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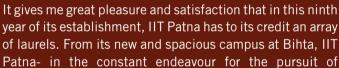
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FROM THE DIRECTOR'S DESK

Dear Friends,





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excellence- has made a progress in academics, sports and cultural activities. The institute believes in all round development of students, and pursues this end with determination. Recent activities pertaining to incubation centre and Technology Business Incubation, and many seminars, workshops and top notch lectures in the institute, have been testimony to the true mettle of an institution of grand stature. Add to these socio-cultural and sportive activities, and one begins to sense the tremendous positive energy and the will to excel on the part of IITP fraternity. From this year IMPULSE- the forum for reporting academic and extra-academic events will assume a different colour and tenor, in showcasing IITP fraternity' talent in creative writing etc.-. As the quote from Charles Darwin goes, "In the long history of humankind (and animal kind, too) those who learned to collaborate and improvise most effectively have prevailed". The synergy and harmony of academics, sports and culture will take the institute to ever greater heights.

I congratulate the editorial team of Impulse for their worthy efforts in the conceptualisation and publication of Impulse and wish IIT Patna a magnificent and triumphant journey.

Prof. Pushpak Bhattacharyya

EDITORIAL

With this issue of the newsletter IMPULSE, we are looking forward to a constructive and joyful academic year 2017. IMPULSE gives us the inspiration and reflects the growth of the institute in all the spheres of an academic environment. The institute has reached new heights in its new Campus and stands tall amongst the best engineering colleges in India. At IITP, all the constructive ideas are welcomed and exhaustively evaluated and implemented through collaborative efforts.

On behalf of the editorial team, I thank our honourable Director, Prof. Pushpak Bhattacharya, faculty members, staff and students for their support in bringing out this newsletter. I wish you to keep supporting us as we strive to continuously improve in all that we do.

With this edition I hope you will explore new thoughts and impetus to make 2017 even more successful for IITP.

I sincerely hope this edition makes for an interesting read!

विदया ददाति विनयं विनयादयाति पात्रताम्।

पात्रत्वाद्धनमाप्नोति धनाद्धर्मं ततः सुखम् ॥

(True/complete) knowledge gives discipline, from discipline comes worthiness, from worthiness one gets wealth, from wealth (one does) good deeds, from that (comes) joy.

Dr. Priyanka Tripathi

School of Humanities and Social Sciences



IIT PATNA-Institute Song

विश्व का मुकुटमणि आई आई टी पटना सदा तत्पर सदा जाग्रत पीछे ना जाने हटना।।

दो हजार आठ छह अगस्त को जग ने कहा, "जी बधाई हो शिक्षा नभ का ध्रव तारा आई आई टी पटना।।"

नालंदा, विक्रमशिला जिस धरती की रही माला उस बिहार का और एक समन आई आई टी पटना।।

चाणक्याशोक, चंद्रगुप्त महावीर और तथागत आर्यभट्ट आशीष धन्य आई आई टी पटना।।

Jewel in world's crown in IIT Patna
Ever active ever awake, knows never to step back
Two thousand eight sixth august
World said, "heartiest congrats
New star in education's sky-IIT patna"
Nalanda, Vikramshila
Land of Bihar they adorn
Has another flower bloomed-IIT Patna
Chaanakya, Ashok, Chandragupt
By Mahavir Tathagat
By Aryabhatta is blessed IIT Patna

विज्ञान, तकनिकी अंकशास्त्र, मानविकी सर्व शास्त्र पारंगत आई आई टी पटना।।

हम ने ले ली यह प्रतिज्ञा ईश्वर की भी यही आज्ञा होगा चरम प्रतिष्ठा पर आई आई टी पटना सदा तत्पर सदा जाग्रत पीछे ना जाने हटना विश्व का मुक्टमणि आई आई टी पटना।।

-पृष्पक भट्टाचार्य

Science and Technology
Mathematics, Humanities
Cultivated in all discipline is IIT Patna
This Promise we do make
Loar God too wills alike
On glory's peak will be IIT Patna
Ever active ever awake, knows never to step back
Jewel in world's crown is IIT Patna

-Pushpak Bhattacharyya

Musical Notation Pushpak Bhattacharyya

- Vikrit, i.e., komal for rishav (2nd note), gandhar (3rd), dhaivat (6th) and nishad (7th) and tivra for madhyam (4th Note) are shown with capital letter; shuddha notes are always in small letters
- Mandra saptak notes are shown with lower suffix of 1, e.g., mandra saptak komal dhaivat is Da1
- Taar saptak notes are shown with upper dash, e.g., taar saptak koma rishav is Re'
- Raag-bhairav
- Notes: saa, Re(komal), ga, ma, pa, Dha (Komal), ni
- Pakad (characteristic phrase): Dha pa, ga ma Re saa
- Taal-rupak (7 maatraas)

ti ti naa l dhi naa l dhi naa

(capital S is called avagraha and indicates continuation of note)

https://iitp.ac.in/index.php/the-institute/mp3-institute-song.html



CONVOCATION 2016

The 4th Annual Convocation was held on 5th August 2016. Prof. P. Balaram, Padma Bhushan and former Director, Indian Institute of Science, Bangalore was the chief guest of the function. In this convocation, 25 students received the Ph.D. degree, 80 students received the M.Tech. degree, and 117 students received B. Tech. [EE-38, ME-34, CSE-45] degree. Various medals and awards were also given to the selected students.

Mr. Shubham Kumar from the Department of Computer Science and Engineering received the President of India Gold Medal. Mr. Ashutosh Agarwal from Computer Science and Engineering Department received the Director's Gold Medal. Three students one each from Computer Science and Engineering Department, Mr. Shubham Kumar; Electrical Engineering Department, Mr. Mayank Aggarwal; and Mechanical Engineering Department, Mr. Avinash Kumar, respectively received the Institute's Silver Medals. Three Institute Proficiency Prizes were also given to three students one each from Computer Science and Engineering, Electrical Engineering, and Mechanical Engineering Departments.

Chairman's Gold Medal was given to Mr. Amit Kumar, an M. Tech. student from Mathematics and Computing branch. Institute Silver medals were given to 8 M. Tech. students one from each M. Tech. branch. Shri Kedar Nath Das Memorial Award was given to Mr. Ayush Kumar from the Department of Computer Science and Engineering for outstanding all round performance, excellent organizational abilities and leadership qualities in Department of Computer Science and Engineering.





SPONSORED PROJECTS

SI.	Name of PI	Name of Co-PI	Department	Project Title	"Sponsoring Agency"
1	Dr. Amit Kumar Verma		MATH	Nonlinear singular differential equations arising in real life	SERB(DST)
2	Dr. Trishikhi Raychoudhury		CIVIL	Fate and transport of engineered nanoparticles in natural sediment and its implication on porous media	SERB(DST)
3	Dr. Debrupa Lahiri, Assistant Professor, IIT Roorkee	Dr. Anup Kumar Keshri	MSE	Surface modified metallic orthopedic implant for sustained drug release.	DST
4	Dr. Rishi Raj		ME	Acoustic detection of leidenfrost dynamics on scalable micro-/nano-structured surfaces	DST
5	Prof. Pushpak Bhattacharyya,	Dr. Asif Ekbal, Dr. Sriparna Saha	CSE	Elsevier centre for excellence of natural lan- guage processing	REIPL
6	Prof. Pushpak Bhattacharyya,	Dr. Asif Ekbal, Dr. Sriparna Saha	CSE	Joint research with Accenture, IIT Patna and IITB, setting up of ATL IIT AI lab	ASPL
7	Dr. Manabendra Pathak	Dr. Mohd. Kaleem Khan	ME	A self adaptive electronic cooling system by enhanced pool boiling	SERB(DST)
8	Dr. Pramod Kumar Tiwari		EE	Analytical investigation of subthreshold behavior of silicon nano-tueb(SiNT) based Field-Effect-Transistor (FETs)	SERB(DST)
9	Dr. Tammineni Rajagopala Rao		CHEMISTRY	Quantum dynamical studies on bimolecular reactions of practical and fundamental interest.	DST
10	Dr. Jayakumar Balakrishnan	Dr. Ajay D Thakur	PHYSICS	Spin transport in 2D material (grapheme/perovskites (LSMO) heterostructures	DST
11	Dr. Sudhan Majhi		EE & MA	Blind Symbol Timing Offset (STO) and Carrier Frequently Offset (CFO) estimation and Implementation over OFDM, and MIMO-SC-FDMA testbed	SERB(DST)
12	Dr. Subrata Hait		CIVIL	Development of ganga grams under namami gange programme with support of Technical Institutions	MHRD&MWR
13	Dr. Raghavan K Easwaran		PHYSICS	Electromagnetically induced transparency and slow light in a two dimensional Magneto Optical Trap (2D MOT).	SERB(DST)
14	Dr. R.K Behera, Dr. S.K Parida		EE	Teaching Learning Centre (TLC)	MHRD
15	Dr. Anirban Bhattacharya		ME	Influence of secondary heat in friction stir welding: mechanical properties and metallurgical observations	SERB(DST)
16	Dr. Somnath Roy	Dr. Probir Saha	ME	Technology gap analysis study for the agricultural implements cluster, Noorsarai, Nalanda, Bihar	TIFAC
17	Dr. Somnath Sarangi	Dr. Probir Saha, Dr. Somnath Roy	ME	Technology gap analysis for combined study proposal for the following clusters: copper & bronze utensils clusters, Mahua, Vaishali, Brass & German Silver utensils cluster – Majhualia, Bettiah, Brass & Bell Metal cluster – Mahisadel, Purba Medinipur, West Bengal	TIFAC

18	Dr. Somnath Sarangi	Dr. S.S Panda	ME	Technology gap analysis study for Jhula Cluster, Kanhaiyaganj, Nalanda	TIFAC
19	Dr. Soumya Jyoti Ray		PHYSICS	Superconducting spintronics using hybrid superconducting - ferromagnetic metamaterials	DST
20	Dr. Naveen Kr. Nischal		PHYSICS	Study of optical image fusion techniques for securing multispectral data	CSIR
21	Dr. Rishi Raj	Dr. Ajay D. Thakur, Dr. Anurag Agarwal (M/s New Leaf Dynamic Tech- nologies (P) Ltd, New Delhi - 110019	ME	Design and development of an agricultural waste based gasiied heating system for GreenCHILL	MHRD&NDTL
22	Dr. Subrata Hait	Mr. Vikash Kumar	CIVIL	Varied profiling of bio-macromolecules for energy by product assessment employing electrochemical tools	VPB
23	Dr. Manoranjan Kar	Dr. Puneet Mishra	PHYSICS	Engineering ferromagnet-molecule interfaces for application in spin organic light emitting diodes	CSIR
24	Dr. Trishikhi Raychoudhury		CEE	Arsenic immobilization by in-situ synthesis of iron-based adsorbent under reducing environment within porous media	DST
25	Dr. Utpal Roy	Dr. Suranjana Ghosh	PHYSICS	Planck Scale structures & Quantum Metrology	CSIR
26	Dr. Smriti Singh, Dr. Sweta Sinha, Dr. Asif Eqbal		HSS/CSE	39th international conference of linguistic society of India	"CIIL,ICSSR,C- SIR, Pvt Companies"
27	Dr. Mayank Tiwari		ME	National symposium of rotor dynamics 2017	Others
28	Dr. R Prabhu	NIL	PHYSICS	Innovation in Science Pursuit for Inspired Research (INSPIRE)	DST
29	Dr. A. K. Thakur	N/A	PHYSICS	Development of indigenous technology for high energy density LiPo battery for low temperature applications	DRDO
30	Dr. Anup Kumar Keshri	N/A	MSE	Plasma sprayed carbon nanotube and graphene reinforced alumina hybrid nanocomposite coating with enhanced properties for light metal alloys	ISRO
31	Dr. Sahid Hussain	Dr. Chandrami- ka Bora	CHEMISTRY	Graphene/conducting polymer nanocomposite based enzymatic biosensors for the detection of biomolecules.	SERB
32	Manas Kumar Sarangi		PHYSICS	Fluctuations in DNA for molecular recognition	SERB
33	Dr. Jobin Jose		PHYSICS	Photonization and Electron Scattering Dynamics of Free and Conined Atomic Systems	SERB
34	Dr. Debashree Guha Adhya	Dr. Yogesh Mani Tripathi	MATHEMATICS	Development of Aggregation operators for fusion of uncertain, data: A special emphasis to interrelated data and information measures of uncertain data	Science and Engineering Research Board, DST

Collaborations

- MOU between IIT Patna and Foreign Universities and Organizations:
- 1. National Informatics Centre (2 March 2017): NIC, Ministry of IT, India has set up the Digital Government Research centre (DGRC) at Patna Software Technology Park
- 2. Tektronix (20 October 2016), focussed on facilitating industry and research corporation in the field of emerging technologies
- 3. Wright State University, Ohio (17 May 2016), to build friendship and foster a relationship that promotes intellectual exchanges.
- 4. IST, Lisbon (3 May 2016) to strengthen the links for cooperation between the two institutions, in the areas of Science, Engineering and Technology.

- 5. **ezDI**, an Ahmedabad based company (head office is located in USA) has setup the Shusrut: ezDI Research Lab on Health Informatics, the aim of which is to develop products related to healthcare and contribute to the research in these domains.
- 6. **Elsevier**, the renowned publishing company has set up the "Elsevier Centre for Excellence of Natural Language Processing" to conduct research and development in some of the novel areas of AI, NLP and ML.
- 7.AI-NLP-ML group recently signed MoU with Accenture Pvt. Limited for research on Question-Answering, Multilingual Support and Virtual Agent

ACADEMIC EVENTS

Workshop on Sobolev Spaces, 16-23 February, 2017

The Department of Mathematics, IIT Patna organized 8 day on Workshop on Sobolev Space from 16th Feb 2017 to 23rd Feb 2017. It was partially supported by CSIR, New Delhi India and IIT Patna. Prof. Swagato K. Ray from ISI Kolkata and Prof. V. Raghvendra from IIT Tirupati (Retired Professor IITK) delivered lectures. Total 25 participants attended the workshop. The session was inaugurated by Prof. Pushpak Bhattacharya, Honorable Director IIT Patna. The conveners of the workshop were Dr. Amit K. Verma, Dr. Prashant K. Srivastava and Dr. N K Tomar.



National Science Day Celebration 2017



National Science Day is celebrated in India on 28 February each year in order to commemorate the invention of the Raman Effect by Indian physicist Sir Chandrasekhara Venkata Raman on the same day in 1928. This year the National Science Day was celebrated in the department of Physics in the Senate hall, Administrative building. The program started with an opening lecture by Dr. N. K. Nishchal on "Scientific presentation; An overview of what I think is important". He emphasized various aspects of scientific presentation and inspired the audience to develop a better skill for the presentation. A lecture competition was held where all the research scholars of the department (2nd year onwards) presented their research work in 5 minutes. The department is delighted to have honourable Director of the institute, Prof. Pushpak Bhattacharyya, as the chief guest in the prize distribution ceremony. In the afternoon session, there was an open house discussion among the students of the department and the faculty members. The interactive session included discussion on teaching methodology, course contents, facilities in the department and most importantly the future directions for the students. The whole program was designed and arranged by the students of the department under the guidance of Head of the department Dr. Utpal Roy.

Research Scholars' Day, IIT Patna 5 March 2017

6th Research Scholars' Day was celebrated in Indian Institute of Technology Patna (IIT Patna) on 5th March 2017. The event started with lighting of the lamp by the Hon'ble Director, IIT Patna, Prof. Pushpak Bhattacharyya and Professor Pradipta Banerji (IIT Bombay), Professor Prasanta K. Panigrahi (IISER Kolkata) and Professor Maya Shanker Pandey (BHU). In his welcome speech Director Bhattacharyya said that like Kashi is auspicious for devotees so is the research for the researchers. On this occasion, Research Scholars have participated in various events including "My Research in Three Minutes" and "Poster Presentation" with great enthusiasm. The guests delivered lectures on various research fields. Prof. Banerji discussed safety of railway bridges and how to do relevant research in the real world problems. Prof. Panigrahi





delivered lecture on Quantum computing which is going to be highly relevant research topic in future. Prof. Pandey discussed about the various aspects of the English language, pronunciations and making effective presentation. At the end of the ceremony, the awards were presented to winners of various competitions. The winners of "Poster Presentation" were Aiman Reyaz (HSS), Akash Arya and Jayant Bera (Physics), Sayeed Ashique Ahmed (Chemistry), Ankita Swati (Civil & Environmental Engg.), Subradeep Pal(Electrical Engg.), Tanmay Sen(Mathematics), Sribalaji M (Material Science & Engg.), Satish G.P. (Mechanical Engg.), Roshni Chakraborty (Computer Sc. Engg.), Sanchari (Chemical and Biochemical engg.). The winners of "My Research in Three Minutes" were Madhu Ranjan Gunjan (1st prize), Satish G.P. (2nd Prize) and Ankita Swati(3rd prize).

Workshop on Gender Sensitization & Awareness Program organized by Women Grievance Redressal Committee (WGRC), IIT Patna 16th January, 2016

Dr. Priyanka Tripathi, WGRC-ICC-Chairman and Assistant Professor, Department of Humanities and Social Sciences conducted a day long workshop on 16th January, 2016 under the aegis of honourable Director of IIT Patna, Prof. Pushpak Bhattacharya. It was especially designed to explain, appraise and familiarize with the provisions of the new law, THE SEXUAL HARASSMENT OF WOMEN AT WORKPLACE Prevention, Prohibition and Redressal) ACT, 2013; and to disseminate simplified information in order to impart due training in creating a clean, congenial and safe working atmosphere in the organization. The Chief guest for this occasion was Ms. Swati Maliwal, Chairman-Delhi Commission for Women and guest of honour was Ms Alankrita Singh (IPS, 2008 batch).



A Three day workshop on Cross Lingual Information Access (CLIA) IIT Patna from 23-25thJanuary, 2016

A three day Cross Lingual Information Access Workshop was held at IIT Patna on 23-25th January, 2017. This workshop was attended by eminent researchers from IIT Patna, IIT Bombay, IIT Kharagpur, Jadavpur University, Guahati University, IIT Bhubaneshwar, IIT Hyderabad, Anna University, CDAC among others. The goal of the workshop was to deploy the search engine Sandhan developed by the CLIA consortium of India. "SANDHAN" (http://www.tdil-dc.in/sandhan/), was launched by Department of Electronics and Information Technology (DEITY) and was developed by a team of more than 100 researchers (affiliated to more than 10 institutions) with Prof. Pushpak Bhattacharyya as the team leader. Prof. Pushpak Bhattacharyya, FNAE, is Vijay and Sita Vashee Chair Professor of Computer Science and Engineering in the department of IIT Bombay and since June 2015, heading IIT Patna as Director.



Short-term Courses on Recent Advances in Power Electronics Applications in Smartgrid and Electric Drives, 3rd to 5th March 2016

Under the aegis of NaMPET-Phase II, an Initiative of MeitY, a short term course on Recent Advances in Power Electronics Applications in Smartgrid and Electric Drives was conducted. Convener of the course was Dr. R. K. Behera and Course coordinators were Dr. S. K. Parida and Dr. S. Sivasubramani.

FIRST INTERNATIONAL SYMPOSIUM ON 5G: Jointly Organised By Indian Institute of Technology Patna (IITP) Centre for Tele Infrastructure and Aalborg University (CTIF) 29th to 31st March 2016

Shri Ravi Shankar Prasad, Hon'ble, Union Minister for Communications & Information Technology Government of India inaugurated the symposium with emphasis on how 5G can serve different requirements in rural and urban India. He also mentioned different policies like Digital India by Government of India in this direction. The main areas of the symposium were the creation of digital infrastructure, Delivering services digitally and Digital literacy through 5G.The Honourable minister also promised to set up 5G Innovation Centre at IIT Patna for high quality research in this direction. Speakers from across the globe, like Japan, Denmark, Finland, France and

USA were the distinguished speakers during the summit. More than 10 industry CEO/CTO/ Technology leaders have participated. The symposium was also well represented by respected academicians from IITs/NITs and top scientists from Government agency. Dr. Preetam Kumar, Associate professor IIT Patna was the General Co-chair of the symposium.



(Inauguration of the Symposium by Honbl Minister Shri Ravishankar Prasad along with Director Dr. Pushpak Bhattacharyya, Dr. Ramji Prasad and Dr. Preetam Kumar)

Symposium on Modelling and Computation, Department of Mathematics, April 9, 2016

The Department of Mathematics organized one day Symposium on Symposium on Modeling and Computation On April 9th 2016. It was supported by National Mathematics Initiative, IISc Bangalore. Prof. G. Rangarajan from IISc Bangalore, Prof. S Sundar from IIT Madras and Prof. A S Vasudev Murthy from TIFR Bangalore delivered talks on various aspects of Modeling and Computation. One paper presentation session was also organized in which 7 papers were presented from internal and external researchers. Total 40 participants attended the workshop. Dr AK Verma and Dr PK Srivastava were the conveners of the symposium.



From left to right: Prof. G Rangarajan (IISc), Prof. P. Bhattacharya (Director, IIT Patna), Dr. Yogesh Mani Tripathi (HoD Mathematics)



Prof. G Rangarajan (IISc), Prof. A S Vasudev Murthy (TIFR Bangalore), Prof. S. Sundar (IIT Madras).

Harmony Workshop 20-22 June, 2016

A Harmony Workshop (Jeevan Vidya Workshop) was organized by the Welness Centre, IIT Patna during June 20-22, 2016. Prof. Rajeev Sangal, Director, IIT BHU, with his team conducted this program for the faculty of IIT Patna. This program majorly focused on human values in academic institutions. The workshop was a platform for discussing a wide range of practical issues like education, happiness, success, aspirations and gaining an understanding on our relationships, environment. social issues, and self-confidence. The workshop also covered some grass root level issues like: to achieve academic and research excellence, to kindle and maintain student interest in their area of study, to work hard with persistence, to understand need to work for institution building, need for human values course for students etc. The program was inaugurated with lighting of the lamp by Prof. Rajeev Sangal (Director, IIT BHU), Prof. Pushpak Bhattacharyya (Director, IIT Patna), Dr. Karali Patra (PIC, Welness center) and the faculty members present during the inauguration ceremony. The faculty community enjoyed attending the three-day long workshop, commencing from 9:30 am to continue till 5.30 pm everyday. The workshop ended with a vote of thanks by Dr. Patra. IIT Patna would be happy to organize such kind of workshop in future.

Workshop on "Concepts of Physics Through Experiments-2016 (CPTE-2016)" July 15-16, 2016; Organized by The Department of Physics, IIT Patna

As one of the outreach activities, Department of Physics, Indian Institute of Technology Patna conducted Workshop on "Concepts of Physics through Experiments-2016 (CPTE-2016)" on July 15 and 16, 2016. The participants of the workshop were the selected class XI-XII students from various schools in Bihar. The goal of the workshop was to encourage and motivate the students towards fundamental concepts in Physics and application to the technology. The Chief Guest of the Inaugural function was Prof. Rajmani Prasad Sinha, member,

Council of Higher Education, Govt. of Bihar. He was also the Director, Bihar School Examination Board and Ex-Vice Chancellor, Lalit Narayan Mithila University, Darbhanga. Prof. Kamal Prasad, Head of Aryabhatta Centre for Nanoscience and Technology, Aryabhatta Knowledge University was the guest of Honour of the Event.



Inauguration Ceremony of the Workshop on 15th July, 2016

A Four-day workshop sponsored by DST SERB New Delhi, on Fluid Mechanics: Modelling, Analysis and Computation is being organized in IIT Patna from 14th-17th July, 2016

Modeling, Analysis & Computation is organized jointly by three departments, Department of Mathematics, Department of Mechanical Engineering, Department of Chemical and Biochemical Engineering at Indian Institute of Technology Patna. The workshop was partially sponsored by DST SERB. New Delhi. Conveners of the workshop are Conveners, Dr. Amit. K. Verma (Mathematics, IIT Patna), Dr. P. K. Srivastava (Mathematics, IIT Patna), Dr. Manabendra Pathak (HoD, ME, IIT Patna), Dr. Sujoy K. Samanta (HoD, CBE, IIT Patna). The lectures are delivered by Prof. Analtoly N. Filippov (Russia), Dr. Satya Deo, (University of Allahabad), Dr. Ashish Tiwari, (BITS Pilani), Prof. Suman Chakraborty, (IIT Kharagpur), Prof. B. V. Rathish Kumar (IIT Kanpur), Prof. Manabendra Pathak (IIT Patna), Prof. Tanmay Basak, (IIT Madras), Prof. Trilochan Sahoo, (IIT Kharagpur), Dr. Sudheer Siddapureddy (IIT Patna), Dr. Somnath Roy (IIT Patna), Prof. Kaleem Khan (IIT Patna).



National CONFERENCE ON "REVISITING SHAKESPEARE IN THE 21ST CENTURY", 15- 16 September, 2016

The Department of HSS organized a two day national conference on the theme "Revisiting Shakespeare in the 21st Century" on 15-16 September, 2017. The conference stood witness to more than hundred participants across India sharing their ideas and perspective on the theme. Eminent professors and resource persons from reputed universities and institutes shared their research with the august gathering.





One Day Conclave on "Social Entrepreneurship, Youth Leadership & Careers in the 21st Century", October 1, 2016

Dr. Richa Chaudhary, Assistant Professor, Department of Humanities and Social Sciences. IIT Patna in association with Gandhi Fellowship organised a one day conclave on "Social Entrepreneurship, Youth Leadership & Careers in the 21st Century" on October 1, 2016. Prof. Pushpak Bhattacharyya, Director, IIT-Patna and Dr. Mayank Tiwari, Dean (R&D) graced the occasion, Mr. Irfan Alam (Founder – Sammaan Foundation) provided the keynote address. Ms Honey Bajaj (MIT Boston), Mr. Ujwal Thakar (Senior Advisor to KPMG), Ms. Sugandha Munshi, Nilima Shil (Gandhi Fellowship – Piramal Foundation for Education Leadership) are some of the most eminent persons attended this Conclave. Successful and Passionate Social Entrepreneurs have been invited to share their expertise & experiences with the young minds. Alumni of Gandhi Fellowship will speak about their exemplary work and journey as a change leader. This conclave is conducted to give clarity and awareness to the students regarding the career prospects in the above mentioned areas.

Workshop on Revitalizing School Physics Education for Kendriya Vidyalaya Teachers, 21-23 October, 2016

A workshop entitled "Revitalizing School Physics Education through Concept-oriented Teaching in KVs (RESPECT KVs) for PG teachers was organized at IIT-Patna, Bihta, jointly by the Indian Institute of Technology Patna (IIT-Patna) and the National Anveshika Network of India, from 21st to 23rd October, 2016. National coordinator Prof (Dr.) H. C. Verma (IIT-Kanpur), Dr. Utpal Roy (Head, Department of Physics, IIT-Patna), and Dr. Manoranjan Kar (local convener, IIT-Patna) conducted the workshop. The workshop was inaugurated by Prof. Pushpak Bhattacharyya, Director, IIT-Patna. Nearly 34 KV teachers from Bhopal, New Delhi, Jabalpur, Patna, Mumbai and other regions of India, together with all the faculty members, students and staffs of the Department of Physics, IIT-Patna, participated in this workshop.

Two day workshop on Computer Networking and CCIE Security, 22 to 23 October 2016

The Department of Computer Science & Engineering organized two day workshop on Computer Networking and CCIE Security. This workshop focussed on security of computing systems and CCIE Security. This was organized jointly with Department of Computer Science & Engineering, IIT Patna, team NSSIT, UAE and Inspire Cyber Solutions.



Two Day Workshop on IoT-applications, Technologies and Platforms, 12th to 13th November 2016

The Department of Computer Science & Engineering organized two day workshop on IoT-applications, Technologies and Platforms. This two day workshop with lectures and hand on sessions, interactive discussion sessions, covered general IoT design, applications as well as specific case studies related to IoT and solutions during the design and deployment of example IoT devices. The course touched upon several fundamental questions in this field, as below, and stimulate interest in Faculty students and researchers to explore further. This was organized jointly with Intel/FICE Team, Bangalore & Department of Computer Science and Engineering, IITP.

Three-day Workshop on "Research Training Workshop on Concepts and Practice of Material Characterization" IIT Patna, 24-26 November, 2016

Department of Physics, IIT Patna organized this workshop from 24th November to 26th November, 2016. The workshop includes talks on X-ray Diffraction, Impedance Spectroscopy, Thermodynamic Characterization and Raman Spectroscopy Techniques. This workshop was aimed at training the participants in a host of characterization techniques prior to the upcoming Asian Conference on Solid State Ionics (also organized by IIT Patna from November 27-30, 2016). Prof. Pushpak Bhattacharyya, Director, IIT Patna was the Chief Guest for the event. Prof. Evvy Kartini, National Neutron Research Facility, Indonesia was the Guest of Honour and Prof. Tarasankar Pal, IIT Kharagpur was the Distinguished Guest for the event.

Asian Conference on Solid **State Ionics (ACSSI-2K16) 27-30 November, 2016**

Asian society for Solid State Ionics (ASSSI) started holding Asian Conference on Solid State Ionics (ACSSI) as biennial event since 1988 beginning at Singapore. Since then, this chain of conference has been held in different Asian countries. Fourth time in India and for the first time at IIT Patna, this ASSSI conference was organised from November 27-20, 2016. Some of the Keynote speakers were Stephan Adams (National University of Singapore, Singapore), Loic Assaud (Universite Paris-Sud/Universite Paris-Saclay, France), A. K. Arof (University of Malaya, Kuala Lumpur, Malaysia), S.Basu (Indian Institute of Technology Delhi, India) et al.

Short term Course On Smart Grid: Cyber Physical Energy Systems (SGCPES) 2-8 December 2016

A short term course on Smart Grid: Cyber Physical Energy Systems (SGCPES) Teacher Learning centre for Internet of Things was organised by Department of Electrical Engineering, Indian Institute of Technology Patna, from 2nd to 8th December, 2016 under the aegis of Pandit Madan Mohan Malviya National Mission on Teachers and Teaching (PMMMNMTT), MHRD, **GOVERNMENT OF INDIA**

6th International Symposium on Embedded computing & system Design (ISED), 15-17 December 2016

Department of Computer Science & Engineering, IIT Patna organized 6th International Symposium on Embedded Computing & System Design (ISED) with the help of Electrical Engineering Department from 15th to 17th December 2016. The objective of the Sixth International Symposium on Embedded computing and system Design (ISED) and co-located event Int'l Conf. on Cyberphysical Systems, Networking and Applications, was to provide a congenial yet serious platform for experts from academia and industry to interact with young researchers in Computer Electrical and Electronics Engineering. Developments in these domains have a large role to play in future electronic system design and technologies focussing on being user-friendly, eco-sensitive and energy efficient



Inauguration of Physics Society

The Physics Society is a group formed under the aegis of the department of Physics, IIT Patna. Membership to the society is open to anyone who has an interest in Physics and presently, it includes all the students and faculty members of the Department of Physics. The objective of the Society is multifaceted. It looks forward to generating an atmosphere that fosters a scientific temper. It provides a platform for those interested in Physics to share and discuss the ongoing activities and scholarly work in the field. The Society also aims to organize outreach programs to generate awareness among the local community. The activities will ensure that the members develop leadership experience and use their knowledge in the area to contribute to the community. With above objectives, the Physics Society was established on 30th of January, 2016. The inauguration was celebrated by the students, staffs and faculty members of the department with great zeal of enthusiasm. We were highly privileged to have Prof. Pushpak Bhattacharyya, the director of IIT Patna and Prof. Ratnamala

Chatteriee, eminent faculty at the department of Physics from IIT Delhi as our chief guests. They illuminated our spirit by their mesmerizing lecture. Head of the department Dr. Utpal Rov delivered a motivational speech and introduced the department to all of us. It was followed by a talk from the president of Physics Society Mr. Rajnish Kumar who introduced the office bearers of the society to us.



PROUD MOMENTS FOR IIT PATNA

- Dr. Mahesh Kumar H Kolekar (EE dept.) elevated to the grade Dr. Sriparna Saha has been elevated to the grade of IEEE Senior of IEEE Senior Member
- Alacrity" is 2nd Runner Up in ASME HPVC Asia Pacific 2017
- Dr. Asif Ekbal: Associate Editor of Sadhana
- Prof. Pushpak Bhattacharvva: Eminent Engineer Awardee
- Dr. Rajiv Misra (CSE dept.): elevated to the grade of IEEE Senior
- Mr. Atul Kumar Best poster award at ICRCS 2017
- Dr. Asif Ekbal awarded JSPS Fellowship
- Richa Chaudhary: best research paper award at IIM World Management Conference
- Dr. A. K. Thakur Vice-President, ASSSI
- Dr. Sriparna Saha: BIRD Awardee 2016
- Dr. Preetam Kumar Editorial Board Member of International Journal of Wireless Personal Communications
- Dr. Sriparna Saha awarded NASI-YOUNG SCIENTIST PLATINUM JUBILEE AWARD
- Dr. Saurabh Kumar Pandey has been Selected of his biographical profile for inclusion in the "Marquis Who's Who in • Ms. Pranjali Kokare received an Adobe Research Women-Inthe World 2016 (33rd Edition
- Dr. S. K. Parida (EE dept.) has been elevated to the grade of IEEE Senior member
- IIT Patna being conferred Education Award instituted by CMAI Association of India. Prof. Pushpak Bhattacharyya Director IIT Patna received the award from the Hon'ble Governor of Bihar Shri Ram Nath Kovind on 8th March, 2016
- Dr. Saurabh Kumar Pandey has received the best research paper award at 3rd IEEE International Conference UPCON 2016 (DEC • Ms Anshupriya received best paper award in Recycle - 2016 at 09-11, 2016) held at IIT-BHU
- Dr. Sudhan Majhi has been selected for Young Faculty Research Ms. Areeba Fatima received Best Paper Award; OPTRONIX-Fellowship in the Visvesvaraya Ph.D scheme
- Dr. Debashree Guha Adhya has been granted the National Scholarship SAIA-NSP) given by Govt. of Slovak Republic
- Dr. Preetam Kumar has been elevated to the grade of IEEE Senior Member

- Prof. Pushpak Bhattacharvya had been invited to be the chair for NLP in IJCAI 2016, a flagship conference in Artificial
- Dr. Sudhan Majhi has been provided with the 'Associate Editor' role in the journal 'Circuits, Systems, and Signal Processing'.
- Dr Mahesh Kumar H Kolekar has been selected as DAAD Fellow. under the programme of Bilateral Exchange of Academics 2017 and invited for carrying out research project at TU Berlin,
- K.K. YENUMULA (1411EE09) received Theme Award in 2016 IEEE Students' Technology
- Symposium, in "Advancing Technology for Humanity.
- Mr. Angshuman Das, PhD scholar in DCEE won First Prize for a paper in SHILP-2016, IIT BHU, Varanasi
- Mr. Sumit Asthana, a final year BTech CSE student, invited to attend the Google Summer of Code Mentor Summit 2016 at Sunnyvale, California, USA from October 28 - 30, 2016.
- Technology Scholarship award for year 2017
- Pranjali Kokare (3rd year CSE) selected to attend the 2016 Grace Hopper Celebration as a Google Intern Travel Grant
- Mr. Vishal Nagarkoti, and Mr. Omprakash Sahu were awarded best paper in FMFP2016 conference
- Mr. Deepak Kumar Prajapati was awarded best poster award in NTC2016
- 2016 Aug. 18-20, 2016, Univ. of Engineering & Management, Kolkata
- Jayanta Bera and Utpal Roy received best poster award for his poster on "Dynamics of Bose-Einstein condensate under time dependent potential spikes", Conference on "Frontiers in Light-Matter Interaction (FiLMI 2016)", 4-5 March, 2016 at IIT Ropar, Punjab)

TRAINING AND PLACEMENT - 2016-17

Training and placement cell (TPC) (प्रशिक्षण एवं स्थानन प्रकोष्ठ) of the institute handles all aspects of placements at IIT Patna for the graduating students of all departments. Right from contacting companies to managing all logistics of arranging for tests, preplacement talks and conducting final interviews the Training and Placement Cell officials and volunteers provide their best possible assistance to the recruiters. TPC Cell comprising of students' representative and faculty members facilitate the interaction between students and organization to find their best matches in terms of their expectation, aspirations and requirements.

TPC helps to provide summer internship for the pre-final year students and placement for final year B.Tech, and M.Tech students. The summer internship for a period of 8-10 Weeks is compulsory component of all branches of B.Tech curricula for the pre-final year students. Last year TPC had arranged summer internship for 179 pre final year B.Tech student in Private Companies, PSU, R & D organisation and various institutes in India and abroad such as Microsoft, CISCO. Arista Networks, ezDI.

Stanford University, DAAD, Germany, National University of Singapore(NSU), National Tsing Hua University, Taiwan, Nanyang Technological University, Singapore, University of New South Wales, Australia, ITRI Tiwan, The University of Tokyo Japan, Singapore University of Technology and Design.

The placement process for the session 2013-17 is continuing and it may be over in the last week of April and till now in the campus placement 46 companies have given 155 offers to B.Tech, M.tech and Ph.D students. List of some Major recruiters who had visited IIT Patna and offered job to IIT Patna student's are Microsoft(1), Arista Network(3), Amazon(5), Directi(1), Sigmoid Analytics(2),Samsung SRI Delhi(18), Samsung SRI Noida(8), Samsung SRI Bangalore(4), L&T ECC(8), Cognum Technology(4), ezDI(3), United Health Group(1), Info Edge(2), Works Apps(1), Wipro(8), TataMotors(5), ISRO(4), TCS-CTO(7), M&M(1), Tricon Infotech(1), Finisar(1), Cognizant(9), CEWiT(2), TVS Motors(3), Indian Oil (9), EdCIL Ltd etc.

ACTIVITIES AT IIT PATNA

TEDX IITPatna

The TEDx IITPatna community is a diverse one, both ethnically and socially. Our organizers, fellows, team members and speakers all coalesce into one large, wondrous amalgamation of brilliant ideas and thoughts. We work with, and around our speakers, and aim to cultivate their work through support and collaboration

SPEAKERS for TEDx 2016

Ashok Krish

Head of Social Media & Workplace Reimagination Practice at TCS Digital Enterprise at Tata Consultancy Services

Dr. George Puthuran

Doctor, Ophthalmologist

Dr. Mohan Kameswaran

Doctor, Otorhinolaryngologist

Dr. Pushpak Bhattacharyya

Director IIT Patna

Professor, Computer Science and Engineering IIT Bombay

Dr. Satyajit Singh

Doctor, Urologist

Institute Colloquium

Lecture series on Nobel Prizes-2016

- 1. Nobel Prize in Chemistry-2016: (Jean-Pierre Sauvage, Sir J. Fraser Stoddart and Bernard L. Feringa "for the design and synthesis of molecular machines") by Dr. Neeladri Das
- 2. Nobel Prize in Medicine-2016: (Yoshinori Ohsumi" for his



discoveries of mechanisms for autophagy") by Dr. Prolay Das

- 3. Nobel Prize in Literature-2016: (Bob Dylan "for having created new poetic expressions within the great American song tradition") by Dr. Smriti Singh
- 4. Nobel Prize in Economic Sciences- 2016 (Oliver Hart and Bengt Holmström "for their contributions to contract theory") by Dr Nalin Bharti
- 5. Nobel Peace Prize-2016: (Juan Manuel Santos "for his resolute efforts to bring the country's more than 50-year-long civil war to an end") by Dr Aditya Raj
- 6. Nobel Prize in Physics-2016: (David J. Thouless, F. Duncan M. Haldane and J. Michael Kosterlitz "for theoretical discoveries of topological phase transitions and topological phases of matter")by Dr. Ajay D. Thakur

Events- Cultural/ Technical and Sports

Nebula Fresher's Party

Nebula welcomes the freshmen into the college. With a keen implementation of Anti-Ragging environment in the college, it provides them with a platform where they can showcase the talents and their skills. Nebula puts forth an unparalleled multitude of

events, meticulously fashioned to suit the interests of band geeks, music and dance maniacs. The cultural delight of the fest, pronites, share the glamour of the Mr & Miss Nebula competition, serenity of classical art forms and amusement of comedy shows.



Independence day celebration

Commemorating the legacy of Mahatma Gandhi, Jawaharlal Nehru and Sardar Vallabh Bhai Patel, IITP celebrated 69th Independence Day with zeal and enthusiasm.





Gandhi Javanti Celebration- Sadhna'16

Gandhi Jayanti, a national festival in India marks the occasion of the birthday of Mohandas Karamchand Gandhi. IITP fraternity celebrated Gandhi Jayanti with a devotional musical session in line with Gandhinian ethos stating "Raghupati Raghav Raja Ram, Patit Pavan Sita





Reverberance

Reverberance is no different. The Inter-Year Cultural Competitions Reverberance have something for everyone.

Arts celebrated Reverberance, *the inter-year Cultural talent in any genre of cultural proficiency. Covering the genres of Tournament. Competitions are the core of any fest and Dance, Dramatics, Design and Gaming, Fine Arts and Music, we at

Anwesha 17, 27-29 January 2017

Anwesha, the techno-cultural fest of Indian Institute of Technology Patna is one of the fastest growing college youth festivals organized entirely by the student community. With its humble start in 2011, the fest is ever-growing and enjoys a cultstatus among the youth of Bihar and around. The splendid platform which brings together the reigning talents of today's youth such as dance, drama, music, technical, literary, fine arts to name a few, together with a social appeal defines the meaning which 'Anwesha' holds. A perfect blend of ecstasy and expression, of energy and excitement, the three-days fest concluded with its eighth edition this January end and we must say, it was one serious affair of talent, passion, and celebration. Started off with a grand opening ceremony graced by popular artists Miss Ranjhana Jha (Classical), Mr. Vineeth Vincent(Beat Boxer) and Tapabrata Chakraborty (Mentalist) and DJ Teias. The fest gave great opportunities to the students to showcase their creative and artistic skills. With events from various aspects such as Performing Arts. Speaking Arts. Social and Welfare and Technical. The Second day was an open stage for the students to showcase their talents in various fields of performing Arts by participating in Events like Syngphony (Singing), Heel Turn(Dancing), Satanz Tantrum(Band Warz) and Verve(The Fashion show). Miss Asia Pacific 2013, Shrishti Rana graced the day as the chief guest for the day. She judged Verve, one of the flagship Events of Anwesha. Day 3 Was a grand celebration of Live wire performance by one of the oldest and most famed rock bands of the country Agnee and Parikrama. It was one of those rare occasion when both the Agnee and Parikrama performed together on Stage. The fest witnessed a great enthusiasm over its social events like MUN, The Parliamentary Debate etc. The musical bass was all time high with DJ Tejas and live wire performances by Parikrama and Agnee. The fest received staggering footfall from all over the country and the fest was a grand success

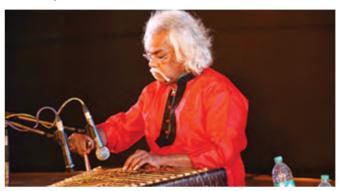






Virasat 2017

Virasat 2017, a programme of Spic Macay during the first half of the year was held at IIT Patna from March 25-28, 2017, IIT Patna was privileged to witness four days of scintillating performances from various artists from across the country. The days were marked by wonderful performances by Pandit Shubhendra Rao, Padma Bhushan Pandit Rajan Mishra and Pandit Saian Mishra, Vidushi Geeta Chandran, Pandit Tarun Bhattacharya, Pandit Partho Sarothy, Vidushi Sudha Rghuraman, Vidwan Mysore A. Chandan Kumar and Vidushi Shruti Sadolikar









Technical Events

Apart from the vibrant cultural activities organized at IIT Patna, the technical performance of various teams at national as well as international level has been commendable.

- 1. 5th Inter-IIT Tech Meet, IIT Kanpur
- The 5th Inter-IIT Tech Meet organized by IIT Kanpur during 25th to 26th March. IIT Patna bagged a bronze medal in one of the competitions, Markovation. The winning team members included Ravi Anand, Jatin Kalra and Shubham Shukla. In another event, Dashboard, the team consisting of Tameesh Biswas, Mukuntha N S, Mayank Vaidya and Manish Kumar stood fourth, following IIT Kanpur, IIT Kharagpur, IIT Madras bagging the top 3 positions respectively.
- Team Alacrity secured 3rd all India overall rank in HPVC, team Invincible came 17th in BAJA Endurance and team IITP Motorsports bagged 53rd position in SUPRA.
- Gagan Kumar and Shifona Garg of Btech made it to the grand finale of TCS Codevita season 6 and ranked among the Top 15 global teams.
- Ravi Kumar and Ravi Anand stood second in The Campus Quiz by TATA Crucible, organized in Patna on March 27, 2017.
- Abhishek Kumar, Deepanway Ghoshal and Shobhit Bhatnagar participated in SemEval and their system was ranked within the top 5 globally.
- Two teams qualified for the grand finale of Mobile 10X Hackthon #HackforIndiaV2, from which team of Naman Aggarwal, Alan Aipe, Newton Kumar and Mayank Aggarwal was ranked second all over India.

Community Events

Rural Technology Development Club (RTDC) is the student club of Indian Institute of Technology Patna that aims to identify the problems prevailing in the rural areas and work to develop technologies and devices to address them. They work to foster an ideas into the routine activities and develop technologies to scale up the efficiency of the traditional manufacturing processes followed in rural areas. Under project Adhyayan of RTDC, student members of the club visit the local government funded schools and teach the students of classes 9 and 10 everyday all round the year. The schools students are taught concepts of Mathematics and Science regularly and also prepared for their Bihar School Examination Board class 10 exams. This noble initiative runs free of cost by entirely by the club. RTDC organises Adhyayan Utsav, the cultural annual festival for rural students, every year in the government funded school of villages Amhara and Dilawarpur.



(IITP Students with Primary School Students at Amahara Village,

Sports activities

1. The Sports Council, IIT Patna has organized its first Inter-College Level Sports Tournament, INFINITO, from 24th March to 26th March, 2017. Over 500 students from 12 institutes of Patna and nearby places, including National Institute of Technology Patna, Birla Institute of Technology Patna, CIMAGE, Chanakya National Law University, Cybotech, All Indian Institute of Medical Sciences, Netaji Subhas Institute of Technology, National Institute of Fashion Technology and St. Xavier's College, participated in the three-day sports fest 'INFINITO 2017'. The event was inaugurated by Prof. D S Mehta, Physics Department, IIT Delhi. This time Infinito 2017 included four games Basketball, Volleyball, Cricket, Table Tennis. The IIT Patna volleyball team bagged 2nd place at IIT Patna's first inter-college sports fest, Infinito 2017. IIT Patna Basketball team and Table Tennis team won the first prize at Infinito, 2017. The efforts made by Faculty in Charge Dr. Pratibhamoy Das, Office in



Charge Shyam Kumar and Sports Secretary Anurag Meena came into the attention of whole communities of IIT Patna on organizing this event. The inter college tournament spread in several leading Newspapers like Times of India, Dainik Jagran etc, which definitely increase the perception parameter of our institute inside India.



- 2. IIT Patna organized an Marathon in the campus on 25th March 2017 morning on the occasion of 'Earth Hour' a worldwide movement which encourages individuals, communities, households and businesses to turn off their non-essential electricity-consuming appliances for one hour, as a symbol for their commitment to the planet.
- The IIT Patna football squad led by Rakesh Sarkar won their first major trophy for IIT Patna, bagging first rank in football at the annual Sports Fest, 2017 of AIIMS Patna.



Winning Football Team Members, AIIMS Tournament, 2017

STUDENT- CORNER

आशा का गीत

बढ़े कदम तो जीत है रुके कदम तो हार है, सूरमा वही जिन्हें चुनौतियों से प्यार है।

झड़े तो फूल क्या हुआ ये पतझड़ों का दौर है, उमंग दिल में है जगी तो जान लो बहार है।

छटेंगी बदली एक दिन कटेगी रात एक दिन चलेगा अपना कारवाँ रुकेंगी आंधी एक दिन

मंजिलों की चाह है न और कोई चाह है एक दिन रुके तो क्या न होंगे ऐसे और दिन ?

लहर लहर नदी चले ठहर ठहर हवा चले चले चलो की सिलसिला बिना रुके चला चले।

कली खिले चमन हँसे हर एक फूल गा उठे जिंदगी की रागिनी हर एक साज़ से चले 11

अंकुर 'बनारसी ' Ankur Pandey M.tech-Communication Systems Engineering (EE)

Set on fire!

Escaped from the circles of blue-berries and pine, the fairy land whispered that it's time. My eyes wide open, deep like divine and in this play of where I am, suddenly found myself after a very long time.

Ambitions above the known, some got frozen under the zone, they stepped back counting to my faults, And I stepped on to my crown, wondering what if the sky was all mine, no wings but the strategy of the clouds, ohh me insane! they change it every single time, leaving pieces of me all across the line, holding on to the ground, do you know what she had found, that mountains are the ones who live near the clouds, you could have too many colors, but only one of them is possible to never get blurred, so test all the crayons and chart all the plots, and at the end make sure you join the unexpected dots, life is a big word, I had only moments, hop, laugh, and full your stomach in this park, and at the end, lights will lead you out of the dark, and remember dear, do not give up on what you desire, even if, for it, you have to put yourself on fire!

Apoorva Shrivastava B.tech -3rd Year

























EDITORIAL TEAM

Vinayak Yashraj, Ankur Pandey, Shifona Garg, Raghu Bora, Hitesh Golchha, Akash Yadav, Abha Kumari, Nilotpal Chakraborty, Utsav Dattani

Editorial Collective

Impulse Newsletter 2017, Vol- IX, compiled and edited by Dr. Priyanka Tripathi, Asst. Prof. (English), Dept. of HSS, IIT Patna Information for Impulse can be sent throughout the semester to the editorial team on the following id: impulse@iitp.ac.in