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NIELIT

**National Institute of Electronics
and Information Technology**

(ISO 9001:2015 Certified Organisation)

An Autonomous Scientific Society of Ministry of Electronics
and Information Technology, Government of India

NIELIT NEWSLETTER

VOL. 08 ISSUE 01 JANUARY 2020 (Quarterly)

Highlights

- Syllabus Revision of O & A Level (IT) in line with Emerging Technologies
- Success Stories of our Alumnus
- Special feature on NIELIT Haridwar
- Tech-वार्ता
 - Microcantilever
 - Deep & Dark Web
 - Big Data Processing
 - DevOps in Data Science Application

Message from Editor-in-Chief



Dear Readers,

Welcome to this issue of NIELIT Newsletter. It covers noteworthy accomplishments of NIELIT during the last 3 months (October 2019 - January 2020): Skilling of youth, Capacity Building of Govt. Officials, FDP or Train the Trainers, Workshops [IoT, Machine Learning, and VLSI etc.], recruitment drive and summer trainings. Several Technical articles are provided. There are MoU with TTAADC Polytechnic Institute, Tripura, and Punjabi University etc.

Top IT firms identify the '**Digital Skills**' that requires in this Digital Era. It is 'Never late to start a 'Digital journey'. Microsoft reports that a 'Certification' helps in the growth:- a) 91% of hiring managers consider 'certification' as part of the hiring process and b) 85% the supervisors improved their productivity because of their certification. **Digital skills** are defined as a range of abilities to use Digital devices, ICT applications to access and manage the information. **Any office** requires workforce with Digital Skill for their future. These skills can provide new ways of working giving highly satisfied workforce. It helps to collaborate, communicate, allows them to do their jobs more efficiently. Some of the **Basic essential Digital Skills** are [a] uses of the device to handle the information, [2] Creating or recreating and editing the contents, [3] Communicate or transacting to the user [4] being Safe from many types of user and [5] Analyze and predict the future. The other **promising Digital Skills** required in a **Workplace** are 1] Creative thinking, programming/ App development 2] Digital Business Analysis 3] Digital Design &

Data Visualization 4] Project Management 5] Digital Product Management 6] Digital Marketing & Social Media 7] Animation and Multimedia production 8] Search Engine Marketing 9] Decision Making for Leaders 10] Strategy planning etc.

A successful **Digital Leader** means being innovative, creative, collaborative, experimental, curious, and able to network. S/He possesses forward-thinking and the ability to remain relevant in a landscape that is constantly changing. Time is changing, and a leader is someone who can respond to these changes. It is suggested to enhance Cross-functional collaboration, Team communication, Digitizing the back office and Agile project management skills. It is also suggested that being a citizen of the country: - Student, Employee or team Lead, to take up the 'Digital Skill'.

NIELIT is taking many activities in line with '**Digital Skilling**'. Any resume/Profile of any citizen with above 'Digital Skill' will be interesting. NIELIT is executing several courses starting from 'Digital literacy' to very 'High end' such as 'Blockchain, Data Science, IoT etc. The 'CCC', 'BCC' and 'O/A-Level's are accepted as one of the prerequisite for many jobs of State and Central Govt. We have launched many NSQF aligned short term **Certification** courses [detail <http://beta.nielit.gov.in/content/nsqf>]. We have updated syllabuses of the O Level (IT) / A Level (IT) to meet the future demands incorporating topics on **AI, IoT, Full-stack, ML, Data Science**, etc.

This issue carries detail about one of the new centre: NIELIT Haridwar. It was set up in 2016 and is conducting various high-end training, capacity building & skill development programmes in the areas of Electronics and Information Technology. They have an area of excellence in -Data Science, Machine Learning, IoT, Embedded system, Data Analytics and Cloud computing etc. More detail is provided inside.

Hope the readers would enjoy reading the news updates and articles. I take this opportunity to request the readers for their valuable feedback at newsletter@nielit.gov.in

Happy reading!

(Dr. Yumnam Jayanta Singh)
Director/Scientist-F

What is Inside

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News from NIELIT Headquarters

Revision of NIELIT 'O' and 'A' Level Syllabus in IT

NIELIT offers a number of non-formal long term courses out of which O-Level and A-Level in Information Technology Courses are the most popular and are being offered across the country. The need of industry has changed now with the availability of new and advanced technologies and tools leading towards change of job roles. Moreover, the digital initiatives taken by the Government have also changed the way the business is taking place these days. These factors prompted NIELIT to put in efforts towards revision of its courses. A Syllabus Committee was constituted comprising experts in the subject who took up the job rigorously and the syllabus have been revised for the 5th time.



Training of Trainers in IoT Applications

The new revised syllabus is designed to enhance the skills of students at par with the industry demands as it includes courses on many emerging technologies like IoT, Artificial Intelligence, Python etc. In this regard, NIELIT is in process of creating a pool of experts from its own manpower resources who would engage in training of Trainers of its Accredited Institutes. The training of Master Trainers on IoT Applications was conducted at NIELIT Calicut during 26-30, August 2019. Officials from many NIELIT Centres participated in the training program. Also, the Training of Master Trainers in Python Language was organized by NIELIT Chandigarh at Kurukshetra Centre during 9-13, September, 2019 in which Officials from many NIELIT Centres participated. The Master Trainers of NIELIT in Python and IoT are ready to further train the Accredited Institutes now on demand basis.



Training of Trainers in Python Programming

Teaching in new syllabus has already been commenced and the first exam on revised syllabus will be held in July 2020.

Major Transformation

Old Syllabus

O Level was not complete sub set of A Level

Programming in C Language

Conceptual learning, but no specialized area in emerging technology

New Syllabus

O Level (IT) is a subset of A Level (IT). Hence, the A Level (IT) students will be awarded O Level (IT) Certificate on clearing of requisite modules

Programming in Python Language in line with recent market demand

Along with conceptual learning specialized areas can be chosen based on one's interest. Specialized areas includes Data Analytics, Web Application Development (full stack), Information Security, IoT, Artificial Intelligence

The completion certificate of A Level (IT) will only be awarded after formal Graduation.

News from Agartala Centre

Inauguration of Skill Development Training by Hon'ble Minister of Tribal Welfare Department of Tripura



NIELIT Agartala in association with Tribal Research & Cultural Institute (TR & CI), under the aegis of Tribal Welfare Department, Govt. of Tripura, inaugurated Skill

Development Training Programme for their employees on 22.07.2019. Shri Mevar Kumar Jamatia, Hon'ble Minister of Tribal Welfare & Forest Department, Govt of Tripura inaugurated the training in presence of Shri Anurag Mathur, Director I/C NIELIT Agartala and other guests.

Two MoU with Polytechnic Institute



An MoU has been signed between NIELIT Agartala and Women's Polytechnic on 23.08.2019 for skill Development Trainings for students, Faculty Development & Knowledge Exchange Programs for Research & Development. The MoU was signed by Shri Niladri Das, Scientist-D and Dr. Tirtharaj Sen, Principal, Women's Polytechnic. Second MoU was signed with TTAADC Polytechnic Institute, Khumulwng, on 28.08.2019.

3 Days Skill Development for Tripura Government Officials

Three days Skill Development training was held for the State Govt Officials on Digital Payment, e-Governance, Information Security Management & Cyber Security at NIELIT Agartala during 05-07 November 2019 in Association with Directorate of Information Technology, Govt of Tripura. Nearly 75 Govt officials from various Dept of Tripura joined the training. Also, various skill development short term courses sponsored by Urban Development Deptt, Govt of Tripura under National Urban Livelihood Mission (NULM) were commenced on 11.11.2019.

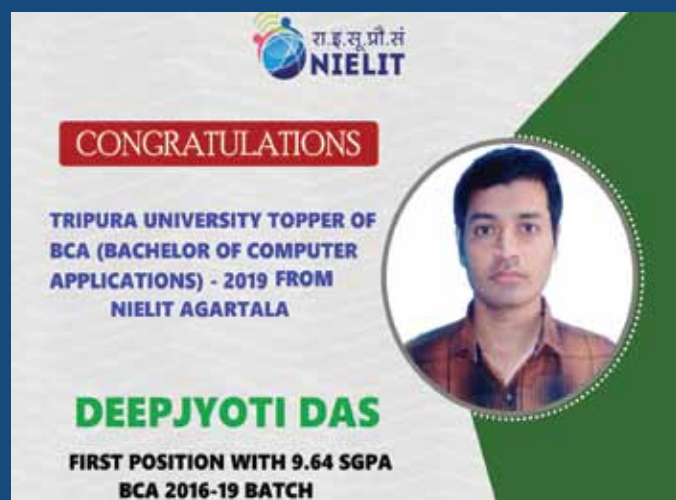


5 days Cyber Security Workshop



A Five Days' Workshop on Cyber Security in the field of ICT under ISEA Project Phase II was conducted for the staff members of Michael Madhusudan Dutta College, Sabroom, South Tripura w.e.f 25.11.2019. Similarly, a Three Day Workshop was started at for the staff members of Ambedkar College, Fatikroy, North Tripura w.e.f 27.11.2019.

Congratulations to NIELIT Topper!



IT Literacy for School Children



IT Literacy Training on CCC for the students of 5 (five) schools run by TTWREIS (Tripura Tribal Welfare Residential Educational Institutions Society) under Tribal Welfare Dept, Govt of Tripura situated at far-flung corners of Tripura were commenced on 6th December 2019.



News from Aurangabad Centre

National Workshop on Medical Electronics and Industry 4.0



NIELIT Aurangabad and Dr. Babasaheb Ambedkar Marathwada University (BAMU), Aurangabad jointly organized a one day workshop on “Medical Electronics and Industry 4.0” sponsored by MeitY on 09.11.2019 at the auditorium of BAMU Campus, Aurangabad. Dr. Sulabha Ranade, DG, SAMEER, Dr. N R Munirathnam, DG CMET, Shri CP Tripathi, Advisor of Bajaj Auto Limited and Dr. Pravin S Wakte, Pro Vice Chancellor, BAMU were the dignitaries present at the inaugural session. Dr. Sanjeev Kumar Gupta, Executive Director, NIELIT Aurangabad delivered the welcome address. Shri. Ajay Prakash Sawhney, IAS and Secretary MeitY could not attend the session due to his

emergent pre-occupancy, however his message was read out by Dr. B M Baveja, Former Group Coordinator, MeitY.

The panel discussion on Medical Electronics was chaired by Dr. Sulabha Ranade, DG SAMEER. Shri Suresh Todkar of SS Controls, Aurangabad was the convenor for the session. Detailed discussions were held to promote collaboration between Industry, Academia & Government R&D Institutions and to highlight job opportunities for the students of the region.

The panel discussion on Industry 4.0 was chaired by Dr. Huzur Saran, Professor, IIT, Delhi. Dr. Mukund Kulkarni, Director, Expert Global Solutions & EC Mobility Aurangabad was the convenor for the session. The Cyber Physical Systems, Business opportunities and various other aspects of Industry 4.0, Cyber Security aspects related to working of Smart Car, Aeroplanes, the complicated concepts of Robotics, 5G and various other technologies, Industrial revolutions, work being done by NIELIT in the area of Industry 4.0, Robotics, 3D printing, how Industry 4.0 as a disruptive technology is impacting almost every aspect of our day-to-day life, Driver Less car etc. were highlighted during the panel discussion on Industry 4.0.

Solar Lamp Assembly Workshop



NIELIT Aurangabad organised a workshop on 2nd October on SoULS (Solar Urja through Localisation for Sustainability) under the agenda “Energy Swaraj” in coordination with IIT Bombay. Over 50 students from NIELIT Aurangabad and other Engineering Colleges across the city participated in the ‘Solar Student Ambassador’ workshop where they learnt to build solar LED lamps. The trainers/Guides for this workshop were the members of faculty of NIELIT Aurangabad under the guidance of Professor Shri Chetan Solanki, Energy Science Department, IIT Bombay and Principal Investigator, SoULS. Dr. Sanjeev Kumar Gupta, Executive Director addressed the students during the workshop and stressed the need to create awareness of solar energy among college students.

Visitors from BDR Thermea Group Netherlands

During their recent trip to Aurangabad, Mr. Leo Verschoor, Project Manager, BDR Thermea Group Netherlands and Mr Joey Wils, Commercial Director, Exes Group B.V. Netherlands visited NIELIT Aurangabad. They visited various Labs of the Centre and appreciated the work being done by the students of the Centre.



Job Fair

Job Fair 2019 was held at NIELIT Aurangabad on 28.11.2019 organised by Model Career Centre NIELIT Aurangabad & National Career Service, Ministry of Labour and Employment, Government of India in association with MAGIC Bus India Foundation Aurangabad. Around 28 companies from Pune, Mumbai and Aurangabad participated in the event. Around 300 candidates attended the job fair and 215 candidates were selected.



TEDx NIELIT Aurangabad



NIELIT Aurangabad hosted TEDx NIELIT Aurangabad on 17.11.2019 at Deen Dayal Upadhyay Auditorium, Dr. B.A. Marathwada Univeristy, Aurangabad. The theme of the event was "Incredible India". The nine speakers at the

function were Smt. Triveni Acharya (Anti human trafficking Crusader, Mother to thousand); Shri Ranjit Srivastava (Developer of world's first Hindi speaking Humanoid Robot "Rashmi"); Shri Harshvardhan Shahi (Founder of Aurangabad Food explorer and food blogger); Shri Akash Dodeja & Ms. Simran Dhanwani (YouTuber Fame Ashish Chanchalani Vines); Arpit Bhalla (Activist, Founder of The Quart Project, LGBTQ); Ms. Chhavi Kohli (Indian born fencer and President Aawardee); Ms. Nimisha Dharukar (RJ Nimmi) and Shri Sandeip Vishnoi, (Founder and president of Indian left hander club). Dr. Sanjeev Gupta, Executive Director NIELIT gave the introductory speech. All the speakers gave motivational talks and shared their inspiring stories.

CVO NIELIT reviews Aurangabad Centre

Shri. Prafulla Kumar, Scientist G & Senior Director, MeitY & Chief Vigilance Officer, NIELIT visited NIELIT Aurangabad on 15.11.2019. He enlightened the staff and students of NIELIT Aurangabad on the various aspects of Security Policy, Salient features of IT Act, Compliance & Assurance and Legal Framework, Security Incident – Early Warning & Response, International Collaboration in a simplistic manner. He spoke about various section in IT Act pertaining to Civil Offences, Criminal Offences, Sensitive Personal Data Protection, Critical Information Infrastructure among others.



NIELIT AURANGABAD IN PRESS

आदर्श गावकरी 13 November 2019

एनआयईएलईटी कार्यशाळेची सांगता

नवीन प्रौद्योगिकी आणि त्याची वास्तविकता यांचा अभ्यास करताना एनआयईएलईटी आणि त्याच्या सहकार्यांनी आयोजित केलेल्या कार्यशाळेचा आख्येचा दिवस झाला. या कार्यशाळेचे उद्घाटन करताना डॉ. सज्जव गुप्ता, एनआयईएलईटीचे निदेशक, यांनी या कार्यशाळेचे उद्देश्य आणि महत्त्व याबतून विचार केला. त्यांनी म्हणले की, एनआयईएलईटीचे उद्देश्य म्हणजे देशातील तरुणांना नवीन प्रौद्योगिकी आणि त्याच्या वास्तविकता यांचा अभ्यास करताना त्यांच्या कौशल्याला वाढवणे आणि त्यांच्या जीविकेसाठी त्यांना संधी उपलब्ध करून देणे. या कार्यशाळेचे आयोजन डॉ. सज्जव गुप्ता, एनआयईएलईटीचे निदेशक, यांनी केलेले होते. या कार्यशाळेचे उद्घाटन करताना डॉ. सज्जव गुप्ता, एनआयईएलईटीचे निदेशक, यांनी या कार्यशाळेचे उद्देश्य आणि महत्त्व याबतून विचार केला. त्यांनी म्हणले की, एनआयईएलईटीचे उद्देश्य म्हणजे देशातील तरुणांना नवीन प्रौद्योगिकी आणि त्याच्या वास्तविकता यांचा अभ्यास करताना त्यांच्या कौशल्याला वाढवणे आणि त्यांच्या जीविकेसाठी त्यांना संधी उपलब्ध करून देणे.

Lokmat Times 6 November 2019

Lokmat Times 11 November 2019

Workshop on medical electronics and Industry 4.0 concludes

The National Institute of Electronics and Information Technology (NIELIT) Aurangabad (NIELIT) and the Maharashtra State Electronics and Information Technology (MSEIT) jointly hosted a one-day workshop on Medical Electronics and Industry 4.0 of the electronic industry, held on Saturday at NIELIT Aurangabad. The workshop was inaugurated by Dr. Sanjeev Gupta, Executive Director, NIELIT Aurangabad. He emphasized the importance of medical electronics and Industry 4.0 in the current scenario and urged the participants to focus on these areas for their career growth. The workshop was attended by students and faculty members of NIELIT Aurangabad and MSEIT. It was a fruitful session where participants gained valuable insights into the latest trends and technologies in medical electronics and Industry 4.0.

Lokmat Times 27 November 2019

Lokmat Times 18 November 2019

Well-known speakers share experiences at 'TEDxNIELIT'

A group of well-known speakers shared their experiences and insights at the TEDxNIELIT event held at Deen Dayal Upadhyay Auditorium, Aurangabad. The speakers included Smt. Triveni Acharya, Shri Ranjit Srivastava, Shri Harshvardhan Shahi, Shri Akash Dodeja, Ms. Simran Dhanwani, Arpit Bhalla, Ms. Chhavi Kohli, Ms. Nimisha Dharukar, and Shri Sandeip Vishnoi. They discussed various topics related to social issues, technology, and personal growth. The event was moderated by Dr. Sanjeev Gupta, Executive Director, NIELIT Aurangabad. The audience was highly engaged and enjoyed the talks. The event was a great success and provided a platform for the speakers to share their experiences and insights with the audience.

Lokmat Times 29 Nov. 2019

Meet on 'Medical Electronics and Industry 4.0' on November 9

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Lokmat Times 13 Nov. 2019

215 landed jobs at NIELIT fair

The National Career Service of Ministry of Labour and Employment, Model Career Centre of the National Institute of Electronics and Information Technology (NIELIT) and Magie Inn India Foundation jointly hosted Job Fair 2019 at NIELIT Aurangabad. A total of 280 job-seekers, who have passed 10th, 12th, ITI, diploma, degree, postgraduate courses in engineering, participated in this fair. Of them, 215 were selected. More than 28 companies from Pune, Mumbai, Aurangabad, including Global, Auto Ancillary Pvt Ltd, Laxmi Agni Pvt Ltd, VMS Multi Services, Naukri.Com, Shine.Com, Marathwada Auto Components Pvt Ltd, Wajuh Media House, Techpointe Wajuh, Varroc Engineering Pvt Ltd and Doot Transmission participated. Assistant director of technical education Anand Pawar and Dr. Sanjeev Kumar Gupta (executive director, NIELIT) inaugurated the fair. Dr. Anil Jadhav, Lakshman K. Zaidi, Kapadi, Vishal Ghavale and others were present.

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Lokmat Times 13 Nov. 2019

NIELIT presents degrees to B Tech, M Tech students

The National Institute of Electronics and Information Technology (NIELIT) Aurangabad (NIELIT) presented degrees to B Tech and M Tech students. The ceremony was held at NIELIT Aurangabad. The students were awarded their degrees by Dr. Sanjeev Gupta, Executive Director, NIELIT Aurangabad. The ceremony was attended by the students, faculty members, and guests. It was a proud moment for the students and the institute. The students were highly motivated and happy to receive their degrees. The ceremony was a great success and provided a platform for the students to showcase their achievements.

Lokmat Times 29 Nov. 2019

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आदर्श गावकरी 4 October 2019

गांधी जयंती निमित्ताने निलिडमध्ये स्वच्छता मोहीम

अहमदाबाद : राष्ट्रपिता महात्मा गांधी आणि भारताचे दुसरे पंतप्रधान लाल बहादूर शास्त्री यांची जयंती निमित्ताने मोठ्या उत्साहात साजरी करण्यात आली. गांधी जयंती निमित्ताने सायकल रॅली आणि स्वच्छता मोहीम राबविण्यात आली.



News from Calicut Centre

Customized Training on IoT with Rasperry Pi

NIELIT Calicut Conducted Customized Training on IoT with Rasperry Pi during 14-18 October 2019. Candidates from Electrical Engineering Department of Deenbandhu Chhotu Ram University of Science and Technology, Murthal, Sonipat, Haryana attended the Training. The topics covered include Python Programming, Rasperry PI, Sensors, IoT Protocols and Cloud Platforms.



Training on Solar Power Plant System Design



A one week customized training on Solar Power Plant System Design was conducted for 28 students of M.Tech from National Institute of Technology (NIT), Calicut during 9-13, December 2019. The course mainly dealt with Designing, Installation and Sizing of Solar power systems including case study on 10kW and 40kW solar power plant. The training programme was handled by Shri. Mohan C, Scientist/Engineer 'D'.

Model Career Centre

The Model Career Centre at NIELIT, Calicut conducted a seminar on exam preparation tips, motivation, career guidance and NCS awareness for Class 9th and 10th students of Ansar English Medium School, Karuvampoyil, Calicut on 25.11.2019. The session was conducted by Mr. Justin Joseph, Young Professional from Ministry of Labour and Employment, Govt. of India. Earlier, similar workshops were also conducted for students of St. Joseph's College Devagiri, Calicut and Government ITI, Chathamangalam.



News from Chandigarh Centre

MoU with Punjabi University



NIELIT Chandigarh, Ropar Campus has signed a memorandum of understanding (MoU) with the Punjabi University, to promote the use of advanced technologies in IT and electronics. The MoU will enable Punjabi University and NIELIT to work together in areas of advanced technologies in the Punjab Region. The agreement will facilitate the training of students of Punjabi University affiliated colleges by NIELIT in the advanced technologies.



Addl. Secretary & Financial Advisor, MeitY visits NIELIT Centre

Additional Secretary and Financial Advisor (ASFA), MeitY, Mrs. Jyoti Arora visited NIELIT Chandigarh at its Chandigarh location. She had a meeting with the Additional Directors and advised on various issues related to Finance and administration. She interacted with the students also who were undergoing refresher course in Big Data and Python with Machine Learning.



Workshop : Python with Machine Learning and Arduino & Raspberry Pi



A workshop on "Implementing MOOCs Using Moodle for an Educational Institution" for 40 faculty members of ASBASJSM College, Bela, Ropar was conducted on 27.11.2019. A 5 Day workshop was conducted on Python with Machine Learning and Arduino & Raspberry Pi for Electrical Engineering Students of DAV Institute of Engineering and Technology, Jalandhar. Also, One Day workshop on Python and Machine Learning and Internet of Things was conducted for the faculty and around 200 students of MCA and BTech of Institute of Engineering and Technology, Bhaddal. Ms Anita Budhiraja, Dr Sarwan Singh, Mr Akhil and Mr. Ravi Kumar conducted the workshops.

Awareness Programmes for NIELIT Courses

NIELIT Chandigarh officials visited Bee Kay Nursing College, Ropar on 08.11.2019 to apprise around 30-35 nursing students about digital literacy courses and other NIELIT courses. In another event, around 70 BCA students of Government College, Ropar visited NIELIT Chandigarh. They were counselled by Shri Deepak Wasan, Addl. Director about the practical aspect of NIELIT courses.



Workshop for Senior Citizen

NIELIT Chandigarh was a part of the Council of Senior Citizens Meeting in Ropar. The staff of NIELIT apprised the Senior Citizens about the various facilities available at NIELIT Chandigarh, permanent campus at Ropar.



Career Counselling



NIELIT Chandigarh in association with Employment Exchange conducted a mass counselling session for the school students on career counselling and enhancement of employment. Ms Meenu Dhir and Mr Ravi Kumar Ravi participated in the counselling sessions.

5 days Capacity Building for Government Officials on Embedded System Design & Application

NIELIT Chandigarh organized a 5 days Training Programme on "Embedded System Design & Application" for Defence Research and Development Organization (DRDO) officials at its Ropar Campus.





News from Delhi Centre

Career Conclave 2019



NIELIT Delhi Centre participated in Career Conclave 2019, organized by Directorate of Education, Govt. of NCT of Delhi, from 21-25 October, 2019. About 80,000 Class 12 students from various Govt. schools attended the event. Students were enlightened about various courses and activities of NIELIT and the career options available after undergoing NIELIT courses. Students were also educated about various government schemes like SCSP/TSP and DGE in which course can be pursued free of cost for weaker section.

Training for Directorate General of Resettlement

NIELIT Delhi Centre conducted 7th batch of Defence Personnels sponsored by Directorate General of Resettlement (DGR) on Certified Multimedia Developer (NSQF Level-5). About 40 JCOs/OR participated in this program. All successful participants were given certificates.



तिमाही हिन्दी कार्यशाला



दिनांक 18 दिसंबर 2019 को दिल्ली केंद्र में प्रभारी निदेशक श्री शमीम खान की अध्यक्षता में तिमाही हिन्दी कार्यशाला आयोजित की गई। कार्यशाला का विषय था “हिन्दी की बात हिन्दी के साथ”। इस अवसर पर उपस्थित सभी अधिकारियों एवं कर्मचारियों को विभिन्न हिन्दी शब्दों के प्रयोग तथा राजभाषा नियमों की विस्तार से जानकारी दी गई।

News from Gangtok Centre

Training on Python and Internet of Things (IoT)

NIELIT Gangtok Centre conducted Training on Python and Internet of Things (IoT) using Arduino and Raspberry Pi during the winter vacation (December 2019-January 2020). The training was attended by the students of Centre for Computers and Communication Technology (CCCT), Chisopani, South Sikkim and Advanced Technical Training Centre (ATTC) – polytechnics under HRDD, Govt. of Sikkim and other colleges including NIT Sikkim, SRM University -Sikkim and Sikkim Manipal Institute of Technology (SMIT). The students demonstrated various innovative applications of IoT devices developed by them in the valedictory session in presence of Shri. Partha Pratim Ray, Assistant Professor, Sikkim Central University; Shri. Arup Chattopadhyay, Director-Incharge, Shri Khagendra Sharma and other senior officers of NIELIT Gangtok.



News from Imphal Centre

Executive Committee Meeting



The 18th Executive Committee (EC) Meeting under the Chairmanship of Shri Th. Prameshwor Singh, ED, NIELIT Imphal was held on 07.11.2019. Shri E. Ibocha Singh, Director, Science & Tech. Govt. of Manipur, Prof. O. Imocha Singh, HoD Computer Sc. Manipur University, Shri N. Hareshwor Singh, MD, MANITRON, Shri Nambam Deben Singh, Director, DIT, Govt. of Manipur attended the meeting as Members of the Committee. Shri Janak Raj, Registrar and Shri Himanish Roy, AD(F) of NIELIT HQ attended the meeting through VC.

Foundation Day cum Freshers Meet 2019

The 31st Foundation Day cum Freshers Meet 2019 was held on 01.10.2019 at NIELIT Imphal, with Prof. (Dr.) T.G. Sitharam, Director, Indian Institute of Technology, Guwahati, Shri E. Ibocha Singh, Director, Science & Technology, Govt. of Manipur and Shri Th. Prameshwor Singh, Executive Director, NIELIT Imphal as the Chief Guest, the Guest of Honour and the President respectively. Various items of cultural group dance were performed by staff and students on the day.



Training for Visually impaired persons in Manipur



The inaugural function of Training for Visually impaired persons on NIELIT's CCC & Soft Skill Course was held in the Welfare Association for the Blind, Takyel on 27.12.2019. The function was graced by Shri Th. Prameshwor Singh, Executive Director, NIELIT Imphal, Dr. Sanasam Ranbir Singh, Associate Professor, C. Sc. Deptt., IIT, Guwahati, Smt. Mutum Santi Devi, Member, MBCWWB, Deptt., of Labour, Govt. of Manipur & Shri Y. Subhaschandra Singh, Addl. Director(Tech.).

PMKVY Skill Development Training - UPS, Inverter and Solar Panel Installation

Online theory assessment session for the PMKVY Skill Development courses on Field Technician – UPS and Inverter (22 candidates); Mobile Phone Hardware Repair Technician (30 candidates); and Solar Panel Installation Technician (23 candidates) were successfully held in November 2019.



Ningol Chakouba 2019 – a Cultural Festival of Manipur for Women



Ningol Chakouba is one of the biggest festival of Manipur especially for women. The celebration of Ningol Chakouba 2019 for the women employees of NIELIT Imphal and its Extension Centres was organized by male staff at NIELIT Imphal on 9th November, 2019. The festival is a celebration of the loving bond between brothers and sisters that gives an opportunity to strengthen ties inside the family.



e-Waste Management Workshop

An awareness workshop conducted on e-waste management by Shri Th. Imopishak Singh, Sc-D, NIELIT Imphal and Smt. Monita Wahengbam, Sc-C, NIELIT Senapati Extension Centre was held on 21.10.2019 as a part of Swachhta Hi Seva. A total of 150 including staff and students participated the programme.



Career Guidance

One Day Workshop on "Career Guidance & National Career Service" was organised by Liberal College, Luwangsangbam in collaboration with MCC, NIELIT Imphal on 22.10.2019. A total of 128 students participated in the workshop.



Placement Drive



11 candidates out of 24 for the 8th batch of TCS Free Employability Training at MCC, NIELIT Imphal got selected in the TCS placement drive held on 21st October, 2019. Prasenjit Dey, HR, Team Lead TCS conducted the interview.

Internal Capacity Building for NIELIT Officials during October-December 2019

Sr. No.	Official of NIELIT Centre	Name of Official	Course	Duration
1	Gorakhpur	Shri Mallikarjuna.S	5G Technology	16-20 December
2	Aurangabad	Shri Yogesh Kumar	AI and Machine Learning	23-27 December
3	Shillong	Mrs Vidhya Vibha	Advancement for Renewable Energy Integration Systems	4-13 December
4		Mrs Ngangbam Saritamala Devi		
7	J & K	Shri Lokesh Dogra	Cloud Computing	14-20 September
8		Shri Rajneesh Raina		
9	J & K	Shri D.S. Oberoi	Information Security	28 Oct' - 15 Nov'
10	Ajmer	Shri Sher Singh Solani	IoT Applications	26-30 August
11	Itanagar	Shri Anil Kumar Shaw		
12	Kurukshera	Shri Jitesh Kumar Prajapat		
13	J & K	Shri Jasvinder Singh,	Machine Learning and Data Analytics using Python	9-13 September
14		Shri Ravi Rastogi		
15	Aurangabad	Mrs. Seema A V	National Level Training Program on Library Automation and Digitization	2-6 December
16	Ajmer	Shri Sher Singh Solani	Python Programming	16-20 September
17	Itanagar	Shri Gordon Kynsai Nongknrih		
18	Aurangabad	Shri Bhaskar Chaturvedi	VLSI Chip Design Hands-on using open source EDA	16-20 December
19		Shri Saket Kumar Yadav		
20		Shri Suryacharan Paidipalli V V		
21	Chandigarh	Ms. Anita Budhiraja	Designing and Development of MOOCs	5-10 November

Setting up of a NIELIT Centre at the holy city of Haridwar was announced by Hon'ble Minister, Electronics & Information Technology in 2016. Subsequently, Hon'ble Chief Minister of Uttarakhand, Shri Trivendra Singh Rawat handed over the letter of possession of about 8000 sq.ft. built-up space in the building campus of Government Polytechnic, SIDCUL, Haridwar in June 2017 wherein NIELIT Haridwar Centre has been setup with the latest infrastructure and facilities. The Centre became functional from December 2017 and is conducting various high-end trainings, capacity building & skill development programmes in the areas of Electronics and Information Technology.



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COURSES OFFERED

- 🌐 National Skill Qualification Framework (NSQF) aligned courses
- 🌐 Non-Formal Courses such as 'O' & 'A' Level in IT and 'O' Level in Computer Hardware & Maintenance
- 🌐 Digital Literacy Courses such as ACC, BCC, CCC, CCC Plus and ECC
- 🌐 Short-Term Courses in Advanced Technologies such as IoT, Python, AutoCAD, Web Designing, MATLAB, Android, Artificial Intelligence, Machine Learning and Data Science etc
- 🌐 Summer/Industrial/Project Training for Engineering & MCA students

AREA OF EXCELLENCE

Data Science & Machine Learning

Embedded System & IoT Applications

Big Data Analytics

Cloud Computing

HARIDWAR

ASSOCIATION WITH PRESTIGIOUS INSTITUTIONS



- Signed MoU with **Lal Bahadur Shastri National Academy of Administration (LBSNAA), Mussoorie** for providing technical support under Facility Management Project.



- Signed MoUs with **THDC-Institute of Hydro-power Engineering & Technology (IHET), Tehri** and **Institute of Technology (IT), Gopeshwar** for conducting Advanced Training programmes, Summer/Industrial Training programmes for their students and FDPs for their faculties.



HIGHLIGHTS & ACHIEVEMENTS

- Conducted Digital Literacy Certification examinations for more than **1.33+ Lakh candidates** in uttarakhand since January 2018.
- Conducting training for more than **300 students** in various long term courses such as NSQF aligned 'O' & 'A' Level courses and short term courses in advanced technologies.
- Conducted **20+** awareness workshops on E-Waste Management, Digital Payment Awareness and Information Security for more than **200+** government officials, **1000+** students & teachers of leading Colleges/Universities/Schools.



Govt. Polytechnic, Haridwar



Tibetan ITI, Dehradun



GKV, Haridwar



Govt. School of Nursing, Haridwar

AWARENESS WORKSHOPS



THDC-IHET, Tehri



Govt. Polytechnic, Haridwar



Chinmaya Degree College, Haridwar



SMJN PG College, Haridwar



News from Kohima Centre

Science Fest 2019 - A 'Scientific Extravaganza' at Nagaland



NIELIT Kohima participated in the second leg of Science Fest 2019, a two-day science fair cum exhibition organised for students, teachers and local community. It was held at G. Rio School Kohima on October 25-26, 2019 motivating the students to be more scientifically aware and motivated. NIELIT Kohima put up a stall for exhibiting its activities & showcasing opportunities in emerging trends like IoT, Information Security, Machine Learning, etc.

Training for the Dept. of Fisheries & Aquatic Resources

A one-day training programme on "e-Mail, Social Network, Digital Payment and Information Security" was organised by NIELIT Kohima on 25.10.2019 for the employees of the Department of Fisheries & Aquatic Resources, Govt. of Nagaland. Basics on email writing and email etiquette, social networking with hands-on learning, modes of digital payment, information security awareness were imparted.



1st PRSG Meeting for Setting up of Digital Forensic Data Centre



The first Meeting of PRSG for project "Setting up of Digital Forensic Data Centre to provide forensic services & virtual training services to NE States" was held at NIELIT Kohima on 02.12.2019. The objective of the project includes setting up of Forensic Data Centre at NIELIT Kohima with latest digital forensic tools and to offer forensic services by sharing the resources in the facility with virtual technology concept for NE States.

Recruitment for Nagaland Government

NIELIT Kohima conducted computer proficiency tests for recruitment to various posts for the Department of Art & Culture, Govt. of Nagaland and also for Administrative Training Institute (ATI), Govt. of Nagaland.

News from Kolkata Centre

Invited Talk on Cyber Security by expert for Plasma Research Centre

An Invited Talk on Cyber Security by Shri Govind Lokhande, Scientific Officer-E of Institute for Plasma Research, an autonomous R&D organization under Dept of Atomic Energy (DAE), Govt of India was organised by NIELIT Kolkata on 18.10.2019. Shri Lokhande spoke about features of data centre - its design, development, security and maintenance, etc. A total of 38 persons attended the programme.



One-day Sensitization Workshop on e-Waste Management



One-day workshops on Capacity Building of Stakeholders on e-Waste Management Rules & RoHS were conducted by the resource persons Shri Kalyan Baital, Sc-C & Shri Bhaskar Banerjee, Sc-C of NIELIT Kolkata at Haldia for 86 participants; at Silioguri for 68 participants; at Chinsurah for 50 participants and at Asansol for 59 participants.



IEEE-iSES 2019 Conference Presentation by Shri Kalyan Baital, Scientist-C

Shri Kalyan Baital, Scientist-C delivered a presentation at the 5th IEEE International Symposium on Smart Electronic Systems (IEEE-iSES) held during 16-18 December 2019 at Rourkela, India. The papers titled "An Architectural Approach for QoS Aware Video Scheduling for Transcoding in Clouds" and "Various Approaches for High Throughput and Energy Efficient Scheduling of Real-Time Tasks in Multicore" published in conference proceedings and also in IEEE Xplore Digital Library.



Skill Development Training at Tier 2/3 City

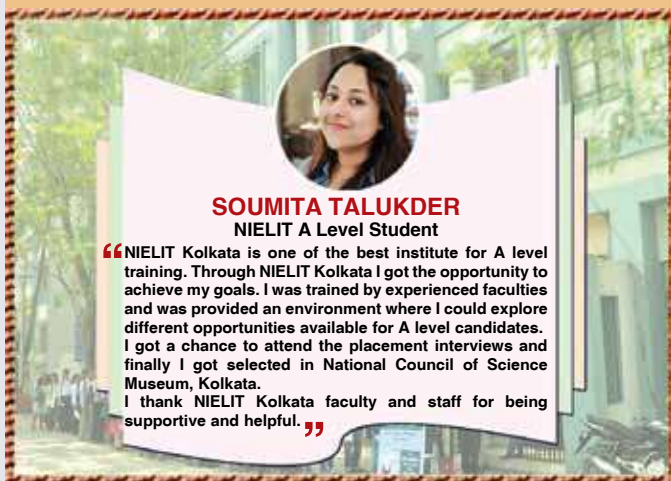
Certificate distribution and Career Guidance Event for Skill Development Training Program at Kharagpur IT Park was organised by NIELIT Kolkata on 06.01.2020 in the presence of officials of Gram Panchayat and local bodies.



Placement Drive

Placement of Students

NIELIT Kolkata A-Level student Ms Soumita Talukder attended placement interviews and has got a placement at National Council of Science Museum (NCSM), Kolkata.



Staff Development Training on VLSI

A Staff Development Training programme on "Introduction to VLSI and Computer Aided Design VLSI" has been organized during 27th to 29th Nov 2019 under the guidance of Shri Kalyan Baital, Scientist-C. Shri Bokka Ravi, Sr. Technical Assistant of the Centre is the Faculty person.



Placement Training by TCS

TCS affirmative action training for third batch with batch size 22 (duration 4th November 2019 to 27th November 2019, 100 hrs training) concluded with distribution of certificates to all the participants.



Seven candidates got selected from the Third Batch conducted under TCS Affirmative Action training at NIELIT Kolkata from 4th to 27th November 2019. The training was coordinated by Smt. Rashmi Mandal (Vijayvergiya), Sc-C and Smt. Sushmita Chaudhuri, Young Professional of Model Career Centre, NIELIT Kolkata.



Winter Training course on 'Machine Learning and Image Processing using MATLAB

The Winter Training course on 'Machine Learning and Image Processing using MATLAB (36 hours)' commenced on 19.12.2019 was conducted by Smt. Sharmistha Bhattacharjee, Scientist-D at Kolkata, JU Campus office.



News from Patna Centre

Information Security Education for CISF

NIELIT Patna in Collaboration with CDAC Hyderabad Conducted workshop on Information Security Education and Awareness at CISF HQs Patna for CISF officials under ISEA project of MeitY.



Training for Bihar Police Officials

NIELIT Patna has started a 35 Days training programme on "Course on Computer Concepts (CCC), Basic Electronics and Communication Technologies" for the employees of Bihar Police. The inauguration ceremony was held at Patna Centre.



Cyber Shikshaa for Women

NIELIT Patna is giving training to girls under the Project Cyber Shikshaa. Registration process is going on to start the course. The Project Cyber Shiksha is launched by DSCI and sponsored by MICROSOFT under their CSR activity. The project is focused onto train the women candidates in Cyber Security and Cyber Forensics. 3 students earlier trained under the projects were also placed in companies namely Skysoft Global and Icare Solutions.

Awareness Workshops for District Officials

NIELIT Patna Conducted workshops on e-Governance and Information Security at various districts namely Bihar Sharif, Araria, Sheohar, Gopal Ganj, Buxar, Bhagalpur of Bihar. Around 550 Officials attended the workshops.



Skill Development Training

Under Skill Development Program, NIELIT Patna is going to start three Courses in the field of Electronics namely Printed Circuit Board Design, Analysis and Manufacturing, Solar-LED Lighting Product (Design and Manufacturing) and Electronic Production Technician. These Courses are Sponsored by Department of Industry, Govt. of Bihar.



TECH वार्ता

MICROCANTILEVER : THE KERNAL FOR MEMS

Micro-Electro-Mechanical Systems, or MEMS, is a technology that in its most general form, can be defined as miniaturized mechanical and electro-mechanical elements (i.e., devices and structures) that are made using the techniques of microfabrication. MEMS sensors and actuators in current trends mostly use micro/nano cantilevers. With the emergence of inexpensive, mass-produced microcantilever promises to bring about a revolution in the field of chemical, physical, and biological sensor and actuator development. The microcantilever responses such as resonance frequency, the amplitude of deflection, Q-factor etc. undergo a considerable change upon exposure to external stimulus. The resonance response variation can be due to mass loading, surface stress, or damping. When used with microwave frequency, inductive and capacitive reactances variation leads to improvement of S-parameters at a particular frequency. When molecules adsorb on surface they can also produce surface stress due to forces involved in the adsorption process and can be observed as changes in deflections of a thin microcantilever. These micromechanical devices are fabricated using standard techniques for mass production of integrated circuits and have the potential to revolutionize both industrial and consumer products by combining silicon-based microelectronics with micromachining technology. In recent years, micromechanical sensors have attracted much attention. Reason for the same is advances in microfabrication technology, which have resulted in improved dynamic response, significantly reduced size, high precision, and increased reliability.

Since, Silicon is widely used within the microelectronics integrated circuit industry; it is well understood and has controllable electrical properties. It is economical to produce single-crystal substrates. A lot of research in silicon provides us with vast knowledge of the material. It's desirable mechanical and electrical properties, availability of existing design tools and fabrication process makes silicon nitty-gritty for development of MEMS using VLSI Technology.

Apart from Bio-MEMS, Microfluidics, MEMS Pneumatics and Optical MEMS, RF MEMS saw amazing growth in the past few years due to its immense commercial and defence potential. The reason is that while there were tremendous advances in GaAs, HEMT devices and silicon CMOS transistors; there was barely an advance in semiconductor switching diodes. The cutoff frequency of silicon CMOS transistors or GaAs HEMT devices, GaAs or InP p-i-n diodes till date has not yet reached to terahertz (THz) level. Thus, a radical new technology was needed to push the cutoff frequency of switching devices to Terahertz frequency range for low-loss applications, and RF MEMS can achieve it. RF MEMS devices are typically fabricated using low-temperature processes and are therefore compatible with post-CMOS, SiGe, or GaAs integration. Since, most of the MEMS switches, varactors, and inductors are surface micromachined, they can even be integrated on glass, quartz, or polished ceramic substrates.

A survey of RF MEMS research leads to four distinct areas, namely: 1. RF MEMS switches, varactors, and inductors. Micromachined transmission lines. 2. High-Q resonators, filters, and antennas. 3. FBAR (thin film bulk acoustic resonators) and filters. 4. RF micromechanical resonators and filters. Let's restrict our talk to RF MEMS Switches. A MEMS switch shown in Fig.1 and an RF MEMS switch designed in simulation software COMSOL Multiphysics shown in Fig.2.

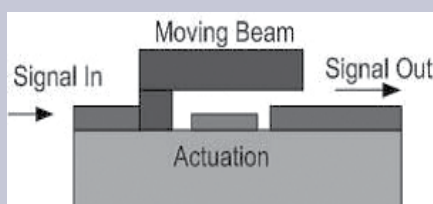


Fig1: RF MEMS Switch



Fig2: RF MEMS Switch simulated in COMSOL

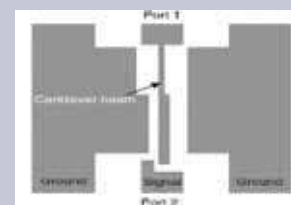


Fig 3: Schematic of a lateral switch (top view)

There are two distinct parts to an RF MEMS switch: the actuation (mechanical) section and the electrical section. The forces required for the mechanical movement can be obtained using electrostatic, magnetostatic, piezoelectric, or thermal designs. The switches can also move vertically or laterally, depending on their layout. A lateral actuation switch is shown in Fig.3.

A cantilever switch can be fixed-fixed beam which forms a capacitive shunt switch, fixed at one end forming a series switch. Both the arrangement can be implemented in lateral switch as well as in vertical switch. Two of the most commonly used switches are shown in Fig.4.

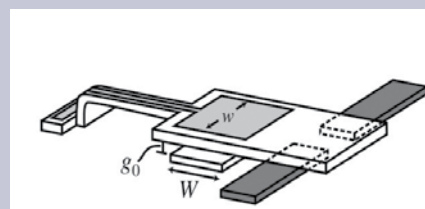
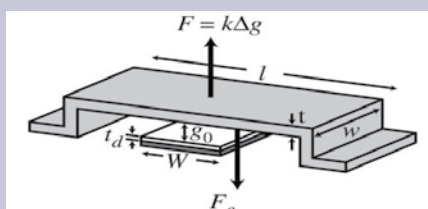
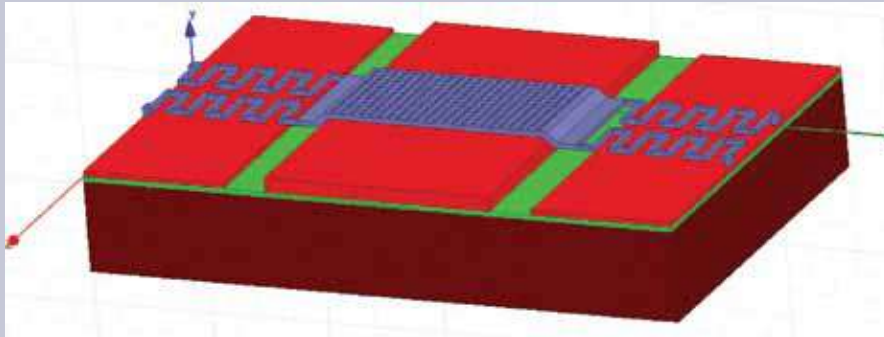


Fig4: MEMS fixed-fixed beam (a) and cantilever (b) with a pull-down electrode.

Most desirable actuation is Electrostatic actuation due to virtually zero power consumption, requirement of small electrode size, use of thin layer, relatively short switching time, need of very small contact forces, and possibility of biasing the switch using high-resistance bias lines. Fig.5 shows the simulation of low actuation voltage RF MEMS switch integrated over Co-planer waveguide designed to work in millimeter-wave range ($>30\text{GHz}$). In many designs, either a thermal actuation coupled with an electrostatic (voltage) hold, or a magnetostatic actuation (current in a coil) coupled with a permanent magnetic field is used. Any switch design has virtually zero power consumption once the actuation happens. Still, they require a substantial amount of current for the switching cycle and, therefore, must be biased using low-resistance (Au or Al) lines. The low-resistance lines need to be coupled with the microwave transmission lines; therefore, a careful design must be done for complicated switching networks.



Low actuation voltage, less insertion loss and very high isolation are desirable parameters for an RF-MEMS switch. The improvement in RF parameters can be achieved by changing the design to control the inductive and capacitive reactances and the improvement in actuation parameters can be achieved through designing the switch using mathematical model to improve mechanical parameters and selection of materials. RF MEMS switches can work for >100 billion cycles under low power conditions, and to billions of cycles under medium to high-power conditions. Advances in material and processes technology, thermal analysis, high-quality dielectric materials, stress control, and mechanical design are reason for the success of MEMS.

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The Deep Web and The Dark Web- The Concept

The deep Web, sometimes referred as the Invisible Web, is the large part of the Internet that is inaccessible to conventional search engines. Deep Web content includes email messages, chat messages, private content on social media sites, electronic bank statements, electronic health records (EHRs) i.e. a majority of vast repository of private content, the records/documents in online databases that general-purpose web crawlers cannot reach. The deep web content is estimated at 500 times that of the surface web but not sure, yet has remained mostly untapped due to the limitations of traditional search engines.

Since most personal profiles, resume, records (public/private) and other people-related documents are stored in databases but are not available on static web pages; most of this higher-quality information about people is simply "invisible" to a general/regular search engines.

The reasons for not indexing this deep Web content are varied. May be the content is proprietary, in that case it can only be accessed by authorized user/ visitors coming in via a virtual private network (VPN). May be the content may be commercial, in that case the information resides behind a member wall and can only be accessed by customers who have paid for charges for that. Or perhaps the content may contains PII (personal identifiable information), and hence is protected under certain regulations and hence can only be accessed to individuals who have got the privileges to do so on the portal. When mashups' have been generated on the fly and information thus created lack a permanent uniform resource location (URL), it becomes the part of the deep Web.

However, there is no clear idea about the size of deep Web, but the estimation by many experts is that search engines can crawl and index less than 1% of the total the total content that can be accessed over the Internet. That part of the Internet which is crawled and indexed by search engines is referred as the surface Web also.



The term "deep Web" was first used by Bright Planet in a 2001 white paper entitled "The Deep Web: Surfacing Hidden Value" and is got confused in the media with the term *dark Web*.

As with deep Web's content; the *dark Web*'s content are also not be accessible by conventional search engines, but the main reason of this content is that the content is illegal..

The content of the deep web can be located and accessed by a direct URL or IP address, but may require a authentication in term of a password or other security access to get past public website.

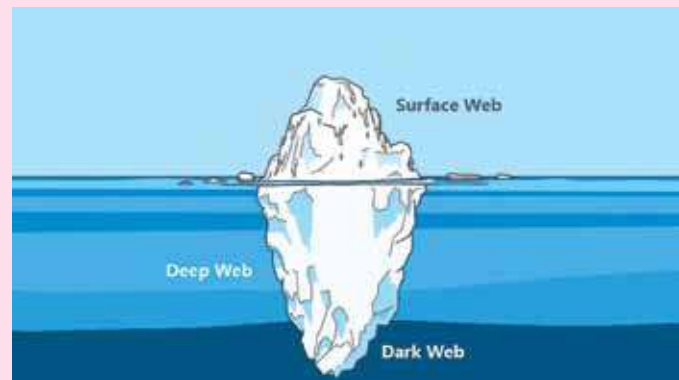


Fig 1. – Surface, Deep and Dark web (Courtesy : Hackernoon.com)

The Dark Web

The dark web has established itself as an online marketplace for illegal/unauthorized goods. Many of the innovations marketed from legitimate online sellers like Amazon and eBay and information like customer reviews and seller ratings, are generally been manipulated to facilitate the sales of black market items.

The dark web also attracts users who seek anonymity when conducting this business. Intentions may be noble, for example a journalists seeking to interview citizens of repressive countries, where communications are monitored. On the negative side, the anonymity on the dark web attracts criminal elements like hackers, drug-dealers, smugglers etc. There is also a growing service economy within the dark web in which hit men and other illegal operatives advertise their services in ways, which is not possible over traditional channels like in pornography.

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Big Data Processing with Balanced Resource Utilization

Introduction

Due to huge increase in generation of data with each day, the collection and analysis of data has become a major research area today [1]. To perform Big Data analytics, Hadoop framework is widely used to manage distributed storage and processing of Big Data. Due to its mechanism of distribution of the data and code across multiple nodes/Virtual machines (VM), it has introduced the challenges in data movement and load balancing among VMs. Random placement of data blocks may result in imbalance of data across VMs and leads to poor performance of the system [2]. The primary intention of this article is to propose a load balancing model through VM migration which adaptively balances the data on each VM by constantly monitoring current memory & CPU utilization which results in increasing the overall performance of the system.

Fig.1. depicts the general architecture of Hadoop with cloud framework in which cloud is setup with various physical machines (PMs) and set of VMs performing the tasks in parallel under each PM [3]. When the load of the PM exceeds a threshold value, the VM is said to overload PM, and the proposed approach migrates the underloaded VM to PM which has overloaded VM and vice versa to balance the load of the system as shown below:

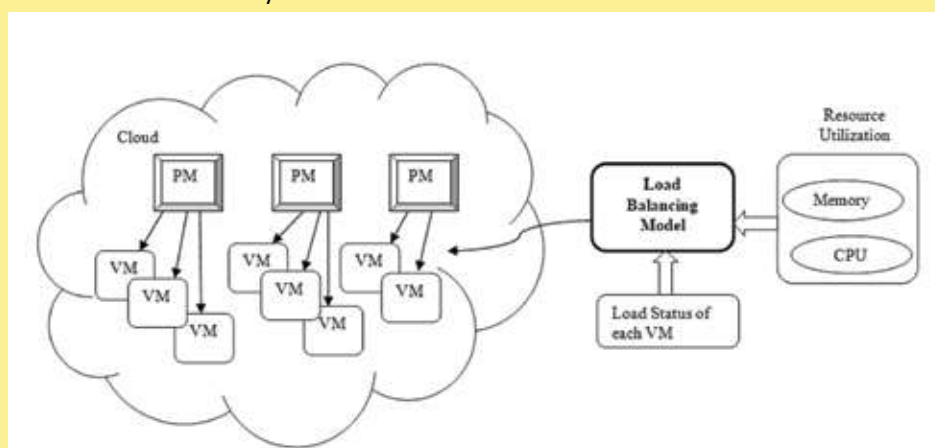


Fig.1. Block Diagram of the Proposed Load Balancing Model

Problem Formulation/ Proposed Work

This article takes into account two types of resources for balancing the load: memory and CPU of the currently running VMs while processing Big Data. Consider that there are total K VMs which are processing Big Data such as $V = \{V_1, V_2, \dots, V_K\}$. Based on memory and CPU utilization, current load of each VM i.e. *Load_factor* is evaluated by using Eq. (1) as shown below:

$$\text{Load_factor}(V_i) = \alpha * (1 - N\text{Mem}_i) + \beta * (1 - N\text{CPU}_i) \quad (1)$$

$$N\text{Mem}_i = \frac{V\text{Mem}_i - \text{MinMem}}{\text{MaxMem} - \text{MinMem}} \quad (2)$$

$$N\text{CPU}_i = \frac{V\text{CPU}_i - \text{MinCPU}}{\text{MaxCPU} - \text{MinCPU}} \quad (3) \text{ Where } 2 \leq i \leq K, K \text{ is number of currently running VMs.}$$

α and β are weightage factors of memory and CPU utilization of VM respectively. $N\text{Mem}_i$ and $N\text{CPU}_i$ are the normalised value of memory and CPU utilization of the i^{th} VM. Since the units of these two resources are different, it is required to normalize these values. For this, maximum feature scaling[4] is used in Eq. (2-3). Furthermore, MaxMem and MinMem are the maximum and minimum current memory utilization amongst all the currently running K VMs; MaxCPU and MinCPU are the maximum and minimum CPU utilization amongst all the currently K VMs which are processing chunks of data. $V\text{Mem}_i$ and $V\text{CPU}_i$ are the values of memory and CPU utilization of i^{th} currently running VM which needs to be normalized. Higher value of *Load_factor* of V_i denotes that V_i is least loaded.

Based on the *Load_factor* value, each VM is categorized into one of the *Load_status* which can be divided such as *Load_status* = {Underloaded, Normal, Overloaded}. The *Load_status* is refreshed after fixed time period T. Based on the *Load_status*, the VM migration is carried out till it becomes Normal.

Conclusion & Future Work

The proposed methodology aims to improve the performance of the system and achieve balanced resource utilization while processing Big Data on cloud environment. The scope for future work includes the implementation of the proposed approach in MATLAB and Hadoop framework and the performance shall be evaluated using number of migrations and resource utilization. The comparative analysis can be done by comparing the performance attained by the proposed approach with that of existing work in [5] and [6].

References

1. Acharjya, Debi Prasanna, and P. Kauser Ahmed, "A survey on Big Data analytics: challenges, open research issues and tools.", vol. 7, no. 2, pp 511-518, 2016.
2. Subhadarshini Mohanty, Prashanta Kumar Patra, Mitrabinda Ray and Subasish Mohapatra, "A Novel Meta-Heuristic Approach for Load Balancing in Cloud Computing", *International Journal of Knowledge-Based Organizations*, vol. 8, no. 1, March 2018.
3. Xu, Gaochao, Junjie Pang and Xiaodong Fu. "A load balancing model based on cloud partitioning for the public cloud", *Tsinghua Science and Technology*, no. 18.1, pp 34-39, 2013.
4. https://en.wikipedia.org/wiki/Feature_scaling
5. Cho, Keng-Mao, Pang-Wei Tsai, Chun-Wei Tsai, and Chu-Sing Yang. "A hybrid meta-heuristic algorithm for VM scheduling with load balancing in cloud computing", *Neural Computing and Applications*, no. 6, pp. 1297-1309, 2015.
6. Jia Zhao, Kun Yang, Xiaohui Wei, Yan Ding, Liang Hu, and Gaochao Xu, "A Heuristic Clustering-based Task Deployment Approach for Load Balancing Using Bayes Theorem in Cloud Environment", *IEEE Transactions on Parallel and Distributed Systems*, vol. 27, no. 2, pp. 305 -316, February 2016.

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Adoption of DevOps in Developing and Deploying Data Science Applications

Introduction

Development methodology to develop and deploy a Data Science application is different from that of a conventional Information Technology (IT) application. The purpose of IT application is to produce a software product that is delivered to client for capturing, processing and generating data. However, Data Science application uses data to extract useful and meaningful information that helps in making business decisions. This article describes the life cycles of a Data Science application and how it is different from normal software engineering practices used in development of IT applications. The



article further describes the model to adopt DevOps in developing and deploying Data Science applications.

Data Science Applications

Data Science is a multi-disciplinary field that extracts knowledge from large amount of complex data varying from structured to unstructured type using statistical and mathematical techniques, processes, algorithms and systems. In other words, Data Science combines domain expertise, programming skills and knowledge of mathematical & statistical techniques to extract meaning and useful knowledge. Data Scientists apply machine learning algorithms on data to develop Artificial Intelligence systems for performing certain tasks that usually humans do. The data can be of any type like number, string, audio, video etc. Few Data Science applications to name are Image Recognition, Speech Recognition, Internet Search, Gaming, Delivery Logistic and Fraud & Risk Detection.

Development of Data Science applications passes through a project life cycle. Different studies and sources show different number of phases in Data Science Project Life Cycle. The count may differ but flow of activities remains the same. A typical data science project life cycle includes 10 phases; Identify the Business Need (Problem to solve with data), Data Collection (Relevant Data as much as possible), Data Preparation (Converts data into desirable form), Data Analysis (applies Analysis Techniques), Feature Engineering (converts raw data into more informative form), Model Building (apply Machine Learning Algorithm), Result Communication (use of suitable Visualization Tools to visualize result), Deployment, Operate and Iterate (Repeat steps as needed to optimize the model for better results).

Developing a Data Science application is different from developing conventional Information Technology (IT) application. IT Application is developed using software engineering practices. The common thing in Data Science and conventional IT Applications is that both require same level of programming skills. Data Science is more on gathering data and analyzing the data frequently for business purpose. However, the purpose of IT application developed using software engineering methodologies is to produce a software product for end-users. This software generates data. Data Science application uses data generated by conventional software to meet business needs. Data Science follows ETL (Extract, Transform and Load) approach while software engineering follows SDLC (Software Development Life Cycle) approach [1]. Another major difference between Data Science application and IT application is that new dataset is added to an existing dataset that may evolve new models. The new models after adding new datasets are made available to users.

It is not possible to get immediate insights from data in Data Science applications. But they need multiple iterations to arrive at a decision. Due to this reason, software engineering methodology is not applied in developing Data Science application. In past, agile methodology was considered for developing Data Science applications. The popular agile methodologies are Scrum, Extreme Programming, Crystal and Feature Driven Development. These methodologies have unique features such as iteration and continuous feedback[2]. Each iteration produces next release based on continuous feedback from all the stakeholders[3]. These two features are required in refining the system [4]. Agile methodology delivers the system using iterative approach but Data Science applications go beyond agility since Data Science applications need data during iteration also. Development of Data Science application requires a model that runs in production environment. The challenge is to get the Data Science application deployed into production environment and making it operational, supportable and iterable. DevOps practices are more relevant to production environment

DevOps

DevOps is derived from two words, Development and Operations. Here, Operation is referred to Information Technology (IT) Operations [5]. The purpose of DevOps is to integrate software development processes, IT Operations and infrastructure monitoring using automated tools [6]. Traditionally, different teams perform different functions like development and deployment. With DevOps, cross functional teams work together continuously to develop, deliver and monitor software products. One of the advantages of DevOps is that the software is continuously developed and delivered. Capabilities and Technologies are two kinds of enabler for use of DevOps. Capabilities enablers include continuous development, integration, testing, release, infrastructure monitoring, infrastructure optimization, feedback, failure recovery and measurement. Technological enabler includes use of automated tools in building, testing, deployment, configuration management and measuring metrics [7].

4. Methodology to Adopt DevOps in Data Science Applications

4.1. Setting up of Development Environment

Data Scientists prefer to solve their problems (business needs) by configuring required tools than to configure entire development environment. Here the role of DevOps team comes into picture. The DevOps team can help Data Science application developer to define tools, configure infrastructure comprising hardware like desktop, software like operating system and tools Jupyter, Tableau and/or Kafta. This environment is used to build model comprising datasets, trained data and algorithms [8-9].

4.2. Setting up of Operational Environment

In this phase, DevOps team keeps track of version control and packages for deployment. Version control tools can be used. After a package comprising trained data, dataset etc. with proper versioning is built, it is time to deploy, operate and monitor Data Science application continuously. DevOps team prepares this operational environment for delivering applications and providing access to users.

4.3. Bridging Gap between Development and Operations

The backbone of DevOps is Continuous Integration/Continuous Deployment (CI/CD) pipeline. CI/CD bridges the gap between development and operations teams by automating build, test and deployment of Data Science applications. CI/CD makes integration and delivery processes simple and repeatable using common repository. Whenever a new dataset comes, this phase helps in building refined model based on existing and new datasets (development). Once new model is build, it is deployed and delivered for use by users. The adoption of DevOps in developing and deploying Data Science applications is demonstrated in Figure 1.

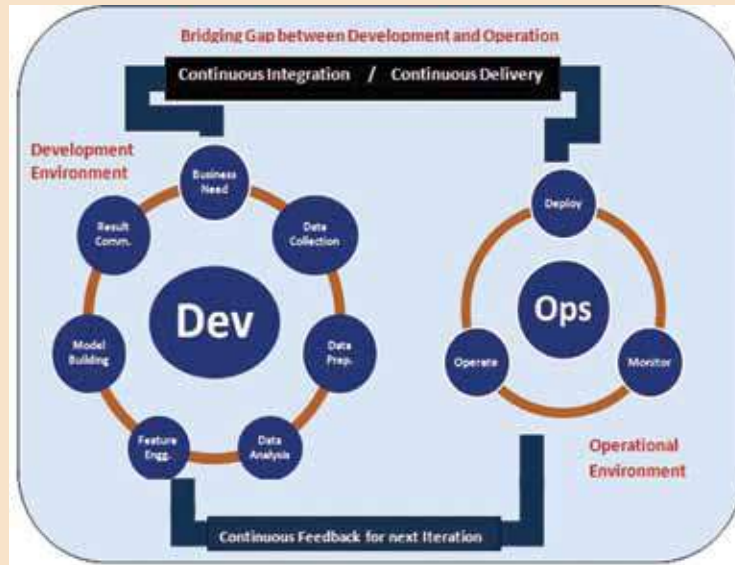


Figure 1: Developing and deploying Data Science application using DevOps

Conclusion

Two major differences have been found in development and deployment of Data Science applications and conventional IT applications. First Data Science applications use data while IT applications generate data. Another difference is that Data Science applications require continuous development and deployment while IT applications do not require such feature. Due to these reasons, different methodology is required to develop and deploy Data Science applications. DevOps methodology provides the environment where applications can be developed and deployed in continuous manner. This methodology also takes care of feedback and iteration. Therefore, DevOps is widely adopted in developing and deploying Data Science applications. The three steps, Setting up of Development Environment, Setting up of Operational Environment and Bridging the Gap between Development and Operation are found helpful for development and deployment of Data Science applications.

References

- [1] Data Science vs Software Engineering | Top 8 useful Comparison available at <https://www.educba.com/data-science-vs-software-engineering/>, last accessed January 4, 2020
- [2] Christoph Matthies, 'Feedback in Scrum: Data Informed Retrospective,' *IEEE/ACM 41st International Conference on Software Engineering: Companion Proceedings*, 2019, PP-198-201
- [3] N. W. Grady, J. A. Payne and H. Parker, "Agile big data analytics: AnalyticsOps for data science," *2017 IEEE International Conference on Big Data (Big Data)*, Boston, MA, 2017, pp. 2331-2339.doi: 10.1109/BigData.2017.8258187
- [4] Vamsi Nelluta, Applying Agile IT Methodology to Data Science Projects, available at <https://www.datasciencecentral.com/profiles/blogs/applying-agile-it-methodology-to-data-science-projects>, last accessed January 9, 2020.
- [5] Data Science, available at <https://www.datarobot.com/wiki/data-science/>, last accessed January 9, 2020.
- [6] C. Ebert, G. Gallardo, J. Hernantes and N. Serrano, "DevOps" in *IEEE Software*, vol. 33, no. 03, pp. 94-100, 2016.doi: 10.1109/MS.2016.68
- [7] Mali Senapathi, Jim Buchan, Hady Osman, "DevOps Capabilities, Practices, and Challenges: Insights from a Case Study," *Proceedings of the 22nd International Conference on Evaluation and Assessment in Software Engineering 2018 Vol. Part F137700* (pp. 57-67). Christchurch, 2019,pp 1-11. <https://arxiv.org/ftp/arxiv/papers/1907/1907.10201.pdf>
- [8] Isaac Socolick, "Applying Devops in Data Science and Machine Learning," available at <https://www.infoworld.com/article/3409620/applying-devops-in-data-science-and-machine-learning.html?upd=1578510218849>, 2019, last accessed January 6, 2020.
- [9] Jankiram MSV, "The Growing Significance of DevOps for Data Science", available at <https://www.forbes.com/sites/janakirammsv/2018/11/04/the-growing-significance-of-devops-for-data-science/#373c18a77481>, last accessed January 6, 2020.

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