internet content distribution
Rudradev Basak, Nikhil Garg and Pradeep George Mathis	18th place in the ACM ICPC 2012 contest	ACM ICPC 2012 contest
Dhruv Jain, Prof. M. Balakrishnan	Best poster award for "Roshni: Indoor Navigation System for visually impaired"	4th IBM Collabo-rative Academia Research Ex-change (I-CARE 2012) held in Bangalore, India
Dhruv Jain, Prof. M. Balakrishnan	Best paper award for "Design and user study of an affordable cell phone based indoor navigation system for visually	13th International Conference on "Mobility and Transport for Elderly and Disabled People" (TRANSED2012)held in New Delhi

	impaired"	
Shivendra Tiwari, Saroj Kaushik	Best Paper Award for "Fusion of Navigation Technology and E-Learning Systems for the On-the-Spot Learning"	In IET International Conference on Wireless Communications and Applications-(ICWCA)2012 held at Kuala Lumpur, Malaysia during October 2012
Amit Ruhela	Best presentation for "online social networks and Internet content distribution"	COMSNETS 2012 PhD forum
Sandeep Kumar Bindal	third prize "Systematic Ranking of the Threads Schedules for Testing Multi Threaded Programs"	PLDI SRC 2011 in the Undergraduate category
ASSISTECH group	best paper award Smart cane for the Visually Impaired	12th International Conference on Mobility and Transport for Elderly and Disabled People
Aaditeshwar Seth's project team	Juror's distinction for Rural community radio stations	Manthan Awards
The Trafficdroid team of Kanav Goyal, Kushal Dudani, Saurabh Gupta, and Shikhar Gupta	Third price for Android application on road traffic monitoring	Ericsson Application Awards for 2011
ACM team	ACM Best Student Chapter award IITD 2010	
Sandeep Kumar Gupta	IBM eclipse campus embassador 2010	
Dr Anirban Mahanti	Best Paper award	9th Passive and Active Measurement (PAM) conference.
Silpa	Won Intel Scholar Program 2008	
Mr. Rohan Paul, Mr. Dheeraj Mehra and Mr. Vaibhav Singh	INAE Innovative Student Projects Award 2008	

5. R & D Environment

5.1 No. of post-doctoral scholars hired in the department/centre and their durations, from (i) abroad, (ii) on project, and (iii) others, and outcomes.

5.2 No. of foreign students enrolled in

(i) Masters: 6

and (ii) PhD programmes : 5.

5.3 No. of Indian and foreign faculty/researchers who have spent a sabbatical in the

department.

Faculty Name	Time-period	Parent Institution
Pankaj Agarwal	2011-12	Duke University
Dr Vishwani Aggarwal	2013	Auburn University
Pascal Weil	2008-10	Univ. Bordeaux

5.4 Sabbatical taken by faculty and where spent.

Faculty	Time-period	Place where sabbatical spent
Amit Kumar	2009-10	MSR Bangalore, IBM Research
Amitabha Bagchi	2013-14	Short research visits
Sandeep Sen	2012-13	MSR Bangalore, ISI Kolkata
S. K. Gupta	2013-14	Writing a Book
Kolin Paul	2013-14	IIT Bombay

5.5 Number of seminars (education and research separately) given by the faculty

(i) in the department: 10

(ii) in other departments: 5

(iii) at other institutions: about 125

5.1 No. of faculty/researchers/scholars invited by the department for giving

(i) Seminars: 95

(ii) spending at least a week in the department: 35

5.2 No. of faculty/researchers who visited the department on their initiative for giving (i) seminars, (ii) spending at least a week in the department.

Year	No of Visitors
2009	49
2010	47
2011	30
2012	41

2013	46

5.3 Adequacy of research infrastructure.

In the last two decades, the faculty profile has changed significantly in terms of focus areas and nature of research. While it was primarily theory oriented in the early year of the department, (except the VLSI group) there is a clear move towards application areas. This is consistent with the changing trends in the rapidly evolving area of CS and IT. The current research groups in the department likeNetworks, Graphics and Vision, Systems, Security and Data Analytics,Visualizationare looking to expand the scope of their work that require more laboratory for individual research group students.

Although the basic research equipment is limited to computers, servers, storage and network equipment, it is a challenge to keep them functional and upgraded. There is a clear need for more laboratory space, space for research students, including Masters students.

By current estimates and near-future requirements, we need to increase our laboratory space by at least a factor two.

Further, in areas that are interdisciplinary like medical imaging, and visualization, it would help immensely to have inhouse prototype equipments like MRI, CT scanners as well as 3D scanners. In addition to the costs, it will also require additional space

5.4 Adequacy of technical staff – existing numbers and competency areas; competency areas in which there is a shortage.

5.5

Both in numbers and quality, we face one of the greatest challenges in hiring and retaining technical staff. Anyone even with competence in the areas of CS and IT command much more lucrative terms of employment in the industry and therefore are not motivated to work in our labs at afraction of the market salaries. Our first generation of lab technicianswere mostly untrained in CS and despite our best efforts, were notable to contribute that much technically (barring 1 or 2 exceptions). We are now facing a crisis situation as many of them are on the verge of superannuationand it will be hard to recruit competent technicians.One of the major challenges has been to provide system administrationsupport to the department and it is only due to some extraordinary efforts of some faculty and student volunteers that we have been able to function succesfully.

5.6 Work space available for (a) Masters students, (b) Ph.D. students, (c) project staff, (d) post doctoral scholars.

Masters students and project staff: They are provided space in the respective labs

PhD students: besides some space in the respective labs, there is a dedicated PhD scholar room.

5.7 No. of national conference/workshops/seminars attended by PhD students (*total and per student for 5 years*).

(Information for 39 PhD students)

Total attended: 68

5.8 No. of international overseas conference/workshops/seminars attended by PhD students (*total and per student for 5 years*).

Total attended:30

5.9 No. of students who have continued to Ph.D. (i) in same dept., (ii) other departments of IITD, (iii) in India, and (iv) abroad (separately for M.Tech. and B.Tech. students).

In same department : 13

Joined from other departments of II in CSE: 5

5.10 No. of projects with co-guide from industry

5.11 No. of students who have spend time in industry as part of thesis/project work (give number and duration).

S.No.	Name	Time Spent in Industry for Thesis/Project
1.	B. Sharat chandra Varma	6 Months at IRISA/INRIA Rennes, France (Research Institute)
2.	Namita Sharma	IMEC Belgium (7 months)
3.	Sandeep Chandran	6 months at Freescale Semiconductors, Noida
4.	Amit Ruhela	5 Weeks in NICTA, Australia
5.	Dipanjan Chakraborty	12 weeks intern at Microsoft Research India Labs, Bangalore
6.	Chinmay Narayan	3 months at MPI Kaiserslautern

5.12 Self assessment reports of the department/centers/schools if any.

5.13 Placement of M.Tech. and PhD graduates in technical careers (*as per format at Annexure-5*).

Placement data is attached as a separate document.

5.14 Inter-disciplinary work -: (i) joint thesis guidance by faculty across groups within a department, or across departments/centres, (ii) Proposals submitted and funded – PI-CoPI and their group/department affiliations.

Name of Student	List of supervisors
Tarun Beri	Subofh Kumar and Subodh Kuansal
Neeraj Goel	Preeti Panda and Anshul Kumar
V.N. Muralidhara	Sandeep Sen and Naveen Garg

Arindam Pal	Amit Kumar and Naveen Garg
S. Anand	Amit Kumar and Naveen Garg
Syamantak Das	Amit Kumar and Naveen Garg
Anamitra RoyChoudhury	Amit Kumar and Naveen Garg
Jatin Batra	Amit Kumar and Naveen Garg
Arvind Mahla (Internet Meaure	Aaditeshwar Seth and Vinay Ribeiro
Aparna Moitra (Impact framew voice based social media)	Aaditeshwar Seth and Archana Kumar (Lady Irwin College)
Anup Kumar Bhattacharya	Ragesh Jaiswal Jaiswal, Sandeep Sen
Gayathri Ananthanarayanan	M. Balakrishnan and Smruti Sarangi
Sandeep Chandran	Preeti R. Panda and Smruti Sarangi
L. Rajyalakshmi	B. N. Jain and Vinay Ribeiro
Muralidhara V.	Sandeep Sen, Naveen Garg
Manoj Gupta	Sandeep Sen, S. Baswana (IIT Kanpur)
MansurehShahraki	M. Balakrishnan and Kolin Paul
Arun Parekh	M. Balakrishnan and Kolin Paul
Sharat Chandra Varma	M. Balakrishnan and Kolin Paul
Rajeswari	M. Balakrishnan and Kolin Paul
AryabarttaSahu	M. Balakrishnan and Preeti Panda
AnupGangwar	M. Balakrishnan and Anshul Kumar
BasantDiwedi	M. Balakrishnan and Anshul Kumar
RajeshwariBanakar	M. Balakrishnan and R. Bose(EE)
Manoj Kr. Jain	M. Balakrishnan and Anshul Kumar
A.R. Naseer	M. Balakrishnan and Anshul Kumar
AtulVarshneya	B.B. Madan and M. Balakrishnan
PiyushChanana	PVM Rao (outside dept.) and M. Balakrishnan
Lava Bhargava	M. Balakrishnan and R. Bose(EE)
Sonali Chauhan	M. Balakrishnan and R. Bose(EE)
Chetan Arora	S N Maheshwari, Subhashis Banerjee and Prem Kalra
Brojeshwar Bhowmick	Subhashis Banerjee, Prem Kalra and Venu Govindu (EE, IISc)

6. Outreach / External stakeholder engagement

6.1 Educational

(a) Workshops/Short term courses – topical research for disseminating research of IITD.

Name of the workshop	Duration	Any other details
School on Approximability	Jan 5-9, 2011	Organised jointly with MSR Bangalore at IISC Bangalore
Workshop on Geometric Computing	Nov 12-14, 2010	Together with Pankaj Agarwal (Duke U.) at IIT Delhi
Workshop on rapidly deployable mesh networks	April 2010	
Workshop on Geometric Computing	Nov 12-14 2010	IMPECS activity (15 Int'l researchers)

(b) Workshops/Short term courses – educational methods (teaching, learning resources, pedagogy).

Name of the workshop	Faculty Involved	Any other details
Breakthroughs in Theoretical Computer Science	Amit Kumar	IIT Mumbai, Dec 15-16, 2011
Breakthroughs in Theoretical Computer Science	Amit Kumar	IIT Guwahati, Dec 10-11, 2013
School on Geometric Computing	Naveen Garg, Sandeep Sen, Pankaj Agarwal(Duke)	IIT Delhi, Oct 1-4, 2010
School on Advanced Algorithms	Naveen Garg, Atul Gupta(IIIT Jabalpur)	June 11-14, 2013
Workshop on Algorithms	Ragesh Jaiswal	IIT Delhi, 2011
Teaching Computer Graphics	Subodh Kumar	2012
Summer School on Computer Graphics	Subodh Kumar	2007-12

(c) Learning, research material on the website.

For many post-graduate courses, lecture notes and other research material is available on the respective faculty member's web-site.

(d) Science & technology for public information – on website.

ASSISTECH website: assistive devices for the visually impaired (http://assistech.iitd.ac.in/)

(e) Courses taught to students of other IITs/NITs/Other institutions.

Course Title	Name of Institution	Time period	Faculty Involved
Projective geometry for compu vision	IIT Kanpur	March 2010	Subhashis Banerjee
Network flows and Matchings	IIIT Jabalpur	26-30 Mar 2010	Naveen Garg
NP-completeness and Approximation Algorithms	IIIT Jabalpur	24-27 Sept 2010	Naveen Garg
Graph Algorithms	IIIT Jabalpur	1-4 Feb 2013	Naveen Garg
Computer Architecture	IIT Ropar	Fall 2011 and Fall 2012	Smruti Sarangi
Computer Architecture	IIT Ropar	2009	Kolin Paul
Randomized techniques in Computational Geometry	ISI Kolkata	Jan-Feb, 2012	Sandeep Sen
Digital System Design	Addis Ababa University (video link)	2010-2012	M. Balakrishnan
Reconfigurable Computing	Addis Ababa University (video link)	2010	Kolin Paul
Operating Systems	Addis Ababa University (video link)	2011	Kolin Paul
Advanced Computer Architecture	Addis Ababa University (video link)	2012	Kolin Paul
Digital System Design	KTH Stockholm	2010	Kolin Paul
Data-structures and algorithms	Addis Ababa University (video link)	2010-2012	Amit Kumar

(f) Courses taught via NKN.

Course Title	Name of Institution	Time period	Faculty Involved
Computer Architecture	IIT Ropar	Fall 2011 and Fall 2012	Smruti Sarangi

(g) Courses developed for NPTEL (last 5 years).

Course Title	Semester in which developed this course	Faculty Involved
Data Structures	II, 2004-05	Naveen Garg
Operating Systems	II, 2013-14 (ongoing)	Sorav Bansal
Computational Geometry	2010-11 Sem I	Sandeep Sen

(h) Books, monographs, study material made available outside IITD.

CSL316 Digital System Design lecture notes (M. Balakrishnan)
Low power design notes (M. Balakrishnan)
Lecture notes on Introduction to Computer Science, Subhashis Banerjee and S. Arun-Kumar.

(i) Experiments developed and made available to other institutions.

FPGA course experiment developed under the virtual lab programme

(j) Seminars live/via NKN, web to other institutions in India/abroad

Two online seminar series courses are taught regularly over the past 4 years by the department.

- Module in Multimedia Communication
- Module in Intelligent Information Processing

(k) Reach out to schools, NCERT, KVs, etc. (e.g. K-12 programmes).

Details of the work	Name of School/Institution	Time period and faculty involved
Seminar on "Match making"	Home Bhabha Center for Science Education, Mumbai	22 Dec 2013 (Naveen Garg)
Seminar on "What is Computer science all about?"	DST Inspire Camp at IIT Delhi organized by R.K. Sharma (Maths)	28 Dec 2012 (Naveen Garg)
Delivered the 2nd Golden Jubilee Lecture at NCERT	NCERT	27 May 2011 (Amitabha Bagchi)

Lecture in INSPIRE CAMP	Organized in JNU for KV Students	Feb 2014

(l) Mentoring of other institutions, e.g. new IITs, NITs, universities, etc. including faculty mentoring, curriculum development, laboratory development, etc.

Details of mentoring	Name of institution	Faculty Involved
Curriculum Development, Senate Member	NIT, Goa	S K Gupta
Advising on faculty recruitment	IIT Ropar CSE	Sandeep Sen (2009- present)
Advising	IIIT Delhi	M Balakrishnan (2009-13)
Lab & Curriculum Development	IIT Ropar	Multiple faculty from CSE

6.2 Industry collaboration

(a) No. of students (Ph.D./Masters) directly linked to industry funded projects: 55

(b) No. of industry staff/engineers who have taken a regular course(s) for entire semester: 14

(c) Technology transfer to companies, entrepreneurs, local and other governments/government agencies, NGOs (separately).

Details of technology	Name of company/agency	Faculty Involved
Online certificate verification system	Kritikal solutions	Vinay Ribeiro
Refreshable Braille Cell	Phoenix Medical Systems, Che	M. Balakrishnan
Smartcane	Phoenix Medical Systems, Che	M. Balakrishnan
INCODE board	VPL, Delhi	M. Balakrishnan

(d) Continuing education/courses for industry.
Many courses to Cadence, Synopsis, Mentor Graphics.

(e) Faculty secondment to industry.
None

(f) Research projects undertaken with industry as partner.

Name of project	Name of company	Time period	Faculty Name
RP02672	Netapp India Pvt. Ltd.	Jan 1 2013, June 2014	Smruti Sarangi Sorav Bansal
Affordable Refreshable Braille Displays based on Shape Memory Actuation	Saksham Trust, Phoenix Medical, KritiKal Solutions	Apr. 2014 – Mar. 2016	M Balakrishnan PVM Rao Kolin Paul
SIP Based Multiagent Systems	Avaya Labs	June 2010-2012	Sanjiva Prasad Huzur Saran Aaaditeshwar Seth
LTE Small Cells	Cisco	June 2011-ongoing	Vinay Ribeiro Huzur Saran
Computer Graphics	Samsung	2011	Subodh Kumar
Computer Graphics	Adobe	2011, 2012	Subodh Kumar

(g) Laboratories, equipment, etc. provided by industry for use in UG / PG teaching laboratories and student projects.

Two rack servers, several smartphones and netbooks.
INCODE board (transferred to VPL, Delhi in early 1998-99)

(h) Seminars/workshops held with industry by the department.

6.3 Professional

(a) Service as Board, Senate, selection committee member at other IITs, NITs, and Universities.

Nature of service	Name of Institution	Faculty Involved
Selection committee Dec 2009	IIIT Jabalpur	Naveen Garg
Selection committee Nov 2011	BITS Pilani	Naveen Garg
Selection committee Nov 2011	IMSc Chennai	Naveen Garg
Selection committee Oct 2012	IIT Kanpur	Naveen Garg
Selection committee March 2013	IIT Ropar	Naveen Garg
Selection committee	IIIT Jabalpur	Naveen Garg

July 2013		
Selection committee Sept 2013	NIT Surathkal	Naveen Garg
Faculty Selection committee member May 2012	NIT Jaipur	Saroj Kaushik
RDC meeting March 2012	UPTU, Lucknow	Saroj Kaushik
Senate member Since 2010	NIT Hamirpur	Saroj Kaushik
Member of BOS (Board of Studies) 2010-12	School of IT, GGSIP Uinv.	Saroj Kaushik
Member of RDC Since 2009	UPTU, Lucknow	Saroj Kaushik
BOS meeting Aug 2011	School of IT, GGSIP Uinv	Saroj Kaushik
Expert member of Faculty selection committee Jan 2012	NIT Hamirpur	Saroj Kaushik
Member of evaluation of performance and academic attainment Aug 2011	G B Pant Engg. College	Saroj Kaushik
Faculty Selection committee member Sept. 2011	Guru Nanak Dev University Amritsar	Saroj Kaushik
Member of Expert Committee to interview candidates for Mexican Govt scholarship 2012 for Ph.D Sept 2011	Dept of Higher Education, MHRD	Saroj Kaushik
Chief guest for ISTE student Chapter & ACSIS event Oct 2011	BNM Institute of Technology, Banglore	Saroj Kaushik
Invited Lecture on Soft Computing Oct 2011	BNM Institute of Technology, Banglore	Saroj Kaushik
Conducting Ph. D viva Oct 2011	IIT Roorkee	Saroj Kaushik
Senate Member	NIT, Goa	S K Gupta
Senate Member	NIT Goa	Sanjiva Prasad
Adjunct Professor	ISI Kolkata	Sandeep Sen

Since 2013		
Selection Committees	IISc Bangalore, IIT Hyderabad, ISI Kolkata, IIT Ropar, IIT Mandi, IIIT Jabalpur, Tejpur University	Sandeep Sen
Selection committees	IIT Bombay, IIT Kharagpur, IIT Madras, IIT Guwahati, IIT Rajasthan, IIT Indore, IIT Ropar, IIT Patna, IIT Mandi; BITS Pilani, Hyderabad and Goa, IISc Bangalore; BHU; Delhi Univ.; ISI Kolkata; IIIT Delhi	Subhashis Banerjee
Selection Committees	IIT Hyderabad, IIT Bombay, IIT Guwahati, BITS Pilani, JNU, Univ of Hyderabad, CU Himachal, DEI	Huzur Saran
Selection Committees	IISc Bangalore, JNU, IIT Hyderabad, NIT Goa	Sanjiva Prasad
Selection Committees	IIT Guwahati, BITS Pilani, DEI, IIT Ropar, IIT Jodhpur, IIT Hyderabad	Prem Kalra
Board Member Since 2005	NSIT Delhi	M Balakrishnan
Alumni Advisory Committee, since 2011	BITS Pilani	M Balakrishnan
Academic Council Since 2009	IIIT Delhi	M Balakrishnan
Selection committee Multiple times	JNU	M Balakrishnan
Selection committee Multiple times	IIT Guwahati	M Balakrishnan
Selection committee Multiple times	IIT Bombay	M Balakrishnan
Selection committee Multiple times	IIT Kanpur	M Balakrishnan
Selection committee Multiple times	IIT Kharagpur	M Balakrishnan
Selection committee Multiple times	IISc Bangalore	M Balakrishnan
Selection committee Multiple times	IIIT Jabalpur	M Balakrishnan
Selection committee 2013	NIT Delhi	M Balakrishnan

(b) Service as Ph.D. thesis examiner at other institutions.

Thesis details	Name of Institution	Faculty Involved

Meghana Nasre (2011)	IISc Bangalore	Naveen Garg
Sreyash Kenkre (2009)	IIT Bombay	Naveen Garg
Multiple MS, PHD Thesis	IIT, Mumbai IIT, Madras Thapar University Tezpur University JNU Hyderabad University Jadavpur University	S K Gupta
An Energy and Spectrum Efficie Distributed Scheduling Scheme Wireless Mesh Networks: Kanthi Vijayalan (2013)	University of Melbourne, Australia	Vinay Ribeiro
Multiple MS, PHD Thesis	IISC IIT Bombay IIT Madras	Huzur Saran
Bayesian network inference (2011)	McGill University, Canada	Vinay Ribeiro
4 theses	IIT Kharagpur, IIT Bombay, BVB CET, Hubli	M Balakrishnan
Several theses (over 15)	IIT Bombay, IIT Madras, IIT Kharagpur, IISc, Jadavpur University	Subhashis Banerjee
Memory Optimizations for Time-Predictable Embedded Software, Vivy Suhendra	National University of Singapore	Preeti Panda
Optimization techniques for heterogeneous acceleration systems, Nadav Rotem	University of Haifa	Preeti Panda
Improving last-level cache performance in single and multi-core processors, R. Manikantan	IISc	Preeti Panda
VLSI architectures for image reconstruction of cone beam CT and affine transform based visualization, Pradyut Kumar Biswal	IIT Kharagpur	Preeti Panda
New multiprocessor scheduling techniques for dynam graphs, Pravanjan Chaudhury	IIT Kharagpur	Preeti Panda
Hardware-software design methods for security and reliability of MPSoCs, Krutartha	University of New South W	Preeti Panda
Power effective policies for dynamic power management in embedded systems, V. Lakshmi	Anna University	Preeti Panda

Prabha		
Computatation Displays	IIIT Hyderabad	Subodh Kumar

(c) Service as technical expert on committees – MHRD, DST, DSIR, DRDO, Pan-IIT initiatives, other ministries, state and local governments.

Name of committee	Time period	Faculty Involved
Techical expert for Central pollution control board	2011 - 12	Vinay Ribeiro
Project steering and review committee for 3 projects (DeitY)	2013 - 14	Vinay Ribeiro
DST Inspire Faculty Fellowship	01/08/11	Sandeep Sen
Member NKN High Level Committee & NKN Technical Advisory Committee	Since 2013	Huzur Saran
Project steering and review committe (Deity)	2008 -- currently	Amitabha Bagchi
Member, Research Advisory Council, CEERI, Pilani (CSIR labo	Since 2010	M. Balakrishnan
Member CCBT Working Group, DIETY. Member Internet Giovernance Wo Group, DIETY Chairman of Multiple PSRG	Since 2008	Huzur Saran
Member, Industrial Applications Working Group, MCIT, Govt. of India	Since 2010	M. Balakrishnan
Member, Microelectronics Working Group, MCIT, Govt. of India	Since 2010	M. Balakrishnan
Ministry of Social Justice, Committees for awards as well as research scholar selections		M. Balakrishnan
Chairman/member PRSG DIT projects at CDAC Kolkata, IIIT Delhi, Jadavpur University, IIT Madras	Since 2010	Subhashis Banerjee
Member Project Advisory and	2010-2012	Subhashis Banerjee

Monitoring Committee (PAMC) of the DST sub-programme on GeoICT: An Integrated Research Programme on multi-dimensional Geo-spatial Data Modeling, Analysis and Applications.		

(d) Technical expert on policy, regulatory, laws, standards committees.

Name of committee	Faculty Involved	Other details
Standards Committee, ISI	S K Gupta	

(e) Member of Board/Advisory Board of public and private sector corporations.

Faculty Involved	Other details
Naveen Garg	Microsoft Research Technical Advisory Board (2013-15)
M Balakrishnan	Director (Non-executive) 2009-2013
M Balakrishnan	Director (Non-executive), ITI 2009-13
Amitabha Bagchi	Advisory board of Guitarstreet Inc.

Positions (e.g. Director, Vice Chancellor, etc.) held by faculty on lien.

6.4 Contribution to national development goals

(a) Projects undertaken and their outcome.

(i) SPARC: Spectrum Aware rural connectivity To assist govt. with TV white space spectrum policy (ongoing), faculty involved: Vinay Ribeiro, Huzur Saran

(ii) There has been a major expansion of technical education but most of the faculty joining these new Institutions though expected to do PhD for career growth but has no exposure to quality research. With a view to address this, M Balakrishnan took initiative to introduce the summer faculty research fellowship programme that enables teachers from different colleges to spend time in summer associated with the faculty in the domain of their research interest. Started in summer of 2008, at present IIT Delhi hosts nearly 150 faculty members each year

and a significant fraction of them start their research at IIT Delhi or elsewhere soon after that.

(b) Policy inputs – implications, visible impact on society.

a. Institute Open House: On projecting the Institute research, an Open House on the fourth Saturday of April for public demonstration of research projects, a PG website listing major achievements of our PG students (www.iitd.ac.in/pg), international conference participation as well as thesis presentations Institute wide. Working with industry sponsors as well as alumni donors for strengthening the PG programmes and give it higher visibility. As part of this initiative, started celebration of National Science day (28th Feb.) as a research Scholars day where selected PhD students from different departments, present their work in a poster session as well as seminars.
b. Professional Candidate Registration: Towards the same end with a view to creating a unique space for IIT Delhi among the NCR (National Capital Region) industries, a professional candidate registration scheme which permits engineers from industries to register for regular courses in the Institute to upgrade their knowledge and skills has been started. To encourage participation eliminating travel time, a few select courses were also being taken to industry sites through video conferencing.

(c) Entrepreneurship development.

Details of entrepreneurship	Faculty Involved
Started a startup with two old students Appin Security solutions	S K Gupta
KritiKal Solutions Pvt. Ltd (2002) – First student-faculty led TBIU unit	M Balakrishnan Subhashis Bannerjee
KritiKal SecureScan (2006)	M Balakrishnan, Subhashis Bannerjee

6.5 Alumni engagement

(a) Regular interactions / engagement with alumni and outcomes.

Many Alumni meetings, PANIITs, faculty participated in many panel discussions organized by Alumni. Many Alumni also visit the department and Give lectures, Interact with students and have also assisted with student internships in their organization.

(b) Contributions from alumni.

Many Alumni also visit the department and Give lectures, Interact with students and have also assisted with student internships in their organization.

6.6 Recognitions and Awards

(a) Awards to faculty.

Name of award	Year	Faculty Name

INSA Medal for Young Scientist	2011	Amit Kumar
Teaching Excellence Award	2012	Naveen Garg
IIT Delhi Teaching Excellence Award	2012	Sorav Bansal
NetApp Faculty Fellowship	2012-13	Sorav Bansal
IBM Shared University Research Award	2011	Sorav Bansal
IBM Faculty Award	2013	Sorav Bansal
Outstanding Young Faculty Fellowship	2011-12	Ragesh Jaiswal
AICTE Career Award	1998-99	Sandeep Sen
IBM Faculty Award	2001, 2002	Sandeep Sen
IIT Delhi Teaching Excellence Award	2011	Subhashis Banerjee
IIT Delhi Teaching Excellence Award	2012	Amitabha Bagchi
Yahoo! Faculty Researc Engagement Award	2013	Amitabha Bagchi
IIT Delhi Teaching Excellence Award	2012	S. Arun-Kumar
Yahoo! Faculty Researc Engagement Award	2013	Maya Ramanath
IBM Faculty Award	2008	Preeti Panda

(b) Fellows of academies, INAE, etc.

Name of academy	Year	Faculty
Indian Academy of Science	2014	Naveen Garg
Indian Academy of Sciences	2007	Sandeep Sen
Indian National Science Academy	2012	Sandeep Sen
Mentor Award, IIT Delhi	2010	M Balakrishnan

Vasvik Award	2008	M Balakrishnan
TODAES 2007 Best paper Award	2007	M Balakrishnan
Konrad Zuse fellow, DAAD, Germany	1994	M Balakrishnan
NRDC invention award	1982	M Balakrishnan

7. Governance

7.1 Governance

(a) Organization structure – their autonomy/ terms of reference

Details of committees and responsibilities are given in (f).

(b) Planning documents developed by the department – space, faculty, staff related.

Space related planning document is attached.

(c) Records of discussions within the department – internal documents (meeting minutes, position papers, discussion papers, concept papers, etc.)

Minutes of all DRC meetings and DFB meetings are kept in the department office.

(d) Physical resources – percentage utilization for UG PG core and electives teaching separately, UG and PG student projects, Ph.D. student research. Projections for future.

(e) Financial resources – (i) funds provided to the department, (ii) processes of distribution, (iii) funding for focus areas, (iv) funding for UG and PG core teaching laboratories. Outcomes of funds utilization. Changes in funding pattern and funds utilization, and effects on departmental strategy.

(f) Delegation of decision making within department/centre. List the processes and structures for financial and academic management, and the methodology for their review.

Various committees in the department are as follows.

Name of Committee	Faculty Members
DRC (Department Representative Committee)	Naveen Garg (Chairman), Preeti Panda, Sanjiva Prasad, Sandeep Sen, Amit Kumar, Huzur Saran, Ragesh Jaiswal
Department Nominees on Board for Academic Programme	Amit Kumar, Preeti Panda
1st Year Student Advising Committee	Sandeep Sen, Subodh Kumar, Amitabha Bagchi, Prem Kalra

2nd Year Student Advising Committee	Naveen Garg, Ragesh Jaiswal, Smruti Sarangi, Aaditeshwar Seth
3rd Year Student Advising Committee	S. K. Gupta, Maya Ramanath, Sorav Bansal, M. Balakrishnan
4th Year Student Advising Committee	S. Arun Kumar, Amit Kumar, Saroj Kaushik, Subhashis Banerjee
Dual degree and other previous entry batches advisign committee	Anshul Kumar, Parag Singla, Huzur Saran, Kolin Paul
Special Advising for Weak students committee	Vinay Ribeiro, Sanjiva Prasad

Coordinators/In-charge for various activities/labs are as follows:

Activity	Faculty in-charge
Dual degree Coordinator	Amit Kumar
M.Tech. Coordinator	Amit Kumar
Time table in-charge	Vinay Ribiero
ACL, Department Library	Amitabha Bagchi
Training/Placement	Saroj Kaushik
Computer Use	Maya Ramanath
Stores and Purchase	Anshul Kumar
Building and Safety	Sandeep Sen, Sanjiva Prasad
System Admin.	Sorav Bansal
Web-page	Aaditeshwar Seth
Department Publicity	Amitabha Bagchi, Maya Ramanath
Invigilation duty	Ragesh Jaiswal
TA assignment	Ragesh Jaiswal
Seminar	Parag Single
Faculty Affairs	Vinay Ribiero
CAIC	Smruti Sarangi

7.2 Department management and operations

(a) Organization structure - mandates, flexibility, etc.

Constitution of various committees and delegation of responsibilities is given under heading 7.1 (f)

(b) Processes for curriculum planning.

The Departmental DRC and DFB are responsible for Curriculum planning. Each PhD candidate is guided by a duly constituted SRC.

(c) Processes and methods for teaching resources management.

This is done in a centralized manner for all the departments. We send requests for special equipment, classroom size etc. and the actual allocation is done centrally.

(d) Guest faculty, affiliation for teaching core, elective UG & PG courses.

In specialized areas suitable guest faculty are invited to teach a course after proper approvals and recommendation from Professorial Committee. Recent courses taught have been by Dr Prasoon Tiwari on Financial Algorithms and Dr S.C. Gupta (NIC) on Software Engineering.

(e) Faculty short-listing criteria.

Shortlisting criteria as approved by the professorial committee for faculty appointments is based on the institute shortlisting criteria with some additions as under:

i) The total minimum number of publications is same as specified by Institute. However the publications to be counted must be in the area of computer science as assessed by the Professorial Committee
ii) The minimum number of reputed publications is the same as the Institute specified criteria. However, only those publications that appear in the list of reputed journals and conferences compiled by the department qualify under the category (the list is attached as a separate document).
iii) Any new faculty applicant should have at least two CS relevant papers in the last three years.
iv) The applicant must have a B.E./B.Tech degree or M.Tech/MS degree in Computer Science or should have demonstrated ability to teach core CS courses.
v) Post Ph.D. Experience criterion may be relaxed upto 1 year and Age criteria (where applicable) may be relaxed upto 3 years for exceptional candidates.

(f) How collectiveness of the faculty has enhanced academic output and enhanced quality, etc.

(g) Nature, quantum and quality of support from of secretarial staff, stores and inventory management, purchases, ambience, etc.

7.3 Faculty

(a) Faculty profile, and a critique of the same.

Name	PhD Institution	Research Area
Huzur Saran	UC Berkeley	High Speed Networks, Graph Theory, Algorithms
M. Balakrishnan	IIT Delhi	CAD of VLSI, Computer Architecture
Subhashis Banerjee	IISc Bangalore	Computer Vision, Real Time Systems
K. K. Biswas	IIT Delhi	Computer Vision, Artificial Intelligence
Naveen Garg	IIT Delhi	Algorithms, Optimization
S. K. Gupta	IIT Delhi	Graph Theory, Computer Vision, Databases
B. N. Jain	Stony Brook	Computer Networks, Information Systems, Multimedia Commumincations
Pankaj Jalote	Univ. of Illinois, Urbana Champaign	Software Engineering, fault tolerance, distributed systems
Prem Kalra	EPFL, Switzerland	Computer graphics, 3D animation
Saroj Kaushik	IIT Delhi	Natural Language Processing, Artificial Intelligence, Knowledge Based Systems.
Anshul Kumar	IIT Delhi	CAD of VLSI, Computer Architecture.
S. Arun Kumar	TIFR, Bombay	Semantics and verification
S. N. Maheshwari	Northwestern	Algorithms, Parallel Processing, Information Systems.
Preeti Ranjan Pan	UC Irvine	Embedded Systems Design, Memory Synthesis and Optimization
Sanjiva Prasad	Stony Brook	Programming Languages, Concurrency, Semantics
Sandeep Sen	Duke	Algorithms, Computational Geometry

Amit Kumar	Cornell	Algorithms, Network Design.
Subodh Kumar	UNC,Chapel Hill	Computer Graphics, Virtual Reality, Visualization, Geometry Modelling.
Kolin Paul	REC, Kolkata	Reconfigurable Computing, Embedded Systems
Amitabha Bagchi	Johns Hopkins	Algorithms, Data Structures, Theory of Networks
Sorav Bansal	Stanford	System Security, Cloud Computing.
Ragesh Jaiswal	UC San Diego	Complexity, Randomized Algorithms, Cryptography
Maya Ramanath	IISc., Bangalore	Databases, Information Retrieval
Vinay Ribeiro	Rice University	Computer Networks
Smruti Ranjan Sarangi	UIUC	Architecture, CAD
Aaditeshwar Seth	Waterloo	Computer Networks, ICTD, Social Networks
Alfeiya Hussain (visiting)	Univ. of South California	Computer Networks.
Manik Verma (adjunct)	Oxford	Computer Vision, Machine Learning.

(b) Diversity in faculty profile by: (i) gender, (ii) category, (iii) region, (iv) Ph.D. institution, (v) post-doctoral institutions worked in, (v) organizations/industry worked in, (vi) employment prior to joining the department.

Amit Kumar

Title	Name of institution	Time Period
PhD student	Cornell University	July '97-July'02
Member of Technical Staff	Bell Laboratories, Murray Hill, New Jersey	July'02-July'03

Naveen Garg

Title	Name of institution	Time Period
Member of Research	Max-Planck-Institut fur Informatik, Germany	Sept 96-Dec 97
Postdoctoral fellow	Max-Planck-Institut fur Informatik, Germany	Sept 94-Aug 96
Research Scholar	IIT Delhi	July 91-Apr 94

A Seth

Title	Name of institution	Time Period
Member of Research	IBM India Research Labs	Oct 2008-Aug 2009

Preeti

Title	Name of institution	Time Period
Staff R&D Engineer	Synopsys, Inc, Mountain View, CA, USA	1998-2002
Software Engineer	Texas Instruments, Bangalore	1990-1993

Sorav Bansal

Title	Name of institution	Time Period
PhD student	Stanford University	2002-2008
R&D Engineer	VMware Inc.	2008-09

Ragesh Jaiswal

Title	Name of institution	Time Period
Post Doctoral Research Scientist	Columbia University, New York, USA	October 2008 to April 2010

Smruti

Title	Name of institution	Time Period

Research Staff Member	IBM India Pvt. Ltd.	November 2007 to Jan 2011
Senior R&D Engineer	Synopsys India Pvt. Ltd.	February 2007 to Oct 2007

Saroj Kaushik

Title	Name of institution	Time Period
Phd	IIT Delhi	1980
Visiting Professor	Dept of CS, at MUM, Fairfield, IOWA, USA	Oct 27 – Nov 20, 2008

Vinay

Title	Name of institution	Time Period
Multiscale queuing theory, network probing and sampling	Rice university	1999-2005
Post doctoral research	Rice university	2005-2006

S Sen

Title	Name of institution	Time Period
Research Associate	IBM Yorktown Heights NY, USA	Jun – Aug 1989
Memb Tech Staff	ATAT Bell Labs, Murray Hill NJ, USA	Jun 1990-Jun 1991

M. Balakrishnan

Visiting Scientist	May '88 - Dec '88	InstitutfuerInformatik, Univ. of Kiel
Assistant Prof.	Sep '87 - May '88	Dept. of ECE, Syracuse Univ.
Research Associate	Sep '85 - Aug '87	Dept. of CIS, Univ. of Guelph
Scientist	May '77 - Aug '85	CARE, IIT Delhi

Parag

Title	Name of institution	Time Period
Post Doctoral Research Scientist	Department of Computer Science. University Texas at Austin, USA	Jan 2010 - Sep 2011

Sanjiva Prasad

Title	Name of institution	Time Period

PhD student (TA+RA)	State University of New York, Stony Brook	Aug 1985-Sep 1990
Computer Scientist	Odyssey Research Associates, Ithaca, New York	Oct 1990-Apr 1992
Researcher	European Computer Industry Research Centre (ECRC Gmbh), Munich, Germany	Jun 1992-Aug 1994
Visiting Lektor	BRICS, Department of Computer Science University of Aarhus, Denmark	August 1998-May 1999

Amitabha Bagchi

Title	Name of institution	Time Period
Doctoral Student	Johns Hopkins University	1996-2002
Associate Specialist	University of California, Irvine	Oct 2002 - Jun 2004
Post Doctoral Research Scientist	Polytechnic University, Brooklyn (now NYU)	July 2004 - June 2005

(c) Procedure for faculty searches.

1. Advertisements are given in newspapers and emails are sent to all well-known CS departments in the world.
2. We try to identify promising candidates who are graduating and approach them. We have also constituted a special committee within the department to look into this matter.

(d) Result of faculty searches – area-wise (as in Annexure IV), number of applicants, short-listed and offered a position, their educational qualifications & experience.

(e) Success in recruitment (data for last 5 years), and offers that the persons had from other IITs/IISc/TIFR.

(f) Faculty lost to other institutions post selection.

(g) Faculty time utilization – in class, in meetings, project management, Ph.D. guidance, Masters project guidance, UG project guidance.

Activity	Time Utilization
Classes (including outside lecture hours)	20%
Project Management	15%
PhD guidance	20%

UG Project guidance	10%
Masters Project guidance	10%
Commitments towards departmental activities (committees, meetings, Conferences etc)	25%

(h) Level of harmony amongst department faculty.

7.4 Students

(a) Criteria for short-listing and selecting students for admission to Master's and Ph.D. programmes of past 5 years.

MTech/M.S.(R) The selection criteria for shortlisting candidates is based on their GPA and GATE scores. The criteria for general category students for last 2 years is follows (suitable relaxations are given to OBC and SC/ST/PH candidates). The GATE criteria is waived for students for CFTI (Centrally Funded Technical Institutions), but we keep a higher cut-off for GPA (8.0).

	Gate Cut-off	GPA/Percentage cutoff
2013	740	60% or 6.75
2012	765	60% or 6.75

PhD The candidates should have a Masters level degree. However, candidates with bachelors degree for CFTI can apply directly. GPA cutoff for general candidates for the year 2013 was 8.5 (or 75%), whereas for students with Bachelors degree from CFTI, the cutoff was 7.5 (or 70%).

(b) Facilities provided to students and their maintenance/management system.

All students have access to email and get enough disk space in dept. labs. They also get access to labs during night and required equipment.

(c) Mentoring seminars/sessions held for Ph.D. students for prospective faculty careers.

8. Benchmarking

8.1 Identify departments/centres within IITD as peers.

Electrical Engineering and Chemical Engineering

8.2 Identify departments/centres/schools/divisions from other IITs, IISc, NITs, private universities as peers, and reasons/criteria there for.

Computer Science and Engg. Dept. at IIT Madras and CSA dept., Indian

Institute of Science. They have similar faculty strength as us.

8.3 Identify departments/centres from institutions in other countries as peers.

8.4

Princeton University (separate CS and EE dept. and faculty strength is similar to us), Hong Kong University of Science and Technology.

8.5 Define parameters for benchmarking

(i) research,

(ii) curriculum - separately for UG, Masters, and Ph.D. programmes,

(iii) teaching-learning processes.

The parameters for each of the 3 categories as as follows:

(1) Departments within IITD as peers: Basic student enrollment parameters, research funding per faculty, PhD enrollment and graduation data including last degree of recent PhD students, recent faculty recruitment profiles, QS rankings, papers and citation information..

	Computer Science & Engg.	Electrical Engineering	Chemical Engineering
Faculty Strength	25	45	25
PhD enrollment per faculty (2010-13)	1.9	4.4	5.1
PhD graduation per faculty (2011-13)	0.4	1.1	0.8
Research Project Funding per faculty in last 5 years (lakhs)	229.06	111.48	80.57
QS 2013 ranking (overall)	72	37	81
Academic Reputation (QS Ranking -2013)	59.4	60.5	62.5
Employer Reputation (QS Ranking-2013)	78.0	83.7	79.2
Citations per paper (QS ranking-2013)	80.4	89.7	66.2
H-index citations (QS ranking 2013)	69.4	82.2	53.1
Numbers of published papers by professors with more than 100 citations	44		12

Closing JEE ranks for undergraduates (general category) admitted in the last 3 years.

	CSE Btech	EE BTech	Chem BTech	CSE Dual	EE Dual	Chem Dual
2013	109	287	1378	217	410	2007
2012	130	270	1244	271	440	1845
2011	116	205	1081	298	488	1706

Details about assistant professors recruited in the recent past.
(i) Dept. of Computer Science and Engineering, IIT Delhi

BTech Institution	MTech/MS Institution	PhD Institution	Post-doc Institution
IIT Delhi	Stanford	Stanford	
IIT Kanpur	Univ. of California, San Diego	Univ. of California, San Diego	Columbia
IIT Madras	Rice University	Rice University	
Bangalore Univ.	IISc	IISc	Max-Planck Institute, Germany
IIT Kharagpur	Univ. of Illinois, Urbana Champaign	Univ. of Illinois, Urbana Champaign	
IIT Kanpur	Univ. of Waterloo	Univ. of Waterloo	
IIT Bombay	Univ. of Washington, Seattle	Univ. of Washington, Seattle	Univ. of Texas, Austin
IIT Delhi	University of Washington, Seattle	University of Washington, Seattle	University of Washington, Seattle

(ii) Dept. of Electrical Engineering, IIT Delhi

BTech Institution	MTech/MS Institution	PhD Institution	Post-doc Institution
Univ. of Madras	IIT Bombay	IIT Bombay	NTU Singapore

IIT Delhi	IIT Delhi	IIT Delhi	
Govt. Engg. College, Pune	VNIT Nagpur	IIT Bombay	
IIT Delhi	North Carolina State Univ.	North Carolina State Univ.	Duke Univ.
Andhra Univ.	Univ. of Tech, Aachen, Germany	Tech. Univ. of Delft, Netherlands	Tech. Univ. of Delft, Netherlands
NSIT, Delhi	Univ. of Florida, Gainseville	Univ. of Florida, Gainsville	
IIT Madras	IIT Madras	IIT Madras	Weizmann Inst., Israel
IIT Kanpur	Caltech	Caltech	
DAVV, Indore	IISc	IISc	IISc
IIT Kanpur	Oxford	Oxford	
IIT Delhi	IIsc	IISc	Linkoping Univ.,Sweden
IIT Kharagpur	IIT Kharagpur	Washington State Univ.	
IIT Bombay	Caltech	Caltech	Caltech
	IIT Bombay	Katholieke University of Leuven, Belgium	

(iii) Dept. of Chemical Engineering, IIT Delhi

BTech Institution	MTech/MS Institution	PhD Institution	Post-doc Institution
IIT Delhi	Univ. of Texas, Austin	Univ. of Texas, Austin	Case Western Reserve Univ.
Jadavpur Univ.	IIT Kanpur	IIT Kanpur	IIT Bombay
M.S. Univ, Baroda	IISc	IISc	Univ. of Leeds, UK
IT BHU	North Carolina State Univ	North Caolina State Univ	Imperial College, London
IIT Delhi	Univ. of Houston, texas	Univ. of Houston, Texas	
	IIT Kanpur	IIT Kanpur	Institute of Chemical and Engg. Sciences,

			Singapore

(2) Departments from other IITs, IIsc, NITs, etc.: Basic student enrollment parameters, PhD enrollment data ,recent faculty recruitment profiles including areas, QS rankings, papers and citation information, new courses and focus areas

	CSE IIT Delhi	CSE IIT Madras	CSA, IISc
Faculty Strength	25	26	28
QS 2013 ranking (overall)	72	103	101
Academic Reputation (QS Ranking -2013)	59.4	59.2	60.3
Employer Reputation (QS Ranking-2013)	78.0	69.9	64.2
Citations per paper (QS ranking-2013)	80.4	72.0	79.9
H-index citations (QS ranking 2013)	69.4	63.3	70.5
Numbers of published papers by professors with more than 100 citations	44	7	46
Number of conference papers published by professors (DBLP data)	481	721	943
Number of journal papers published by professors (DBLP data)	205	453	241

Closing JEE ranks for undergraduates (general category) admitted in the last 3 years.

	CSE BTech IIT Delhi	CSE BTech IIT Madras	CSE Dual IIT Delhi	CSE Dual IIT Madras

2013	109	212	217	470
2012	130	240	271	548
2011	116	263	298	623

Details about assistant professors recruited in the recent past.

(i) Dept. of Computer Science and Engineering, IIT Delhi : data already given above

(ii) Dept. of Computer Science and Engineering, IIT Madras

BTech Institution	MTech/MS Institution	PhD Institution	Post-doc Institution
Univ. of Madras	Louissiani State Univ.	Univ. of California, Irvine	NTU Singapore
Univ. of Madras	University of Texas	University of Texas	
R.E.C. Rourkela	IIT Madras	The Robert Gordon University, U.K.	
R.E.C. Rourkela	IISc	UCLA	
IIT Bombay	IIT Bombay	IISc	
Visvesvaraya National Institute of Technology	IIT Bombay	IISc	University of Texas
Iowa State University	University of California, Santa Barbara	University of California, Santa Barbara	
NIT, Calicut	IMSc	IMSc	
	IMSc	IMSc	

(ii) Dept. of Computer Science and Automation, IISc

BTech Institution	MTech/MS Institution	PhD Institution	Post-doc Institution
St Stephen's	Trinity College	University of Illinois	MIT
MIT	MIT	MIT	Princeton
IIT Madras	IISc	IISc	EURANDOM
		Duke	Max-Planck Institute, Germany

Govt. College of Engg. Pune	IIT Bombay	IIT Bombay	Univ. of Pennsylvania
Govt. College of Tech., Coimbatore	IIT Bombay	Univ. of Wisconsin, Madison	IBM T.J.Watson
Anna Univ.	Purdue	Purdue	
IIT Madras	Ohio State Univ.	Ohio State Univ.	IBM T.J. Watson
Jadavpur Univ.	IIT Kanpur	IIT Kanpur	Max Planck Institute, Germany

(3) Departments outside India:Basic student enrollment parameters, PhD enrollment data, recent faculty recruitment profiles including areas, QS rankings, papers and citation information, UG curriculum comparison

	CSE IIT Delhi	CS Princeton	CS Hong Kong
Faculty Strength	25	35	39
QS 2013 ranking (overall)	72	11	12
Academic Reputation (QS Ranking -2013)	59.4	78.5	74.9
Employer Reputation (QS Ranking-2013)	78.0	79.5	87.3
Citations per paper (QS ranking-2013)	80.4	97.7	92.2
H-index citations (QS ranking 2013)	69.4	91.5	89.8
Numbers of published papers by professors with more than 100 citations	44	692	247
Number of conference papers published by professors (DBLP data)	481	1242	1829
Number of journal papers published by professors (DBLP data)	205	996	1266

8.6 Perform benchmarking and report the analysis/findings for the last 5 (or 10) years.

Benchmarking data is given above.

9. Feedback systems and results

9.1 System for feedback from UG students and its results.

At the end of each course, the students are asked to fill out an online course feedback form. This is mandatory for all students. The feedback form, besides having the usual questions about instructor and course content, allows the course instructor to design specific questions tailored towards a particular course.

9.2 System for feedback from PG, Master's and Ph.D., students, and their outcome.

For courses, the process is same as above. Further, the MTech coordinator and the PhD coordinator meet the students regularly during the semester to address any issues.

9.3 System for feedback from recruiters (i) on-campus, and (b) off-campus - separately for UG and PG graduates; and the results.

9.4 Mechanism of obtaining industry feedback and the findings.

9.5 Alumni feedback mechanism and its outcome.

9.6 Placement records – Ph.D., M.Tech. and B.Tech..

Placement data is attached as a separate document.

10. Vision for next 5-10 years

10.1 Goals and benchmarking for future in relation to (i) curricula, (ii) research, (iii) outreach, and (iv) processes for regular internal assessment.

IITs in general and CSE Department in IIT Delhi in particular has built an excellent global reputation for education especially undergraduate education. This is reflected in the global QS ranking of 72 among all CS&IS programmes. It is important to note that substantial contribution towards this ranking comes from "reputation" among the stakeholders whether it is the other academics, students or employers. Comparatively our ranking in the research parameters is much lower. This document has been worked out with a common underlying objective – focus on higher impact research whether it be academic impact measured in terms of citations or H-factor or societal impact based on know-how and technology transfer resulting in improved perception among all stakeholders. ***Thorough the efforts outlined below, the department would strive to reach a QS ranking of within 50 in the next three years and within 30 in the next six years.***

Faculty is clearly the key to growth in research productivity whether the metric be quantity or quality. We are extremely proud of the success in attracting quality faculty to join the department almost right from its inception – on the other hand we do feel we have not been that successful in building up the numbers. One clear drawback has been a rather reactive approach to faculty recruitment – we promptly try to process the applications that are received and also engage with the applicants but rarely do anything proactive for attracting faculty. A significant step that has been put in place is a faculty search committee with a clear mandate to work towards faculty recruitment. One of the proactive steps that is being considered is identifying areas to expand and either recruit or

publicise interest at area specific major international forums with significant Indian origin research scholar presence. We feel this may also help recruit International faculty which is now part of the mandate for IITs. ***The department would work towards a faculty strength of 32 in the next three years and 40 in the next six years after accounting for superannuation.***

Department has always insisted on a flexible curriculum with emphasis on self-learning and design projects. The overall reduction in course credits as approved in the new curriculum would help in moving towards these goals. The improved standing of our dual degree program is clearly a matter of satisfaction as generally the feeling is that most UG students are looking for a quick exit with an IIT degree to take up careers unelated to their academic training. Unlike in the past, the competition from global palyers is already visible as a number of school graduates who can afford education outside he country are opting out for universities outside. This may get accelerated further once a clear policy for locating foreign universities in India is approved. All of us need to be aware of this challenge if we hope to retain quality students in IITs. ***For effectively meeting these challenges, the department is planning to put in place clear tracks that would not only offer specialization to interested students but also promote entrepreneurship integrated in the programme.***

Apart from faculty the other key component for research is the quality and quantity of PhD students. The challenge in CS has always been the quality of potential applicants because of attractive alternative opportunities available to any student who is planning to stay back in India. Our recent successes in converting our own MTechs who had attractive career options to PhD gives us confidence that we are on the right track. Challenge would be to convince both our dual degree students to join for PhD as well as attracting graduates of other premiere Institutions. Department has often tried programmes like summer internships for reaching out with some limited success. Greater career opportunities in Industrial R&D can also be leveraged for this growth. ***A focused approach we feel would help us reach an average PhD enrollment of 4 per faculty in three years and 5 per faculty in six years.***

Computer Science as well as research in general is going through a major transition. Whereas earlier research publications and the forums they had appeared (impact factors) were solely used for judging the comparative research profile of an entity. Increasingly the expectation is that research, even form universities, should be seen to impact society directly. This happens by research know-how/IP being transferred to industries or through entrepreneurship of recent graduates primarily based on their work in the university. Department has been active on both fronts in the last decade but clearly there is a need to scale up and be more visible. Interestingly major successes here are likely to change the perception of IITs in the society from quality education Institutions to research happening places. At present under the joint banner of the department and School of IT, three major research activities with potential societal impact are in progress. This includes the Graamvani and associated research, affordable assistive technologies for the visually impaired and IT for health care jointly with AIIMS. Additional space that may be available with the new building would definitely help in scaling this. ***The attempt would be promote consolidation of these three activities through research, technology transfer and social entrepreneurship as well as initiation of at least two more activities in the next three years.***

10.2 New areas for research and Masters programme, and industry participation in these.

Machine Learning & AI, Security & Cryptography, Human Computer Interaction & Interactive Computing, High Performance Computing.

10.3 Projections for (i) funded projects, (ii) journal publications.
We would like to have access to 10 crores funding annually for the department.
(ii) 2-3 journal publications per faculty per year in leading venues would add up to about 60-80 per year.

10.4 Projected graduation numbers - Ph.D., M.Tech. and B.Tech.
1 phD/faculty/year or about 20 per year (100 PhDs enrolled at any point. Grow the Masters program to about 100 students (from present 75) and maintain the BTech students at about 100 – 120.

10.5 Projected faculty profile, and areas for recruitment of faculty.
We will continue to seek faculty comparable to top 50 depts globally and hope to recruit about 2–3 per year till we attain 40-45 faculty. The priority areas for recruitment would be Big-data and Analytics, Systems including cloud, Security, HCI, High-performance computing and Software Engineering.

10.6 Projections for future benchmarking (for comparison after 5 years) – institutions in India and abroad, and parameters for future comparison.
We will continue to benchmark against the top CS departments in the country and top 50 departments globally. The parameters will be the quality of undergraduates and graduate students, doctoral thesis, research impact of the faculty.

10.7 Infrastructure and governance - limiting factors that affect achievement of benchmarks and methods to overcome these.
We require larger number of high quality PhD students who will be able to contribute as teaching assistants for the large undergraduate program as well as carry out high quality research. We require senior researchers in form of post-doctoral students who help in sustaining high-quality of research and developmental work. We also need motivated and well trained system administration staff and engineers to help in building prototypes of innovative systems.

10.8 Working with other departments/centers and institutions in teaching and research.
We intend to continue collaboration with our current collaborators like Max-Plank Institute and bi-national partners in areas of mutual interest. We also feel the need to Strengthen collaboration with CS depts. In other IITS, IISc and other leading research institutions.

10.9 Outreach goals and anticipated limitations in the attainment of these.
Would like to make all our courses available on Knowledge network, and integrate our teaching with platforms like MOOCS and also devise testing procedures that scale without necessarily using MCQ framework.

10.10 Mechanisms for effective changes based on feedback received and development and implementation of corrective measures.

10.11 Questions to which the department seeks answers from the Review Committee.

(1) Should we build on our current strengths or should we try to diversify. It is relatively easier to attract a good faculty in our areas of strength. Where is the right tip-over point.

(2) How can we retain our own UG students to continue for Masters and PhD. Retaining even 5-10% could radically change the ecosystem.

(3) How can we motivate IT industry to collaborate on innovative projects.

11. Information in public domain

11.1 Minutes of all meetings.

Minutes of all meetings are kept in the department office, and is available to any interested individual.

11.2 All reports are archived in the central/department/centre libraries.

11.3 Past vision documents, review documents, Standing Review Committee documents.
Curriculum review document for undergraduate and graduate programs are attached.

11.4 Any other documents developed by the department, a group/section of the department/centre.

11.5 Feedback documentation and action taken on the same, and its outcome.

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